

MUSIC Maker



Patrick Moraz

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- ★ Instrument Reviews & MiniSynth Supplement
- ★ Projects: Sweep Equaliser, AMDEK Chorus Effects Kit, ElectroMix 842



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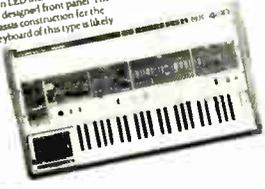
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TEISCO SX-400 POLYPHONIC SYNTH
RRP £1,690 CHASE CASH PRICE £949

The Teisco SX-400 synthesizer is the top model in the Teisco range. It features a 49 note polyphonic keyboard with a memory incorporating 8 preset functions, as well as the facility to programme and memory bank up to 8 of the users own settings. The synthesizer has a wide range of effects more commonly found on higher priced keyboards. The player can see at a glance which preset and effect are switched on by red and green LED indicators which are built into the ergonomically designed front of the keyboard. It has a tough metal chassis construction for the demanding road use which a keyboard of this type is likely to receive.



CRUMAR STRATUS POLY SYNTH
RRP £900 CHASE PRICE £549

SYMPHONIC SOUND!
The Crumar Stratus is the first polyphonic synthesizer that attaches 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 of control. You can trigger a particular effect whenever a new note is played even though other keys are depressed. There are other note worthy qualities to the Stratus like two independent oscillators, continuously variable and invertible envelopes and polyphonic resonances. But we suggest you experience this 'symphonic' sound for yourself as you turn on the power.

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 synthesizers are limited by their 4 or 5 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, alternate between the 480Hz and 500Hz waves all directly from the keyboard.



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RRP £579
CHASE PRICE £249



OCTAVE CAT
RRP £950
CHASE PRICE £399



24dB filter for bigger fatter sound ● 4 function envelope generator ● note generator ● auto repeater or keyboard repeat ● sample and hold circuit ● 5 selectable waveforms ● 3 octave keyboard with bigges fatter sound ● 2 octave capability ● 2 independent oscillators ● 24dB filter for bigger fatter sound ● sample and hold circuit ● note generator ● interfacable with most variable synthesizers

Duophonic synthesizer ● will play 4 notes at a time ● upper and lower voice memories ● 2 oscillators with combable waveforms ● 24dB filter for bigger fatter sound ● sample and hold circuit ● note generator ● interfacable with most variable synthesizers

CRUMAR TRILOGY POLYPHONIC SYNTH
RRP £1300 CHASE PRICE £799

TRIOLOGY
Crumar's Trilogy combines polyphonic synthesizer, orchestra strings and cathedral organ 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, so the professional musician this ideal. Accordingly we have created the most complete polyphonic synthesizer the market would wish to have. Added to these a comprehensive easy to use bank of presets which may also be internally altered to your own taste.

Like a super string section and you have all the ingredients to make the TRIOLOGY live up to our highest expectations.



THE SYSTEM BY OBERHEIM TO SELL AND SERVICE THE PRODUCTS IN THE U.K.

CHASE ARE THE SOLE U.K. AGENTS AUTHORISED BY OBERHEIM TO SELL AND SERVICE THE PRODUCTS IN THE U.K.

THE OBERHEIM SYNTHESIZER PERFORMANCE SYSTEM consists of either the Oberheim OB-Xa or the OB-Xa POLYPHONIC SYNTHESIZER, plus the DEX Digital Drum Machine. You can record notes, punches and drum beats, then play them on stage or in the studio in a solo or a duet mode. The DEX also features a drum sequencer that would take a dozen musicians to pull off conventionally. The OBERHEIM SYNTHESIZER PERFORMANCE SYSTEM makes getting your ideas down faster and easier than ever before.

Program the multi-track DEX directly from the Synthesizer keyboard - record different sections and then merge them together to make the song as long as you change sections, tempo and transpositions in any of 10 different sequences, each with 10 tracks. In addition to all of the voices in the Synthesizer, the DEX also has eight external CV and Gate outputs.

Program the multi-track DEX directly from the Synthesizer keyboard - record different sections and then merge them together to make the song as long as you change sections, tempo and transpositions in any of 10 different sequences, each with 10 tracks. In addition to all of the voices in the Synthesizer, the DEX also has eight external CV and Gate outputs.

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CRUMAR T3 PORTABLE ORGAN
RRP £1,475
CHASE PRICE £449

2, 49 manuals ● 13 tone pedal board ● Servo Centre 50 Whyth flute settings ● Per manual 4-25, 100Hz ● Rotating sound system built in speed and timbre characteristics of the largest organ sound cabinet ● 3 manuals on upper or lower manual ● Separate 16 and 8 strings on upper or lower manual ● Automatic piano and guitar



ARP PIANO
RRP £1,700 Chase Price £849

Fully polyphonic electronic piano ● 4 separate voices selected by quick touch ● 1600 Hz resonance wood keyboard for piano realism ● soft or vibrato ● light weight multipurpose electronic piano in a soft carrying case

ARP SOLINA
RRP £800 Chase Price £349

4 octave fully polyphonic keyboard with violas, violins, trumpets and brass. All mixable to produce unlimited range of sounds including organ, electric piano etc. Separate bass section. Attack and crescendo facility. Interfacable with other synthesizers to produce polyphonic synthesizer sounds. Reduced from over £600 to £299. Carrying case also available for only £20 extra. This is the best bargain we have ever had on offer!

THE SX2000 RRP £300 Chase Price £149



THE SX1000 RRP £300 Chase Price £149



CRUMAR DP/50 PIANO
RRP £1300 CHASE PRICE £849

12 incredible Piano Voices, the ability to create your own and a keyboard response you can tailor to your touch

THE VOICES sound as though they were played on the Crumar DP 50 and you'll discover the world's most popular pianos are at your fingertips. Six preset function in two modes, the first six being more traditional acoustic and electric piano sounds, the second six offering more brilliantly defined sounds not normally associated with acoustically oriented instruments.

FREE SECTION The seventh preset enables you to control our very special Free Filter Section. This section lets you create your own piano sounds, plus many expressive synthesizer voices individually coloured by the energy you dial in to the keyboard.



THE FEEL There are several electronic pianos claiming to be dynamic, but they still do not give you the same playing style and touch should be. Not so with the DP 50. In the back of

THE TOUCH OF A PIANO THE BRAIN OF A SYNTHESIZER

THE CRUMAR PERFORMER Strings and Brass
RRP £500 CHASE PRICE £399

MORE STRINGS, MORE BRASS, MORE GIGS!

Violins, violas and cellos, Trumpets, trombones and French Horns. Synthesizer effects. You can have them all at your fingertips with the Crumar Performer. This incredible range of sounds that you can mix and overlap in any combination. You can make the Performer the most gig producing keyboard on the market. Add a true to life string and brass section tremendously and you have a professional quality instrument. The Performer is priced just right for the working musician. Get your hands on one today.



CRUMAR MULTIMAN S/2 RRP £700 Chase Price £549

One master console on Crumar's versatile Multiman S/2 controls string, bass and piano sounds with a range of 24 filter oscillators. All sounds can be played simultaneously to provide orchestral effects. A split keyboard permits separation of each sound quality on either lower or upper registers. Compact, robust, reliability and a redesigned new look characterise all aspects of this 20kg professional instrument.

CRUMAR ROADRUNNER PIANO
RRP £300 CHASE PRICE £229

The ROADRUNNER 2 has been designed for a colourful new look and positive electronic and mechanical reliability. The features include a new variable 'chorus' effect and accessible pitch control and rainbow tab control for bass and 3 different piano sounds. Still included is the two octave bass extension that can be fed through a separate amplifier to give a 'stereo' effect. For the ultimate in portable pianos, play CRUMAR'S new ROADRUNNER 2 - the first and foremost of its kind.



CRUMAR ROADY PIANO
RRP £400 CHASE PRICE £299

The Crumar Roady is destined to become the electric piano of the 80s. Free full octave of Piano, Vibes and a punchy Bass provide the player with a wide range of possibilities that include millions of Vibes with variable tremolo depth, excitation of popular electric piano, a mellow sound, produce that bring edge to jazz solos.

3 distinctive piano sounds that can be mixed in any combination and can be played on either the left side, the right or across the entire keyboard. Bass that can be played percussively or simultaneously sustained with the Vibes.

The blending of all the Roady's distinct voices in a wide range of proportions possible with three discreet signal outputs. The past is played out. Get your hands on the Crumar Roady today!



HOHNER DUO RRP £455 Chase Price £299

The Hohner Duo is a compact polyphonic keyboard offering four independent sections: BRASS, Two strings with the option of mixing with the other sections, independent attack and sustain and a delayed vibrato option.

HOHNER CLAVINET E7 RRP £225 Chase Price £123

The Clavinet is one of the most popular of the keyboard world. The Hohner Clavinet E7 has been designed to provide the same authentic Clavinet sound as the original. It features a split keyboard with 48 keys and 48 strings. The Clavinet E7 is a compact, portable instrument with a carrying case.

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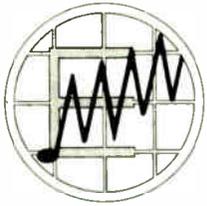
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Editor Mike Beecher

Assistant Editor (Electronics) Kenneth McAlpine

Assistant Editor (Music) Mark Jenkins

Art Editor Pat Haylock

Editorial Assistant Toni Markwick

Secretary Linda Barkass

Consultants

Electro-Music Robert Moog

Hubert Bognermayr

David Ellis

Tony Bacon

Dave Crombie

Alan Townsend

Patrick Moraz

Rick Wakeman

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TRIO ELECTRONICA!

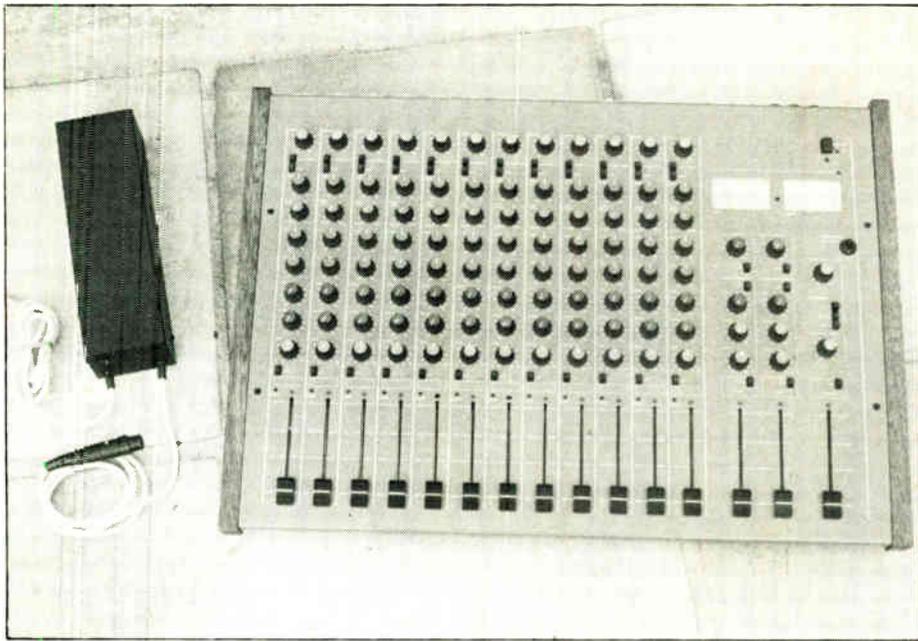
With quite a few notable musicians hard at work in the studios recently, surprise visits from Dr. Moog and Wolfgang Duren (PPG), and an electronic music festival in Austria, it's been a big news gathering time. We're delighted to welcome an exceptional trio who have offered their help as consultants.

First, Dr. Robert Moog, whose historic achievements in the development of the first commercial voltage controlled synthesiser give him a unique experience that now stretches into the development of performance controls. Second, a founder of Ars Electronica, Hubert Bognermayr, whose electronic music studio is based on sampling and treating natural and mechanical acoustic sounds. ('Elektronisches Försterhaus' Studio für computerakustische Musik). At a recent performance of his Erdenklang, he used 3 Fairlight CMI's and other synthesisers played by co-composer Harald Zuschneider, Robert Moog and the third in the trio, Bruno Spoerri. Bruno is likely to expand another area of electro-music in the use of wind instruments. Primarily a saxophonist with his own studio in Zurich, his years of research into utilising electronics with traditional wind instruments as well as playing synthesisers like the Lyricon should encourage many musicians who blow instead of 'tickling the ivories'.

You can look forward to getting their views in future issues, although this month we have an interesting report on Dr. Moog's 'Young Person's Guide to Electronic Music' lectures.

Finally, we're looking forward to meeting our readers at the 'Hands on Show' in London on December 4th/5th. We'll be demonstrating E&MM projects as well as providing lectures on electro-music. Several of our consultants hope to attend to meet you, including Warren Cann and Patrick Moraz, so there should be plenty of music in the air and we'll be inserting your free ticket to the show in next month's issue.

Enjoy creative music!

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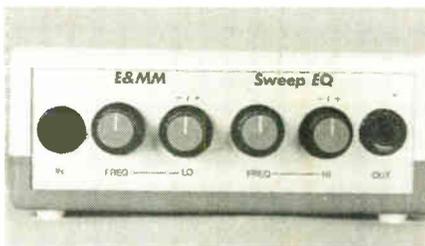
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The second and final
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The second of a series
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A variable 2 band Equaliser
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Send to: Reader's Letters, Electronics & Music Maker
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Vitavox

Dear Sir,

With reference to Sound on Stage by Ben Duncan (E&MM August 1982): it is interesting to see this subject discussed from the viewpoint of the entrepreneur attempting to put a P.A. system together for a band.

Many of these personalities have come to us over the years, and in the early days nobody would believe us when we told them they needed large horns for efficient sound reproduction. Unfortunately, when the penny finally dropped, it dropped into the laps of American driver manufacturers.

There were a lot of UK loudspeaker manufacturers involved in those days and it would have been nice to see a mention for us in an article on British P.A. even if the Americans did win the lion's share of the driver market. Out of interest, back in 1970 when Jim Morris and Bill Kelsey were putting the amazing E.L.P. P.A. system together, they used RCA Bass Horns supplied from Sunbury-on-Thames, driven by Vitavox 15" Cone Loudspeakers, Vitavox 500Hz crossovers, Vitavox 220Hz Multicell Horns with Vitavox S2 Pressure Drivers. They also had American Crown industrial amplifiers and a mixer which I believe Bill himself made.

It may be that during the preparation of this rig the idea of bi-amping was born. Bill noticed that the crossovers

were getting warm and on inspection we found the HF attenuator set to -8dB to balance the extreme efficiency of the S2 and Multicell. The internal resistors were not man enough to handle the power diverted through them (cinema work was never like this) and we had to change them for a mains-dropper!

for Vitavox Ltd.
David Young (M.D.)

Comments Please

Dear Sir,

Just thought I'd write and let you have some of my thoughts on E&MM. Being the only British electronic music magazine in the shops it is obviously the best. However, you could do with taking a few tips from Synapse and Polyphony, both of which I have subscribed to. Both tend to be more 'experimental' and possibly 'technical' than E&MM which seems content to rely on safe articles and projects.

This leads me onto another complaint I have, which is that there appears to be a bias towards keyboard. Whilst I appreciate that there are many keyboard synth players and many keyboard synths, how about aiming your articles at experimental/electronic music in general rather than at keyboard? After all, the word 'synthesiser' was originally used for electronic systems that did not need a keyboard. The keyboard is only one of many possible interfaces that can be

used to control the electronics. My own electronics system is capable of being controlled by guitar, violin, microphone or a bank of four 6 note sequencers and may in the future be adapted for percussion synthesis. I believe that something should be done about the popular misconception that all synthesisers include or need a keyboard and that it can't be a synthesiser if it doesn't. In reality a synthesiser doesn't actually need an interface and can be used to generate sound and even music by use of the controls.

I like the idea of a sound sculpture exhibition where the actual presence of the visitor would cause changes in the sounds in various parts of the room, and this is an area I intend to investigate in the near future.

Finally, despite all my criticisms I still think E&MM is very good and I'll go on buying in the hope you'll get even better

G. P. Hughes
Swansea

Stereo Guitars

Dear Sir,

Having read Peter Maydew's articles (E&MM, May & July 1982) featuring methods of attaining 'almost' stereo guitar, I thought you may wish to hear of a means of producing a true stereo picture, simply and cheaply. Developed and, I believe, patented by Mark Griffith in the mid-70's, it failed to make the impression on the commercial scene that it deserved, despite the assistance and advice of Manfred Mann.

By angling two adjacent sets of pickups in opposite directions, and amplifying them separately, Griffith was able to 'spread' the strings from left to right. He further developed a means by which to produce alternate strings from opposite speakers, which was particularly effective on bent

strings as the sound panned from left to right and back again.

Still not content, he modified a Fender Rhodes piano for Manfred Mann, which produced consecutive pairs of notes from alternate sides of the stereo pattern. Finally, on the subject of hexaphonic pickups, I know of one other, manufactured by Bob Easter's 360 Systems (USA) — hardly 'cheap' though!

Brian Hamlin,
Essex

School Music

Dear Sir,

My school's music department curriculum includes courses in Electronic Music making, and we're desperate for source material. While the courses are, relatively, in their infancy, and undergoing constant revision, the pupil demand is enormous — 49 applying for 20 places, for instance. The subject is now firmly established in our school curriculum. Our equipment includes three Korg MS10 synths, the basic teaching 'weapon', a Roland SH09, three Boss Doctor Rhythms, electric piano, string machine, E&MM Digital Delay and other signal processing equipment, Vocoder and, most importantly, the Teac 144 Portastudio, which enables the pupils to take their work to its logical conclusion with the production of their own master tapes.

Our most urgent requirement is a polyphonic synthesiser (a Juno 6 will do to start with) but any addition to our resources — including your LP offer! — is welcomed by staff and pupils alike.

Michael A. Tumelty,
Principal Teacher (Music)
St. Columbia's High School
Clydebank

One Tangerine Dream 'White Eagle' LP is on its way. Any more schools interested?

News & Events

Planetarium concert

An evening of music at the London Planetarium is planned by Warren Cann of Ultravox and synthesiser player Hans Zimmer. They'll improvise under the backdrop of the unique display of the Planetarium's Zeiss projector. Exact dates have not been confirmed yet, but keep your eyes open for further details.

Stockhausen Concerts

Karlheinz Stockhausen, the enfant terrible of the classical avant-garde, is taking part in a massive cycle of his works which takes in the whole of Europe, but is centred on the Music Conservatory in The Hague, Holland. Performances include 'Aries' (31 October) with Stockhausen as sound engineer and his son Markus as trumpeter; 'Sirius' (4-6 Nov.) with the Deutsche Grammophon recording line-up of Markus Stockhausen, Annette Merriweather, Suzanne Stephens, and Boris Carmeli; 'Harlequin' (13 Nov.) with Suzanne Stephens, clarinet and mime, and Stockhausen, lighting; 'Der Jahreslauf' from the epic 'Licht' (16 Nov.) and various lectures and symposia covering the whole of Stockhausen's career and every conceivable combination of musical forces. Full details are available from:

Stockhausen-Projekt des Koninklichen Conservatoriums Den Haag, Juliana van Stolberglaan 1, 2595 CA's-Gravenhage, Holland. Tel. 070-814 251, extn. 130, Herr W. van Roon.

I.C. Records

Klaus Schulze follows his UK and European tour with a set of new releases on the IC label, now distributed by DJM. They are Robert Schroder's 'Galaxy Cygnus A', Klaus Kruger (ex-Tangerine Dream) 'Zwischenmischung', Avis Davis 'Love Junky', Rainer Bloss 'Traum-Toters Knecht' and Lorry 'Paperback Heroes'. Lorry are to support Joe Cocker on tour in Germany, meanwhile Schulze has regained the rights to the early IC LPs including Robert Schroder's 'Harmonic Ascendent' and these will be re-released. For further information contact Dennis Emsley, 50 Durell Road, Dagenham, Essex.

E.S.S.P.

Electronic Synthesiser Sound Productions continue their campaign for wider acceptance of electro-music and their opposition to the Musicians' Union motion proposing strict controls on the use of electronic instruments. They are now distributing car-stickers promoting their pressure group, the Union of Sound Synthesists, using catchy slogans such as 'I'm a Synthesiser Sympathiser' and 'If You're Not One of U.S.S. You're Probably One of Them'. Contact ESSP, The Sound House, PO Box 37B, East Molesey, Surrey, KT8 9JB.

London Musicians' Collective

The Man from T.R.O.N.I.C.S. Martin Naylor, among others, a regular contributor of tapes for E&MM's cassette review, will be appearing during Club Night at the LMC, 42 Glou-

cester Avenue, Camden Town, London W1 on Thursday, 7th October at 8 p.m. We'd like to know about this one from readers.

Tangerine Dream Tour, Froese LP

Tangerine Dream play a series of dates in the UK during October and November. Dates and venues are: October 29th Glasgow Apollo, 30th Derby Assembly Rooms, 31st Croydon Fairfield Halls, November 1st Manchester Apollo, 2nd Bristol Colston Hall, 3rd Oxford Apollo, 4th Sheffield City Hall, 5th Birmingham Odeon, 6th London Dominion. Ticket prices are £3, £3.50 and £4 and £3.50, £4 and £4.50 for the London and Croydon dates.

Although there's no new Dream album, founder member Edgar Froese's seventh solo album 'Kamikaze 1989' was due for release on October 1st, under Virgin catalogue number V2255.

Inkeys

The new cassette magazine of electronic music, Inkeys, includes an interview with Robert Schroder, an extract from his new album and a previously unreleased piece of his music in edition two. Other articles include a report on music in Holland and Belgium and on electro-music information centre E.S.S.P., pieces from British electronic musicians Mark Shreeve, Mark Jenkins, Ron Berry and Carl Matthews, and all the usual news and information. As an additional incentive there's a competition to win a signed copy of Robert Schroder's album 'Galaxy Cygnus A'.

The price of £1.99 includes P&P. All orders should go to Inkeys, 50 Durell Road, Dagenham, Essex.

In Brief ...

Casio's repair and servicing department is now at Unit 6, 1000 North Circular Road, London NW2... instruments can now be turned round in a day... Sennheiser introduce a 40g headphone, the Ministar MS100 for walkabout cassette players at £28.00... sell 100,000 sets of their HD 400 lightweight headphone to airline companies... contact Hayden House, Chiltern Hill, Chalfont St. Peter, Bucks... Streeley Electronics of Mellotron/Novatron fame join forces with Dick Parmee, ex. of PA:CE Electronics, and promise 'a new range of exciting high technology audio products'... Cerwin-Vega intends to show their 'digital ready' loudspeaker range in conjunction with Sony's PCM F1 digital audio recorder at the Audio Engineering Society Convention in Anaheim, California, during October... The Italian SIM Hi-Fi IVES audio trade show attracted a record 124,089 visitors over five days in September... Robert Fripp of King Crimson has produced the latest album by The Roches, due for October release... The Contact List of Electronic Music is still alive and kicking, be patient and write to C.L.E.M. P.O. Box 86010, North Vancouver, British Columbia, V7L 4J5, Canada... send a money order for \$3.00 Canadian or U.S. for the master May issue... JVC have arranged a nationwide tour during November featuring Alan Haven playing the JVC Victor M1210 organ... details from JVC UK, Eldonwall Trading Estate, Staples Corner, 6-8 Priestley Way, London NW2 7AF.

E&MM

HAPPY BIRTHDAY

Roland

To celebrate their tenth anniversary Roland have produced two amazing new synthesisers, both of them world-beaters. Firstly, the incredible **JUNO 60** polyphonic synthesiser; it has all the features of the **JUNO 6** plus 56 memories, footswitchable patch shift, programmable VCA levels, tape dump and load facility and built-in interface to the Roland MC-4B microcomposer multi-channel sequencer. Prices are: **JUNO 60 £995** (R.R.P.), **JUNO 6 £695** (R.R.P.). The Juno 6 is the best-selling, true polyphonic synthesiser ever, so we think you'll like the Juno 60 even more. At the monophonic end of the scale Roland have also produced a winner with the **SH-101** synthesiser. Designed to replace the best-selling SH-09 synth, the SH-101 is equally at home strapped around your neck with the optional modulation grip or in a studio synth set-up. Battery or mains-operated, the Roland SH-101 has mixable waveforms, sub-oscillator, noise generator, arpeggiator and built-in 100 step digital sequencer. The SH-101 sequencer can be controlled by an external clock source such as Boss DR. Rhythm, Roland TR-606 Drumatix or Compurhythm Composers; individual CV and Gate input/outputs are also provided; all these features for only **£249** — Superb value! Good stocks of the Juno 60, Juno 6 and SH-101 will be available at the London Rock Shop from November onwards, but hurry because prices are due to rise on all Roland products in December.

For guitarists, **BOSS** (made by Roland) have designed a sensational sound control centre **SCC-700** pedal board which takes 7 effects pedals and can be programmed to memorise 32 patch combinations; fortunately, as the SCC-700 will put a large hole in your pocket, Boss have also produced a **BCB-6** pedal board to take 5 effects and Multiway PSM-5 power supply/master switch for under £100. However, for a limited period only, we are giving away a carrying case absolutely free with every Boss pedal to get your pedal board started. This offer is open to all purchasers, including mail order, while stocks last (first 500 customers only)!

If you're handy with a soldering iron then don't forget you can build your own effects pedals with



AMDEK kits. The new percussion synthesizer and programmable rhythm machine are the latest addition to the AMDEK range. Please send 25p in stamps for AMDEK Colour Brochure. Boss and AMDEK are Roland Corporation Products that are imported and serviced by Roland (U.K.) Ltd. The London Rock Shop is a Roland main agent. We have the largest selection of Roland, Boss and AMDEK products in the U.K. In short, we consider ourselves specialists in the electro-music field — we are open seven days a week, including Sundays, for sound advice at a better price!

Our current stock includes the following:

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 MXR: New
 MXR: Dual limiter/compressor
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P.S. IT'S ROCKY'S 2ND BIRTHDAY TOO!



PATRICK MORAZ

Swiss-born, English-based and transcultural in outlook, Patrick Moraz became well known for his multi-keyboard work with Yes and The Moody Blues.

Now as a solo performer of his own 'instant compositions' and soundtrack composer for over thirty films, he has several albums on his own Future Memories label.

This short article introduces Patrick Moraz and gives you a transcription of one of his pieces to play. He'll be giving his own points of view about his work with the Moody Blues and his latest Future Memories and Coexistence LP's next month.

Patrick Moraz was born in 1948 in Switzerland, a country, he says, with no musical background. His early influences, then, had to be drawn from other countries, from the ethnic music of Brazil, the folk music of France and from American jazz.

His early attempts to fuse these influences, with L'Orchestre Patrick Moraz, Integral Aim, Main Horse Airline and the Latin Rock Trio, met with mixed success, and Patrick saw that Switzerland held little

for him. It was in Switzerland, however, that he first met the members of British rock super-group Yes, although the future significance of this meeting wasn't appreciated at the time.

Patrick then teamed up with bassist Lee Jackson and drummer Brian Davidson, who had previously formed the other two-thirds of Keith Emerson's trio, The Nice. His keyboard style may have lacked Emerson's showmanship, but its pure technique began to bring the band to the attention of the record-buying public; an LP was cut under the name Refugee, and Patrick's multi-keyboard style and wide range of influences began to become established.

With Refugee Patrick played a Hammond C-3 organ, two Minimoogs, a Fender Rhodes piano, Clavinet, piano and Mellotron. Very few musicians were using larger set-ups at the time, with the exception of Keith Emerson with ELP and Rick Wakeman with Yes. Having stepped into Emerson's shoes once, fate seemed to dictate that Patrick should now step into Wakeman's; in 1974, his opportunity came.

With the surprise news that Wakeman was to leave Yes to pursue a solo career, Patrick became what was seen as a rather exotic replacement. His classical training and experience of multi-keyboards made him ideal for the job, but fears that he could not fit in with the Yes 'sound' persisted until

the release of the seminal 'Relayer' album.

On 'Relayer' Patrick's keyboards, and particularly his use of the grandiose Mellotron, blend and layer perfectly with Jon Anderson's voice, and the album became one of the band's greatest artistic successes. Patrick still had his own ideas to express, however, and his first solo album "The Story of I" re-introduced his use of exotic South American percussion and wind instruments.

As a result of his solo albums and work with Yes, Patrick was offered the occasional keyboard seat with The Moody Blues, a job which allowed him time to continue working on his own projects. The Moody Blues in their original incarnation relied heavily on the Mellotron to simulate whole string sections and orchestras, and Patrick now used the updated Novatron single and dual manual instruments to preserve some sense of continuity, while at the same time producing a new futuristic feel on albums like 'Long Distance Voyager' using his Yamaha, Oberheim and Roland Synthesizers.

Patrick has also been able to establish his own studio in Geneva and set up a label, Future Memories, for his solo albums. Recently he has collaborated with a Rumanian panpipe player, Syrinx, on the 'Coexistence' album, and is now working on his second 'Future Memories' album: of live multi-keyboard improvisations.



Adagio for a Hostage Track from the LP Coexistence: Carrere CA 641 *by Patrick Moraz*

Here's our first piece for panpipes with accompaniment arranged to be played with synthesisers or other instruments, including guitar and drums. If you don't happen to have any panpipes handy, the solo line sounds great on a Lyricon, Variophon, Yamaha CS-01 (using the breath controller), or miked up flute/recorder. Another alternative is to use your favourite flute preset — the one on the new JVC KB-500 reviewed in this issue worked well. Whatever instruments you choose, the music provides an interesting study piece and can be multitracked or performed live with just two musicians, if the bass line is played from foot pedals.

The three line score represents the main melody (for Panpipes), the harmony and additional solo lines (for polyphonic and monophonic instruments), and bass line (for foot pedals or bass guitar). Rhythm guitar chords placed beneath the bass line can be used to fill in the harmony.

On the recording (which is part of our special album pack offer this month), Patrick Moraz plays all the keyboard instruments, with Syrinx performing on Panpipes, Richie Moraes on drums and John Wooloff on guitars. Both Patrick and Syrinx do some multitracking to achieve the final rich layering (at letter E). The drum part can be programmed from a drum machine as suggested (basic drum beats have notes as crosses). The drums enter 3 bars before E and are primarily based on the rhythm in the first bar at E, (but use the footswitch to get round the 2 bars!).

It's an emotional piece that conveys Patrick's instinctive skill with harmonies and melodies. The music is almost hymn-like until the drums add a Bolero rhythm, and moves from D minor, through F minor, to a powerful middle section at D in Bb minor, followed by a strong counterpoint line on 'Horn' synth at E. The strength of the panpipes and their ability to blend with synthesisers is superbly demonstrated on the LP.

An original Electro-Music Transcription by Mike Beecher.

© = Cymbal crash

♩ = 78 Adagio

PANPIPES SOLO

MONO/
POLY
SYNTH

BASS/
GUITAR
CHORDS/
DRUMS

A *p*

Harpichord + Strings (etc.) with VCA modulation

pp *p*

Dm / Dm7 / Dm6 / Bb A Dm / Dm7 / Dm6 / Bb A Dm / Dm7 /

Dm6 / Bb A Dm / Dm7 / Dm6 / Bb A Dm / Dm7 / Dm6 / Bb A D / B7 /

B *mp*

Add quaver beats etc.

mp

Em / C#7 / F# / Gdim / Fm Fm9(+11) Fm / C C7 Fm / Fm7 / Fm6 / Db C

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**Adagio
for a Hostage**
Patrick Moraz



2nd track added →

Fm / Fm7 / Fm6 / Db C F / Eb / F / A / Dm / Dm7 /

(Froot)

Dm6 / Eb A Dm / Dm7 / Dm6 / Bb A D / B7 / Em / C#7 /

C

F# / Gdim / Fm / / / C(#5) / Fm / Fm7 / Fm6 / Db C Fm / Fm7 /

Gliss.

f Arpeggios (every beat) (etc.)

f- Arpeggios (every beat) (etc.)

Fm6 / Db C F / Eb / F / Eb (Froot)

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**Adagio
for a Hostage
Patrick Moraz**

D

ff

Horn Solo *ff*

+ Drums : ?

Bbm / Eb / Ab / Ebm / F / F7 / Bbm / Gb

fff

E

Drums:

Horn Solo:

Drums continue

Gb / Db / F / A / Dm / Dm7 / Dm6 / Bb / A

Dm / Dm7 / Dm6 / Bb / A / D / B7 / Em / C#7 / F# / Gdim

F

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Fm / C(15) / Fm / Fm7 / Fm6 / Db / C / Fm / Fm7 / Fm6 / Db / C

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INDUSTRY PROFILE

Interior of Mobile One showing MC1 tape machines.



Behind an unassuming smoked glass exterior in Windmill Street, just off Tottenham Court Road in the heart of London, lies Tape One, a centre of activity for the UK record industry and home base for Europe's largest mobile studio. Tape One, like Mobile One and the smaller Mobile Two, is the brainchild of Barry Ainsworth, a recording engineer whose career started as a sound balancer at PYE and who worked his way up via the position of studio manager at De Lane Lea Music. Nowadays he and his partner Bill Foster are kept busy with bookings extending solidly for months.

Tape One is a facility house used by many of the major record companies. There are three cutting rooms for producing master discs, each using a Neumann lathe and Studer A80 tape machines. For the technologically minded there's a Neumann VMS 80 computer - controlled lathe, complete with a TV monitor which reduces the need to use a microscope for groove checking. Alternatively, for the purist, there's a Neumann AM32 lathe which appears fairly similar to the VMS 80 (a good design never needing to be drastically changed) but in fact dates from the 1930's. It's matched with a modified VG1 valve amplifier rack; some record producers insist that only

a valve lathe can provide the sound they want, and Tape One is all about providing sounds to order.

Tape Copying

Other rooms have facilities for master tape copying, again with Studer A80 tape machines and using Dolby A, stereo synthesisers for use on mono master tapes, and PPM, VU and Phase metering. Often masters will be copied for the foreign subsidiaries of record companies, or short runs of cassettes will be produced as previews of albums in production.

There's no attempt made to compete with the mass duplicating specialists: real time copies only are made, using a stack of AIWA cassette decks roughly corresponding to those at the top of the domestic hi-fi market. These can be fed from tape or disc via Alice mixers built to Tape One's own specifications, which provide EQ or if necessary a little dynamic limiting.

Tape One produces compilation masters for companies like Ronco and K-Tel. Due to recent improvements in cartridge and LP quality it's no longer necessary to cut down the running time of individual tracks to fit onto one side of an LP: it's possible instead to reduce the overall volume as compared to the

corresponding single, if necessary. Masters are cut for everybody from symphony orchestras through rock and pop groups to Barry Manilow and Dana. There's a huge library of tapes in constant use for re-issues and compilations, and at least a dozen new masters are turned out each working day bearing the signatures of the three resident cutting engineers, 'Bilbo', 'Jacko' and 'Pounda'. There are plans for expansion, and for an early move into the area of laser disc-cutting when the technology becomes available.

Although Mobile One travels as far as Yugoslavia and Russia, on the occasion of our visit it was parked less than a mile away at the Coliseum, which was playing host to Jonathan Miller's production of the English Opera Company's 'Rigoletto'. Barry Ainsworth's specifications were turned into a 36 foot long, 13 foot high, 9 ton Eastlake-designed mobile recording studio by a chassis and box structure company in Scotland, an acoustic engineering company in Manchester and an electronics engineering company in Reading. The whole assembly is towed by a standard Ford tractor and is insured for £250,000.

Interestingly enough it could all be powered off a 13A plug socket if it weren't for the air conditioning, which makes a 35A supply or a mobile generator necessary.

On this occasion a generator truck supplied both Mobile One and the Television International truck hired by Thames TV to cover the event for Channel 4. The soundproofed cubicle in the rear of the studio had been supplied with a video monitor to synchronise the sound mix to the action on stage. Mikes inside the theatre were a mixture of condenser and dynamic, including a pair suspended from the ceiling, a selection of rifle mikes behind the proscenium arch, and highly selective 'mice' mounted horizontally on the stage which pick up the surprisingly clear vocal sound transmitted through the stage itself. A stagebox and multicore feed into the van via external connectors and into the MC1 36 in/36 out mixing console.

The MC1 console can be supplemented if necessary by a Triad 16 in/16 out console, and these are connected to one or two MC1 24 track machines. These can provide 46 tracks if locked together by an SMPTE code generator (two tracks being used up in the process), and the system is designed to be both portable and flexible. All the tasks of a static studio can be performed, including overdubbing of vocals or even a full drum kit after a performance using the soundproof booth at the rear of the truck.

As a 46 track Mobile One is the largest in Europe, most of the others being 24 track, and so has been used to cover prestige jobs from the Golden Reel Award-winning recording of Supertramp's 'Paris' album to TV shows and live albums for Sky, Barclay James Harvest, Barry Manilow and James Galway. One recent 'first' was the recording of the Duke Ellington Memorial



Multicore connections.

Concert at the Albert Hall in London, with video pictures being synchronised to a digital recording.

Digital Recording

Digital recording (as discussed in E&MM October '82) has the advantages of a total absence of wow and flutter, complete fidelity in copying and millisecond accuracy in editing. Tape One and Mobile One own, or hire if necessary, both Sony's two-track or multi-track digital systems and 3M's multi-track digital system. Unfortunately the Sony and 3M systems aren't compatible, and it's hoped that a leader will emerge in the near future.

Recording is via a pulse code modulation (PCM) device such as the Sony

PCM 1660, onto a standard videotape if necessary, in which case the stereo image is preserved by multiplexing the signal. Digital editing can be carried out at Tape One, using a desk which closely resembles a standard video editing unit, or in the case of a classical concert where a 'one-take' stereo recording is often sufficient, no editing would be necessary.

This is where Mobile Two comes in: the stereo Sony digital equipment together with a Neve mixing console can be loaded into an estate car, and classical concerts can be recorded using a selection of condenser mikes. Some rock groups, such as Genesis, also require a 'classical' sound, although harder dynamic mikes would often have to be substituted. Outside

engineers are encouraged to supervise the three resident staff of Mobile One in order to obtain exactly the sound the band requires. Although static studios often have a distinctive sound or 'feel', a mobile should be able to provide sounds to order.

Often the staff will need to be able to read a musical score, particularly during classical pieces, where different sections of the orchestra need to be brought in at different times. For rock and pop, though, it's usually sufficient to have a 'good ear' - or at least a commercial ear.

Future Plans

Future plans include reactivation of the video recording side of the organisation, which has lain dormant since being outstripped by the amount of business done by the audio recording side. This will naturally enough be known as Video One, and to do full justice to the latest technology larger premises are being sought; with business as healthy as it appears to be at the moment, this shouldn't be too much of an obstacle.

In the immediate future Tape One will continue to turn out masters at a rate of knots and Mobile One has engagements for Shakin' Stevens, more classical work for TV, and live work in Paris and Moscow. By this stage the reader should be wondering how much these services will cost, and so an abbreviated list of approximate rates is included below.

Mark Jenkins

E&MM

Tape One

Digital Cutting	£50/hr (minimum £100)
Conventional cutting	£90 (average LP)
Cassette copying (realtime)	£16/hr

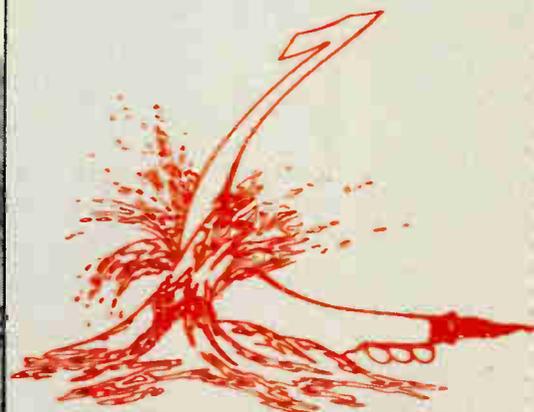
Mobile One

Hire	£600/day (reduces for subsequent days)
Outside London	£150/day (staff expenses)
Tape	£75/reel
Digital Equipment	(available as an option)

Tape One/Mobile One is at 29-30 Windmill Street, Tottenham Court Road, London W1. Tel. 01-580 3744.

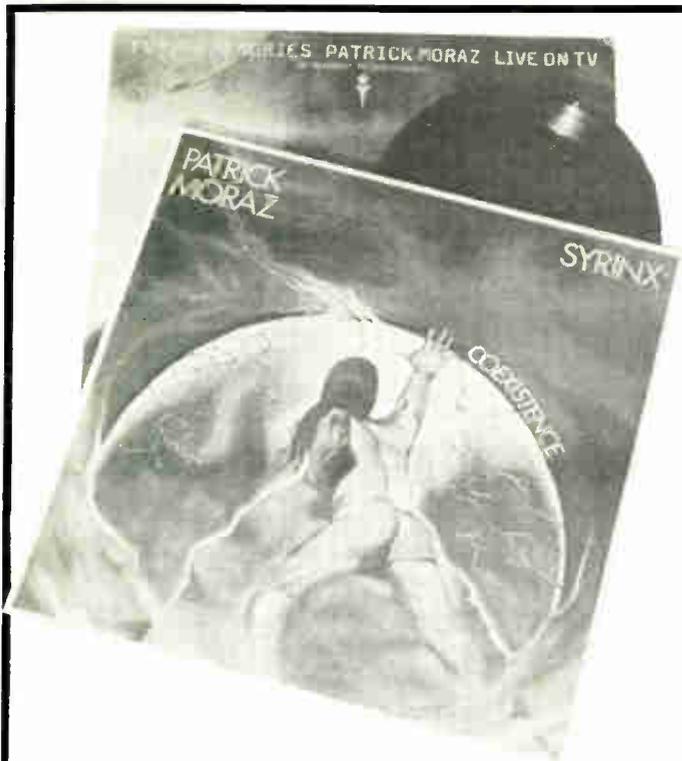


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COMPLETE KIT £79

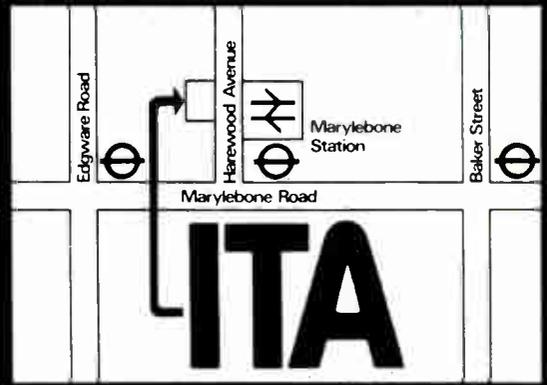
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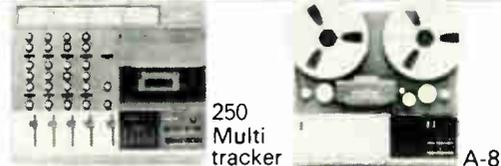
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Porta studio

Fostex



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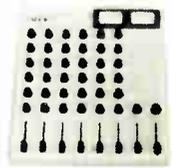
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Micromusic

Spectrum Synth Controller



In the last Micromusic article we were looking at a programme which arranged your Spectrum Beep's into some form of melodic order!

This month we will continue with the next logical step — using the Spectrum sequencer to control a synthesiser.

Timing

Two problems related to timing occurred during the development of the Beepquencer programme. Firstly, Basic is really too slow for musical applications, even a simple sequence can only be run at moderate speeds. Secondly, an interrupt is generated by the Spectrum several times a second to update the VDU status from memory holding up the task in hand until the interrupt routine is finished.

Critical timing loops (i.e. playback) must therefore be assembled and run in machine code without interrupts.

Circuitry

The circuit diagram of the interface is shown in Figure 1. The INS8255 is an Input/Output device which has 3 ports. These can be configured as inputs, outputs or a combination of both. The chip is enabled, via the 74LS30 and half of the 4001, when A₀-A₄ and A₇ are all high and IORQ (Input/Output request)

is low. The two address lines A₅ and A₆ determine which port the data is to be sent to or received from, depending on WR (Write) or RD (Read) conditions.

The port addressing is as follows:

Port	Hex	Dec
A	9F	159
B	BF	191
C	DF	223
Control	FF	255

In this application Port A is arranged as input, Port B as output, the lower half of Port C as input and upper half as output. The control word required to set this up is 91h or 145. Therefore to initialise the ports send the data to address 255 i.e. OUT 255, 145.

Obviously, we still have to convert any digital data coming through the port into analogue form before it can be used to drive a synthesiser.

The digital to analogue convertor, DAC0800, is buffered by op-amp 2 and then sent to the Portamento circuit of op-amp 1. This voltage is summed with a bias voltage, used for tuning the sequencer $\pm\frac{1}{2}$ octave.

A gate signal, for triggering ADSR's is derived from the MSB of Port C. This positive-going edge is doubled in amplitude by op-amp 4 to provide a signal approx 10V in amplitude, as required by the author's synthesiser. This signal

may be modified by re-configuring op-amp 4 as an inverting amplifier, for negative going gates.

The DAC reference voltage is adjustable to allow the 1 volt/octave law to be set.

The two NOR gates, 3 and 4, are wired to produce a variable speed clock which is used to drive the sequencer programme.

An external clock, other than the one shown could be used, providing it has an output 0-5V in amplitude, connected to pin 17 of the INS 8255.

Three switches are included; Start/Stop which gates the clock, Reset which as the name suggests, resets the sequence and Break which returns the programme to Basic control and The Menu.

Construction

The controller circuitry can be built on a piece of veroboard, connected to the Spectrum via 20 way ribbon cable and the appropriate edge connector. Take care when connecting the address and data lines to the I/O device - any wrong connections will disrupt the operation of the computer.

Sequencer Programme

The programme, shown in Figure 2,

Continued on page 72.

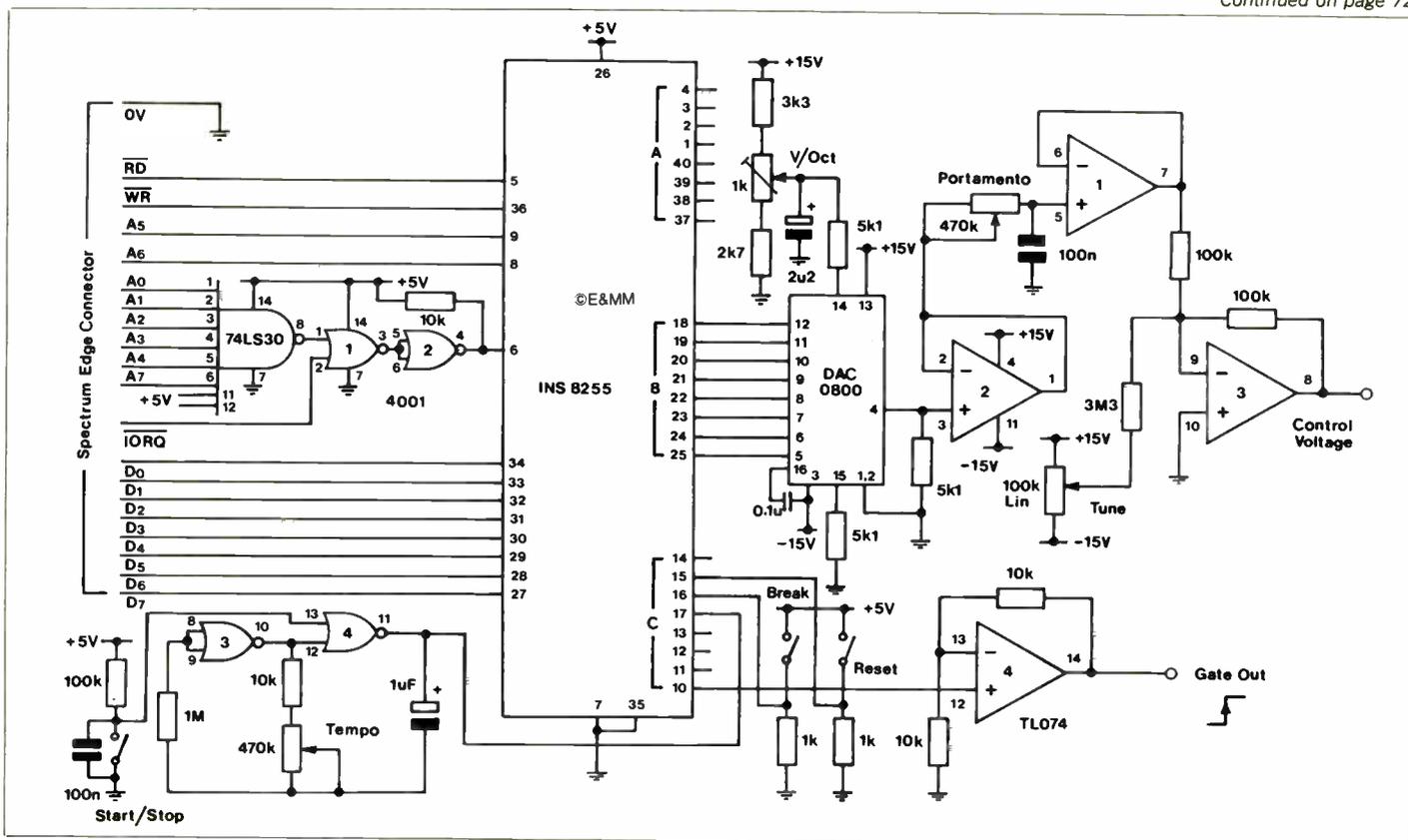
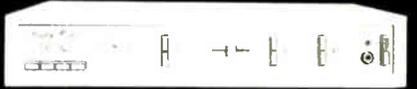


Figure 1. Synth Controller circuit diagram.

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ON PAGE
63



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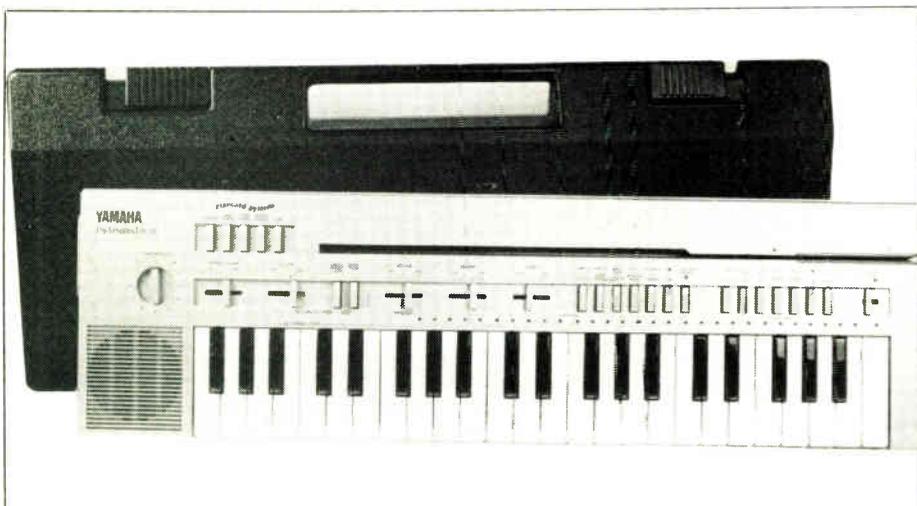
E&MM NOVEMBER 1982

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Yamaha Portasound PC-100



This latest addition to Yamaha's Portasound range is intended to be a revolutionary product that lets you enjoy playing and learning keyboard music in a variety of ways; obviously Yamaha have set themselves a difficult task to accomplish in a small keyboard, and yet in many ways they've achieved their aims with a certain flair not often seen these days.

The major feature on the learning side of the instrument is its use of the 'PlayCard' system, which is capable of programming and replaying melody, bass, chords, arpeggio and rhythm for an entire song. Each song is contained on a 13 x 9cm card bearing conventional top line musical notation, chord symbols, and a magnetic strip along the bottom carrying the programming information. As the melody plays, an indicator light goes on above the note sounding at the time (red for white notes, yellow for black) and it is possible to cancel the melody line and play it back by hand, following the indicator lights or the music score. After being pushed through the slot along the top of the instrument which contains the card reading head, the Playcard stands in the position of a normal music rest; eventually the aim is that the user will learn to play

directly from the score and be able to switch off the indicator lights (using lamp cancel). The twelve cards provided range from the very simple 'Do-Re-Mi' to quite complex tunes such as 'Take the A Train', via an incredible version of 'Night Fever'!

After mastering right-hand technique, the learner can add one-finger chords read from the score by cancelling the autochord/bass facility. The remaining rhythms and arpeggios have individual volume sliders to balance the overall sound, and it's also possible to transpose all the functions up or down by anything up to half an octave, using the large dial on the left of the keyboard; this helps when accompanying a singer or, for instance, an instrument such as the B flat saxophone.

Although the magnetic strip selects an ideal rhythm and sound for each tune, this can be changed by the user after starting. There are ten rhythms and ten polyphonic sounds, selected by the now familiar system of five switches and a sixth 'a or b' selector. The organ and vibraphone sounds are particularly good, with added key-click and a slow tremolo respectively, while the violin and some other presets have a fixed delayed vibrato. The rhythm sounds are bright and

convincingly metallic, certainly not a simple burst of white noise, and with autobass, arpeggios and sustain all in use the overall effect is very enjoyable.

Sound generation is by Yamaha's Pulse Analogue Synthesis System, P.A.S.S., first used on the large home organs such as the C and D Series. Polyphony is provided by a multiplex system based almost entirely on 3 large custom-designed Yamaha ICs, together with half-a-dozen standard CMOS devices. The card reader uses two CMOS RAM ICs for storing the tunes, and once you've mastered sliding the PlayCard through at an acceptable speed, programming becomes very rapid and efficient.

As a learning machine, then, the PC-100 is highly versatile and adaptable. There's even a 'free tempo' control which slows the rhythm down until you've correctly played the next note of the melody, so there's no chance of falling behind. The keyboard, although miniaturised, is pleasant to use with a fair degree of 'push-back' and the 3½ octave span (F1 - C5) coupled with the clarity of the polyphonic sounds makes the PC-100 a pretty reasonable performance instrument as well. It's stylishly designed with a lacquered ABS resin body, comes in a futuristic-looking plastic case, and has a built-in speaker, headphone socket and a range of power supply options.

The selection of PlayCards available is very wide, including Classics, Pop, Walt Disney, Abba and Stevie Wonder, and so the appeal to learners is obvious; on the other hand the quality of the PC-100's sounds is high enough to appeal to the more accomplished musician in search of portable entertainment as well - and so another all-round success for Yamaha!

E&MM

The Yamaha PC100 is distributed in the UK by Kemble Yamaha, Mount Avenue, Milton Keynes, Bucks. Tel: (0908) 71771

Specifications

Keyboard

44 keys (F1 - C5)

Playcard System

Repeat, Lamp Cancel, Free Tempo, Melody Cancel, Play, 30 Melody Lamps.

Orchestra Section

Organ, Piccolo, Trumpet, Violin, Clarinet, Oboe, Piano, Harpsichord, Guitar, Vibraphone, Sustain.

Rhythm Section

March, Disco, Waltz, Slow Rock, Jazz Rock, 16 Beat, Swing, Bossanova, Rhumba, Samba, Synchro Start, Tempo, Volume, Tempo Light.

Arpeggio

Volume.

Auto Bass/Chord Section

Single Finger Chord, Variation, Volume.

Other Controls and Indicators

Power Switch, Power-On Light, Master Volume, Transposer (½ octave high and low), Pitch Control.

Auxiliary Jacks

Headphones, Aux-out, Expression Pedal, DC 9-12V Input.

Amplifier/Speaker

1.4W (RMS)/7.7cm.

Power

DC 9V using 6 x 1.5V batteries, AC power adaptor, or car battery adaptor.

Dimensions

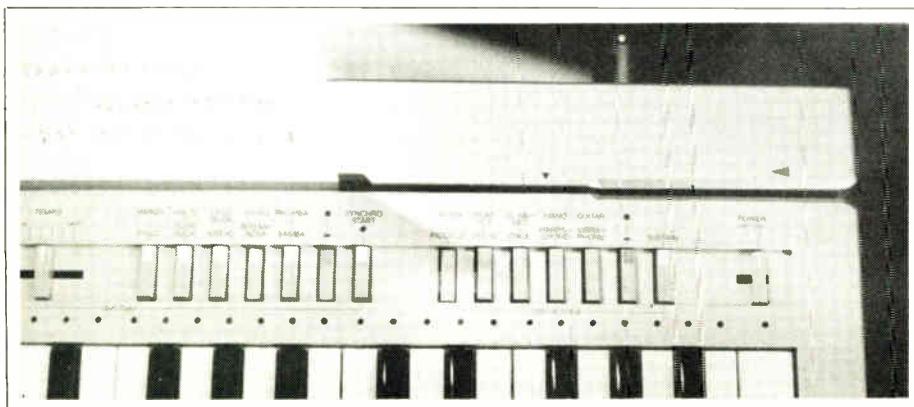
62.3(W) x 18.6(D) x 4.3(H)cm.

Weight

2.0Kg (4.4lbs) (excluding batteries and case).

Price

£345



The PC100 voice and rhythm selection controls.

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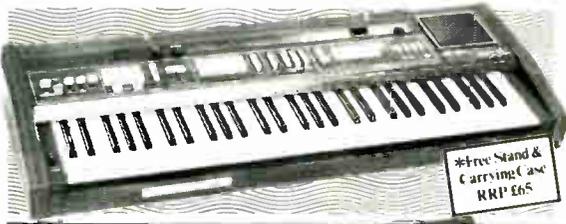
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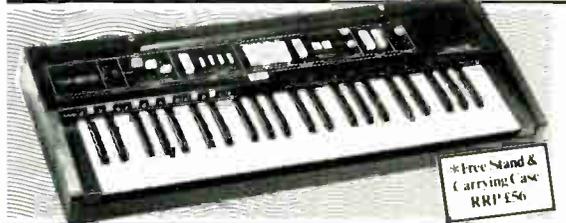
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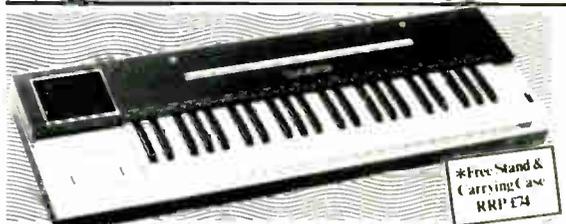
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Technics SX-K200



Technics are understandably excited about their latest product, and its smaller brother the SX-K100 (both of which are due for release during November), as the machines represent a slight change of direction for them and include two features described as 'World's Firsts'. However, there's a basic problem of approach to be solved before examining this instrument; Technics insist on marketing it as an 'organ' when potentially it can be much more than this.

In common with the other keyboards examined, the SX-K200 combines a selection of polyphonic voices available over the whole of the four octave keyboard with several automatic accompaniment features on the lower 1½ octaves. There are two built-in speakers on the top surface, and the overall styling is extremely smart, in black and silver to match Technics' hi-fi range. Additionally, on this keyboard there is an extra section of switches for the monophonic 'solo synthesiser' presets which operate on the top note played.

The 8 polyphonic voices are produced by conventional organ analogue circuitry derived from Technics' top-of-the-range Pro U-90, recently seen on television's 'Show Me Show'. The sounds are interesting, not always strictly imitative — for example, on the Guitar which consists of a sharply resonant 'twang'; some of the solo voices are also reminiscent of popular synthesiser settings, for instance the Cosmic Wah, while the beautiful Pan Flute has a touch of 'breath' derived from the white noise generator of the rhythm box.

If accompaniment is required it is available in the form of percussion rhythms (with volume control) and bassline/chord accompaniment (with volume control); the chords can be played normally or in single finger mode, and can appear as a 'strummed guitar' or 'arpeggio piano' style when the rhythm is operating. A Transpose control

can be preset to alter the pitch of the entire instrument to any degree at the touch of a button, and the rhythm unit can provide a four-bar opening, fill-in, or automatic variation on every eighth bar.

The rhythm sounds themselves demonstrate Technics' proud claim to a 'World First' in the use of Pulse Code Modulation (PCM) techniques as part of an organ accompaniment section. Each sound has been digitally sampled, and is stored in a custom-designed memory and recalled by the central processor each time it is needed as part of a rhythm. The hit-hat can be clearly heard in open and closed positions, the skin on the tom-tom stretches and contracts audibly and the bass drum has a kick like a mule; certainly this is the only way to obtain Linn Drum quality for a few hundred pounds! The fills and variations are very carefully composed, and are expressive without being overbearing — it's certainly worth hearing this instrument for its rhythm section alone, particularly when using a pair of the matching SYT100 40 Watt bass reflex combo amps, available at £130 each.

The last major feature, which draws together all the others, has been left until last because its basic concept is a little difficult to appreciate, and because it's seen as being infinitely expandable in the future. A combination of ROM (Read Only Memory) and RAM (Random Access Memory) is used to give the SX-K200 the ability to store tunes internally or externally in a 'library'.

The tunes permanently stored in the internal ROM can be recalled by pressing one of the top keys which are numbered 1 to 8, and are complete down to the details of voicing and variations. The 'Full Band Setting Computer', the second of Technics' 'World Firsts', enables the user to program his own tunes in this way, entering the details of setting, chords and melody as slowly as necessary on the keyboard, and then transferring all the details to a 'RAM Pack'

contained in a recess on the top of the instrument. Blank RAM Packs cost £11.99, and can contain 8 programs of up to 50 bars each: in other words, the user can store eight tunes on each pack, label the pack, and instantaneously load it into the machine ready for the melody to be added on 'live'.

Technics' hope is that users will build up a library of packs in order to be able to play 'requests' in a live situation, exchange packs with other owners to show off their compositions, and generally begin to use these small cassette-like objects as a new form of information transfer which is instant, non-volatile, non-degrading and totally accurate. Apparently the idea of marketing 'pre-recorded' packs hasn't been accepted yet, but it's one of a long list of possibilities. There are only three SX-K200s in this country at the time of writing, and one of those is with Status Quo — it should be interesting to see what uses they come up with for it!

E&MM

Specifications

Dimensions 83 x 11 x 33cm
 Keyboard 49 keys, full size, C-C
 Presets 8 polyphonic
 6 monophonic
 Effects Sustain, Tremolo, Chorus/Celeste
 Auto Single/Multi finger chords, rhythmic or arpeggio accompaniment
 Rhythms 8 rhythms, intro, fill-in, auto variation
 Memory 8 x 50 bars on each blank RAM pack
 8 preset tunes
 Speakers 12 cm 5 watts x 2
 Power Mains or car battery
 Price £399.00

SX-K100

As above, omitting monophonic presets, stereo sound, some effects
 Price £299.00

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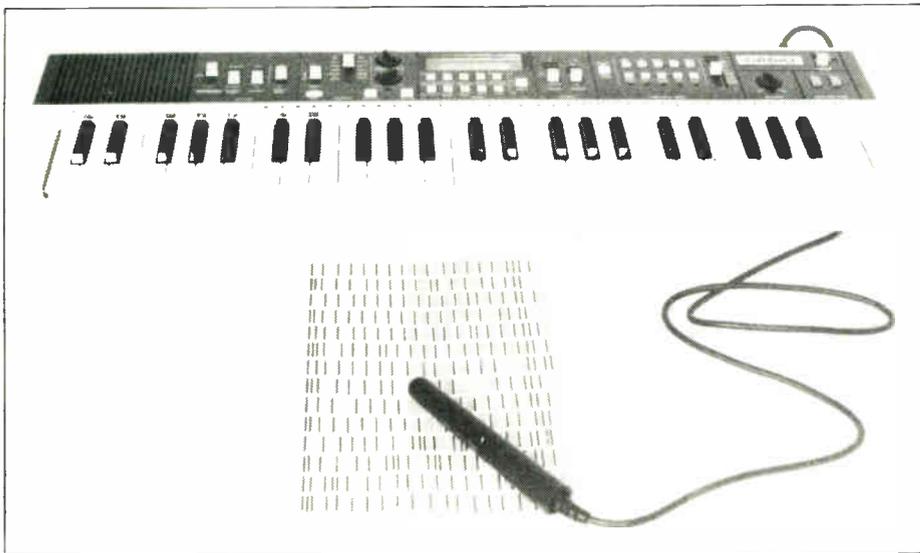


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E&MM/11/82

MINI SYNTH SUPPLEMENT



Casiotone MT-70

Casio's continuing search for new combinations of size, facilities and price have now resulted in a four-octave mini-keyboard with a versatile memory capable of both teaching and entertaining, which is programmable in a variety of ways.

The visual impact of the MT-70 is immediate; banks of grey and white buttons surround a multi-function l.c.d. display set in the centre of a metallic grey coloured control panel, mounted on an off-white plastic body to give a very modern effect overall. The dimensions, weight, built-in speaker and battery power options make this an eminently portable product, although one of its programming systems is not too suitable for the great outdoors, as we shall see.

The keyboard is split to give the option of one-finger chords, and arpeggio or rhythmic accompaniment, on the bottom one and half octaves, or alternatively the whole keyboard can be made to play one of the twenty 8-note polyphonic voices selected by ten grey switches and a final white 'A/B' selector. There's the usual range of Casio sound's, plus a new 'Synth Bells' setting with an automatic octave repeat on each note, and a pleasantly swelling 'Cosmic Flute'.

However, some of the settings such as 'Funky' are very brief, even with the sustain switch on. There's a vibrato setting with an optional delay, and the voice selected is shown on the l.c.d. display. The rhythms are selected by a five-position slider switch and 'A/B' selector, which seems a slight design inconsistency; however, there's a useful 'fill-in' switch which can be tapped at any time to give a rhythm break. The rhythm sounds are of average quality and the accompaniment is a fairly standard arpeggio or a more interesting rhythmic chord effect using one of the 'jazz organ' settings; alternatively it's possible to play one finger chords, with the chord symbol being shown on the l.c.d. display.

The display also shows the status of the memory. This can be programmed 'live' from the keyboard or from sheets of bar-codes (as used in supermarkets!) using the light-pen supplied. Each bar enters a line of melody, chord or note length information, so a typical piece may need about 50 bar codes; as it only takes a second to scan a bar this isn't as much effort as it may sound,

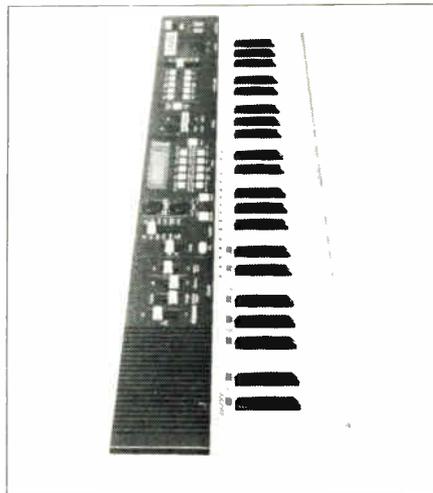
although it's best done on a flat surface to avoid errors. If there is a mistake in programming, caused by moving the pen too quickly or too slowly or by a mark on the sheet, an audible warning is given.

By erasing the memory (which is normally maintained even while the power is off) it's possible to program in your own compositions or arrangements on the keyboard. Notes are entered one at a time, with the possibility of adding rests, deleting errors and repeating whole sections automatically. The notes are then re-timed against the most suitable rhythm, at a slow speed if necessary, using the 'one-key play' buttons. The whole procedure is repeated for the accompanying chords and the complete composition is ready to play back.

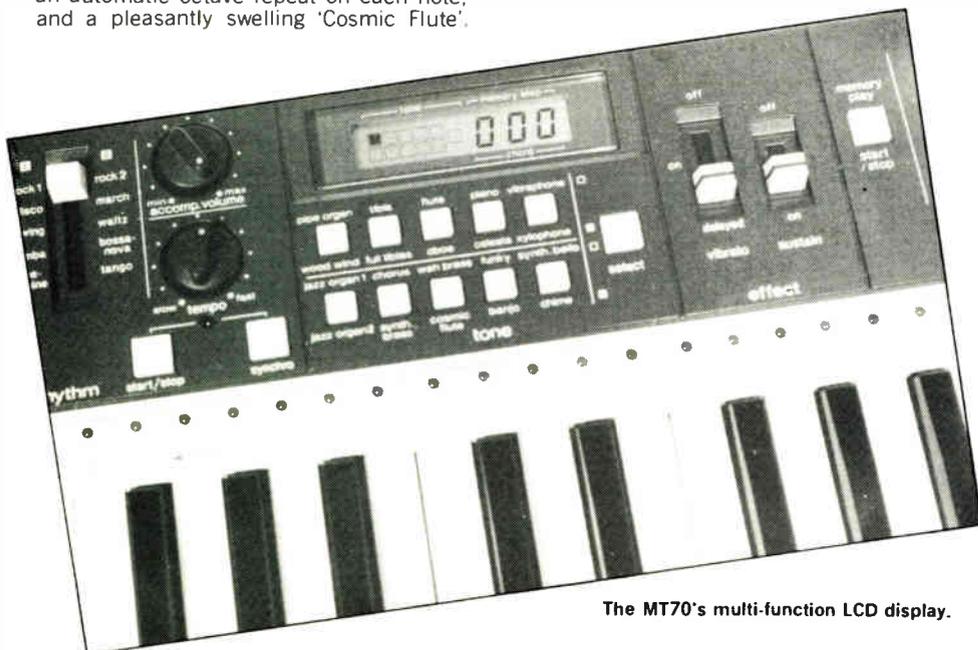
The final major feature is the 'melody guide', which uses a lamp above each key (red for white notes and green for black notes) to indicate which key should be played next in order to produce the required melody; the user can learn his own compositions at whatever speed is convenient, or learn to play the melodies from the large range of bar code music available.

No major problems in design or usage then; the basic sound quality of the instrument and accompaniment voices hasn't changed since the first days of Casio, and although there are a few unusual sounds here, the MT-70 is much more useful (as, I suspect, was intended) as a learning machine/entertainment device than as a performance instrument. **E&MM**

The Casiotone MT-70 is distributed in the UK by Casio Electronics Co. Ltd., Unit 6, 1000 North Circular Road, Staples Corner, London NW2. Tel: 01-450 9131



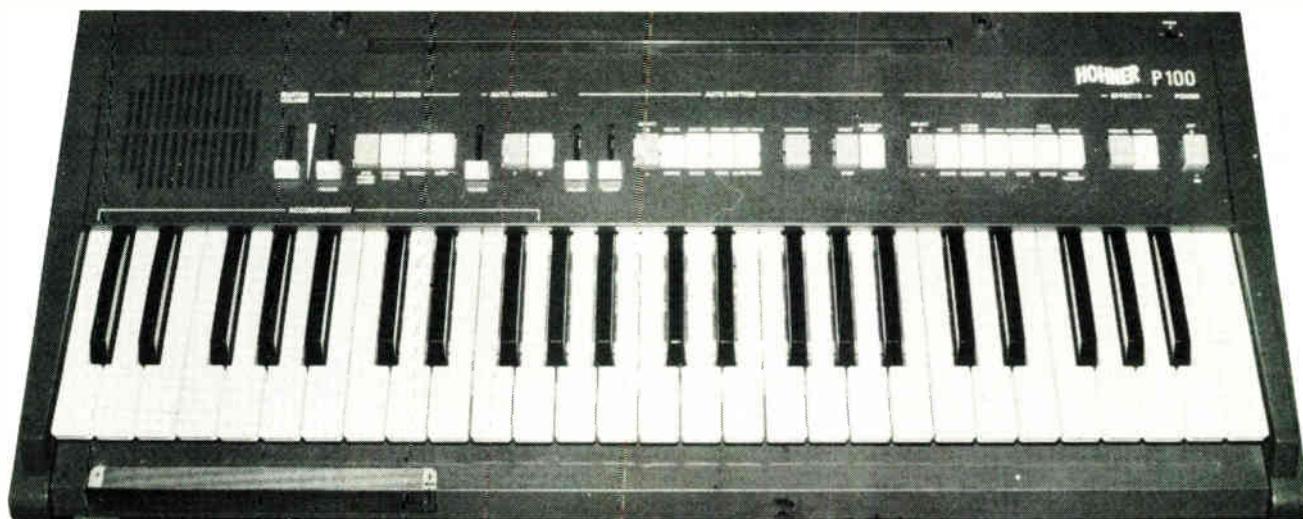
Compact styling of the MT70.



The MT70's multi-function LCD display.

Specifications

Dimensions 68 x 633 x 188mm.
 Weight 2.7kgs.
 Keyboard Miniaturised 49 note (4 octave C-C).
 Presets Pipe Organ, Woodwind, Tibia, Full Tibias, Flute, Oboe, Piano, Celesta, Vibraphone, Xylophone, Jazz Organ, I & II, Chorus, Synth. Brass, Wah Brass, Cosmic Flute, Funky, Banjo, Synth. Bells, Chime.
 Effects Vibrato, Delay Vibrato, Sustain.
 Auto Single finger chords, Rhythmic/Arpeggio selector, Rhythms.
 Memory 345 notes, 201 chords.
 Melody Guide On/off.
 Display L.C.D. multi-function display.
 Speaker 8cm. 1W.
 Power Battery, mains adaptor, car battery adaptor.
 Price £255



It's possible to deduce the intended market for Hohner's new keyboard immediately from its name — the Family P100. This is another full-size keyboard from the prestigious manufacturers of the Pianet and Clavinet, this time with a full range of 8-note polyphonic voices and a selection of accompaniment features. While these latter are intended to aid the learner and home entertainer, it should be possible to use this keyboard for more diverse purposes as it would with the Casios of this world.

The overall appearance of the machine is good, the finish being in dark brown wood and plastic; there's a fitting for a music rest and for a stand. The keyboard is 4 octaves C-C, with a bank of square tabs in brown, white, grey and yellow above it on the sloping top panel. At the left a built-in speaker is provided, rated at 5W.

There are 12 instrumental voices, selected by six white pushbuttons towards the right hand end of the control panel, together with a single brown bank selector. The Vibraphone is particularly realistic, with a slow built-in tremolo, and the Wah Trumpet has a fast 'filter opening' effect with a high degree of resonance. Strings has a fixed delayed vibrato, and there's a good selection of other sounds including Piano, Harpsichord and Accordion. To the left of the voice push-buttons and next to the power button are two buttons for Vibrato and for Sustain, both useful effects which give a reasonable degree of variation to the existing sounds.

At the centre of the control panel is the rhythm section, the first of the three auto features of which the other two are arpeggio and bass/chord. Four white buttons and another brown bank selector give a total choice of eight percussion patterns, including Disco, Rock, Rhumba and Slow Rock; the percussion sounds are adequate, typical of a small home organ perhaps, and there's a Variation available on each pattern. On the Waltz, for instance, use of the Variation doubles up each snare drum beat while leaving the bass drum unaltered. On March the snare drum becomes quadrupled, while on Disco the variation is a quick snare drum offbeat on each bar.

The rhythms have a volume slider, and a tempo control which also regulates the other auto features. All the sliders work from bottom to top and have large white tablet caps, the length of travel being sufficient to allow fine adjustments to be made quite easily.

Between the rhythm section and the polyphonic voice section are two more tablet switches, marked start/stop and

Hohner P100



Rear connections.

synchro start, which link together the percussion and the other auto functions. Above these two buttons is a red LED which indicates the state of the accompaniment section and of the synchro start option.

On the left of the control panel are the auto bass/chord and arpeggio sections. The arpeggio has three controls, a sliding volume control and two tablets to select arpeggio I or II (II having priority if both are pressed). For tempo and start/stop the arpeggio depends on the rhythm section. Arpeggio I plays the 3rd, 5th and Root of the chord selected on the accompaniment section (the lower 1½ octaves of the keyboard) in an ascending mode, while arpeggio II plays in an ascending/descending mode: in each case the arpeggio covers the whole range of the accompaniment section and is in a high-pitched piano-like voicing.

The final section, autobass/chord, is a little unusual, since in addition to the main panel controls there is a touch sensitive strip wrapped around the front of the casing below the keyboard which determines the exact chord played. Synchro Start causes the rhythm unit to start when a chord is first played on the accompaniment section, and this chord can be either played normally (using the Finger Chord button) or with one finger (using the Single Finger Chord button). In the latter case the key alone produces a major chord, while the top part of the touch sensitive strip alters this to a seventh, the middle part to diminished seventh and the bottom part to minor. This chord voicing is also applied to the arpeggio, and it's possible to lock the chord on using the Memory button.

The chords play in a low piano-like voicing with a different pattern for each rhythm, and it is also possible to add a Bass pattern which plays Root/5th/3rd/Octave and variations thereof depending on the individual rhythm pattern.

Internally the Hohner is well laid out, with PCBs and circuitry of very high quality and a power transformer rated to cope more than adequately; the built-in speaker doesn't have

its own enclosure however. The major control functions are carried out by two large ICs, the Columbia MSM 60312 and Matsushita's MN1564XJ. The rest of the circuitry is fairly standard CMOS, with three 8253's in addition to 4013, 4011 and 4071's being in evidence.

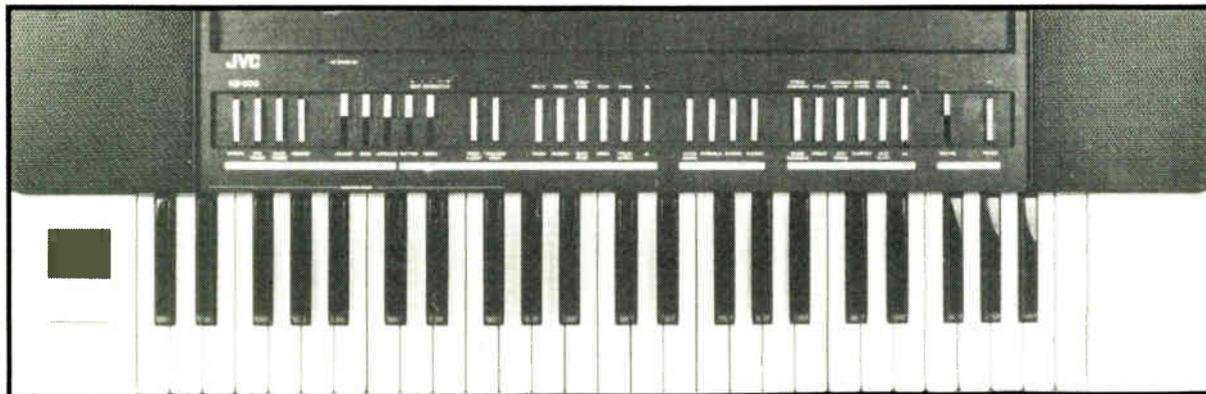
On the rear panel there are sockets for a sustain on/off footswitch and an Expression pedal, an 8Ω Headphone connected after the master volume control, and an Auxiliary Out which is independent of that control. Also there's an Auxiliary In, which should be useful for accompanying taped music or even connecting a microphone, and a screwdriver-adjustable tuning preset giving plus or minus a semitone centred around A = 440Hz. There's also a battery power option.

The optional extras include a very smart white and maroon carrying case in waterproof plastic, with a pocket for footpedals, which in addition to the keyboard stand also available helps to produce a very portable package which should be equally at home on the move or in your front room.

E&MM

Specifications

Keyboard	4 octave C-C full size
Voices	8 note polyphonic × 12, Sustain, Vibrato
Rhythms	8 + variation; Start, Synchro Start, Volume
Autobass	On/off
Auto Arpeggio	I/II, volume
Autochords	Finger, Single Finger, Memory, Volume, Touch bar for 7th/dim/minor
Connectors	Aux in/out, Headphones, Volume Pedal, Sustain footswitch
Power	Mains/battery
Price	£299 inc. VAT



JVC KB-500 Stereo Keyboard



The KB-500 is a little more expensive than many other portable keyboards, but the difference really shows, both in construction and in sound production. Although primarily intended for home use in conjunction with a hi-fi system, its standards are set high enough to consider it for recording or even stage use.

Importantly, the keys are full size, if anything unusually deep and firmly sprung, moulded in plastic with rounded edges. The overall finish is in black and cream, although there's an option of a silver finish, with effects switches in blue, selector switches in white and power and volume in red. Miniature sliders are used to balance the relative volumes of the different sections, while at either end of the machine on

the top surface there's a 12cm speaker delivering 2½ watts; it's possible to select a 'stereo' setting which 'opens up' the sound between the two speakers or two line outputs. There's also a switch for a fixed sustain, and another for an ensemble effect which helps to raise the machine to the level of a professional sound. The four percussive sounds: Piano, Hawaiian Guitar, Harpsichord and Vibraphone are given a subtle stereo phasing effect, whereas the Jazz Flute, Clarinet, Organ and Jazz Organ are thickened up considerably. On the String and Brass settings, the ensemble is switched on permanently, and these sounds compete quite favourably with more expensive string and brass ensembles. The strings are full with a reasonable amount of bass, and the brass has an interesting 'wah' reminiscent of popular settings on several polyphonic synthesisers.

Several of the other presets are something special too; the jazz organ has a realistic keyclick, the clarinet an expressive delay vibrato, and the jazz flute a combination of delay tremolo and a 'chiff' of white noise intended to simulate 'overblowing'. In the model we examined, the white noise was much too loud, but overall the presets show a good deal of thought and, above all, musicality.

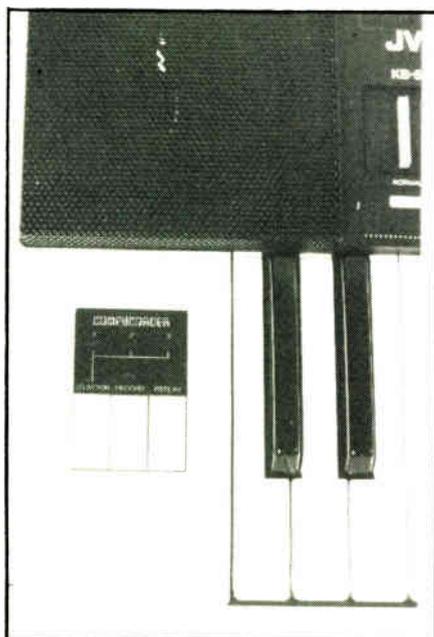
In common with the other keyboards reviewed, the JVC has various automatic accompaniment sections; switching the lower 1½ octaves of the keyboard from 'normal' to 'one finger' gives single finger chords, whereas 'multi finger' allows chords to be played normally, in a reedy organ voicing. In this limited sense the keyboard can be described as split, with the left hand volume varied by the 'accompaniment' slider. If the rhythm section is started while in either of these two modes, the left hand chords are played as a recurring staccato accompaniment, along with a preset bass-line (one for each rhythm) and arpeggio, all with individually mixable volumes. The percussion sounds are bright and clear, with a

convincing metallic ring to the cymbals and snare, and although there's no variation or fill-in available, each of the ten rhythms is imaginatively composed, using an appropriate selection of instruments in each case.

The JVC isn't intended to play back complete scores, but does have a versatile 'Compu-corder' chord memory which can store the chords for up to 126 bars, in three groups of 42. The voicings and rhythms are freely interchangeable as the Compu-corder is working, and programming is fairly simple, the device acting rather like a digital version of a cassette player with tabs for Record and Replay, plus Group Select. It's possible to skip from one group to another while playing and there's the usual 'synchro start' facility which means the Compu-corder won't start to play back until a lower keyboard key is touched.

Despite the usefulness of these features, there's a good chance that many people will want to use the instrument in a straightforward single keyboard mode, and to this end there's one final feature which improves the sound even further. The 'Ultrachord' facility converts melody notes into full chords determined by the lower keyboard in single or multi-finger mode, so that a C on the upper part of the keyboard becomes a C major (or minor or seventh) according to what notes are played further down, and an E played simultaneously will also become an E major (or minor or seventh). The capability of reproducing very complex chording techniques with only a couple of fingers must be a temptation which even the semi-professional would find it hard to resist!

E&MM



The JVC's Compu-corder section.

Specifications

Dimensions 860 x 85 x 290mm.
Weight 6.8kg.
Keyboard 49 keys, full size, 4 octaves C-C.
Presets String Ensemble, Piano, Hawaiian Guitar, Harpsichord, Vibraphone, Brass Ensemble, Organ, Clarinet, Jazz Flute.
Effects Ultrachord, Ensemble, Stereo, Sustain.
Auto Single-finger chords, Multi-finger chords, Bass, Arpeggio, Rhythms.
Memory 3 x 42 chords.
Speaker 2 x 12cm, 2.5W each.
Power Battery, mains, car battery.
Price £399

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JVC Stereo keyboard KB-500

£399



This amazing value, new portable keyboard CMES from the famous JVC company in Japan. Battery or mains-operated with built-in stereo ensemble, stereo amp and speakers. 4-octave keyboard, 10 true-to-life preset sounds, 10 different automatic rhythms, auto bass/Arpeggio/accompaniment and A-O-C ultra chord for the right

hand. So what's new? Built-in Compu-corder records up to 126 bars of chord changes (max. 2 per bar) and plays back automatically; auxiliary input (with vol. control) for guitar or voice through stereo chorus.

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Gibson Firebird II



Coming towards the top of Gibson's Solid Body range, the Firebird II re-introduces a long familiar design, now complete with active electronics by Moog which help to produce a tremendously versatile instrument. Over the years the Firebird has been revised, copied and re-issued in a variety of slightly differing styles, but at a cool £950 this could be regarded as the ultimate version.

The body shape is as eye-catching as ever, equally comfortable when standing up or when playing with the guitar rested on one knee; the upper strap button is located on the back of the body. The lower cut-away doesn't appear particularly deep, but this is partly an illusion produced by the body styling and doesn't prohibit access to the higher frets in the least. As on the Explorer and a few other Gibsons, all the machine heads are on one side of the head, in this case the lower, and are Gibson's own Deluxe design. The neck is laminated 3-piece maple with a rosewood fingerboard bearing pearl dot inlays, and the laminated body is in very high density Rock Maple - this means it's heavy, but that's the price that has to be paid even on an electric instrument to obtain reasonable sustain. The model we looked at had a subtle Antique Sunburst finish, with cream binding along the edges of the body, and the overall finish was well up to the standards that would be expected from a guitar in this part of the market.

Construction and Mechanics

The neck is a typical Gibson, with a scale length of 24 $\frac{3}{4}$ inches and a width at the nut of 1 $\frac{11}{16}$

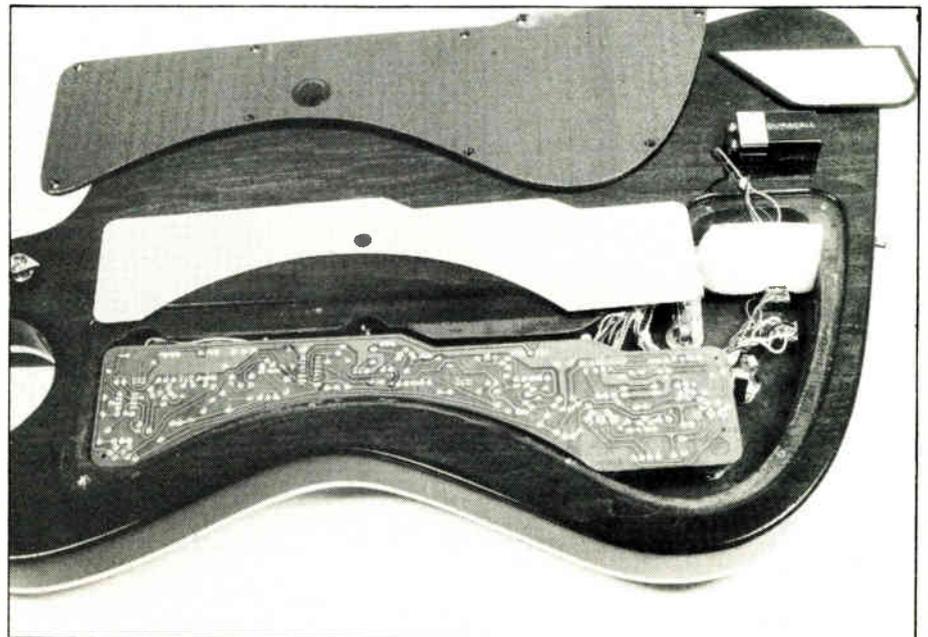
inches; the fingerboard is smooth and fast in use, and although the strings supplied (probably Gibson 740 XL's) seemed a little heavy, this is clearly a matter of personal taste which only the individual musician can resolve. The two pickups are Gibson Series VI active humbuckers, chrome plated, and the bridge and tailpiece are separate as on all the solid body range. Here, the tailpiece is a TP6 Fine-tune, which is fitted with small fine-g geared thumbwheels which make very accurate tuning possible, rather similar to a violin's E-string adjuster. The advantages of this system can be imagined; it's possible to make extremely fine and rapid alterations to the tuning of individual strings with the right hand without having to adjust the relatively coarse machine heads. The TP6 is available separately and is very simple to fit to any guitar with the same spacing as Gibson's conventional stock tailpiece.

There is a standard Switchcraft three-way toggle switch for pickup selection, near to which is mounted the output socket. Gibson have evidently had enough of having to fit a steel plate to side-mounted sockets to prevent damage to the guitar's finish caused by helpless fumbling for the output socket on a darkened stage! Finally there are two miniature toggle switches for the active electronics, together with the volume controls and the slightly unusual tone controls.

Active electronics

Gibson have used active electronics in one form or another since the time of the RD Artist, but these early experiments offering compression, expansion, 'brightness and other forms of control often proved too complicated for practical use. When Gibson and Moog came together under the umbrella of a single company, the synthesiser manufacturers drastically redesigned and simplified the circuitry involved; nowadays the circuits, powered by a 9v battery which is disconnected when the output jack is removed, are both easier to use and more effective. The tone controls run from 5-0-5 rather than using a simple 0-10 scale as a passive capacitor tone circuit would, since they provide a real boost of treble or bass rather than simply attenuating the degree of treble present. Apart from a wider variation of tone control, this also means that output level can be much higher than a conventional guitar, and so problems with

Internal circuitry.



loss of volume when using several effects can be partially solved. There are other advantages; it should be possible to overload the input of your favourite 200-watt amp to obtain an overdriven sound at a much lower volume level. Gibson have thoughtfully provided a preset, accessible by removing a rubber cap from the back panel, which adjusts the output of the built-in pre-amps and so allows you to obtain an overdriven heavy metal sound permanently if you so wish, or alternatively just to closely match the input sensitivity of your amp.

Access

The battery can be changed easily enough by removing two small screws which hold in place a part of the back cover. A further eight screws hold on the rest of the cover, which is insulated from the circuitry by a sheet of thick card. Removal of the Moog circuitry is not so simple - Rosetti, who distribute Gibsons in the U.K., say they've never had to try, as they've never encountered a defective Gibson! It's also possible to adjust the truss rod, although this is discouraged as every guitar is very carefully set up before being sold. The pick-guard is fixed to the guitar by seven small screws, and is in white with an eye-catching red 'Firebird' logo.

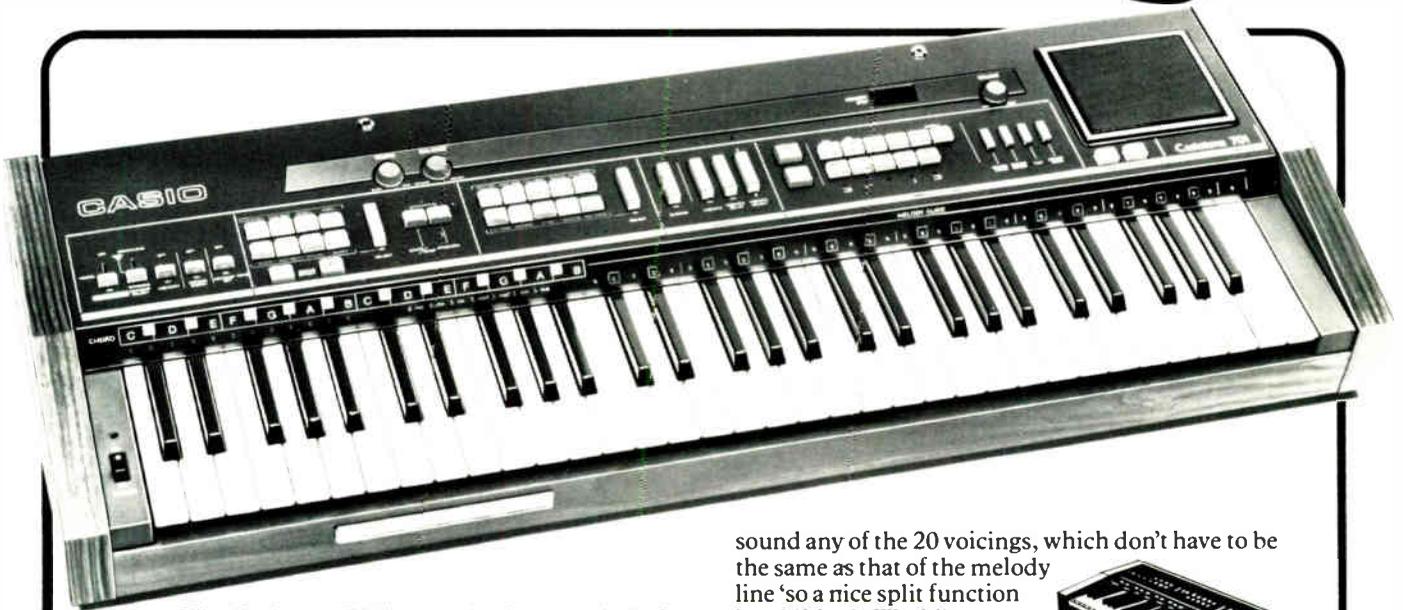
Performance

The range of sounds obtainable on this guitar really has to be heard to be believed. Treble cut with the active electronics in the 'standard' mode can give a deep, mellow jazz sound, whereas at the opposite end of the scale use of treble boost and the 'bright' mode can produce sounds that really 'clean your ears out'. In between there are an infinite number of possibilities, and the obvious appeal is to the working session musician who wants to obtain the maximum number of clear, rich sounds with the minimum amount of complication. On the other hand, a guitar of this power and appearance is obviously going to be most widely used in heavy rock music, for which it would be ideally suited. In a sense that's a shame, because for your £950 you would be getting a guitar which is capable of doing almost anything.

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The Gibson Firebird 2 is distributed in the U.K. by Rosetti, 138-140 Old Street, London EC1V 9BL. Tel. 01-253 7294.

The music press called it 'Real Magic'



The Casiotone 701 has received a great deal of critical acclaim from the music press. Music World, for example, from whom we took our headline, also called it 'the most talked about new instrument of the year.'

Why? There are a good many reasons, but as Organ Player put it 'there is so much to take in with the 701 . . . it is going to be very difficult to cover the whole instrument in the space available.'

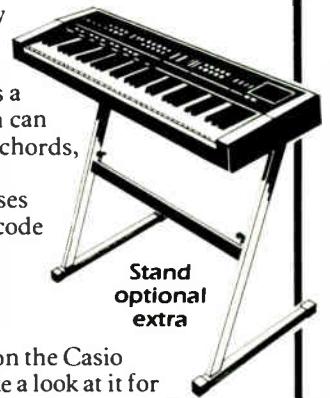
sound any of the 20 voicings, which don't have to be the same as that of the melody line 'so a nice split function here' (Music World).

The CT701 also features a Memory Play function which can store up to 345 notes and 201 chords, to play back along with you.

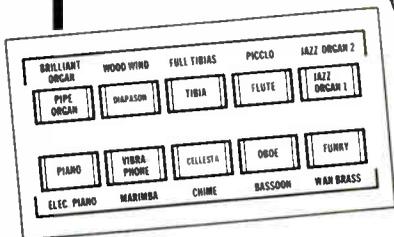
One more feature that uses the memory is the MS-1 bar code scanner which actually reads bar coded music and stores it in the memory to play whenever you want.

In fact, there's so much on the Casio CT701, that you'll have to take a look at it for yourself to discover just how much it can do. But for now, let's leave the last words to the music press. 'I can think of no better all round keyboard' Music World. 'A tremendous addition to the range of Casio Keyboards . . . it will lead the way' Organ Player.

See the Casio Keyboard range at your local music shop or fill in the coupon below.



Stand optional extra



20 preset voices

It also features the Casio Chord System which can be programmed to

So let's just talk about the main points. Basically, the Casio CT701 is an eight note polyphonic keyboard covering five octaves, and featuring 20 preset voices, complemented by 16 drum rhythms.

It also features the

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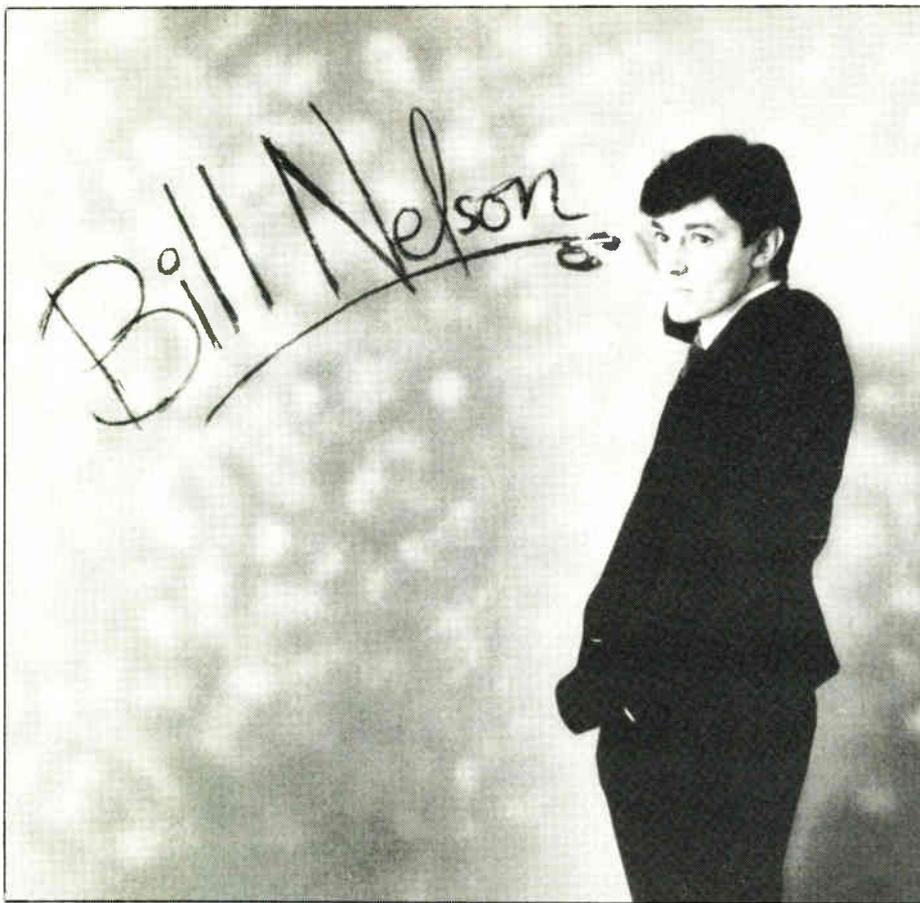
Please send me details of the CT701 and the Casio keyboard range, together with the name of my nearest Casio dealer.

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E&MM/11/82



A new Bill Nelson record has always been an event to enliven the ears, ever since Be-Bop Deluxe placed Bill's guitar and vocals in the midst of an alert mixture of heavy metal and sharp pop. Next came Red Noise in the late 1970s, a short-lived but significant group based around Bill's investigations which were taking him further away from any limiting labels like 'guitarist' and 'singer' and deeper into electronics and sound treatment. Now, Bill produces bands like the Units from San Francisco, collaborates with the Yorkshire Actors Company on music for theatre projects, plays everything from marimba to Casios, still runs his own Cocteau label, shoots film to accompany some of his audio productions, has his own 8-track studio, and even finds time to make Bill Nelson records!

Tony Bacon speaks to Bill following the release of his two-for-the-price-of-one LP, 'The Love That Whirls/Beauty and the Beast'

Speed Effects, Patchbays, and the Beast

"I still haven't been able to improve my home studio to the degree that I want to because of lack of money, but I recently updated it and got one of the Fostex 8-tracks, the 350 desk, and the digital delay — a whole package, just under £2000, which is really good. I've got some reasonable speakers now, too, some Tannoy Little Red monitors — before I'd been using old Dynatron hi-fi speakers for 10 years, and one of them was completely blown, you could never tell what you were getting until you mixed it on to 2-track and cassette and had taken it downstairs and put it on the hi-fi! The 'Ritual Echo' album was done on that old system, with the Teac 4-track that at the time only had three tracks working. The first thing I've done with the Fostex was the second soundtrack I've done for the Yorkshire Actors Company, called 'Beauty And The Beast'."

"One disadvantage with the Fostex 8-track is that while it's got varispeed, it can't do half-speed. It's quite a nice range on it, but it's not enough to be radically different. With 'Ritual Echo', what I'd do was to find a pretty mundane repetitive pattern on a keyboard, record it normal speed, and then turn the tape round, reverse the thing, and play it back at half-speed and dub on to it. Then I'd mix that down and bounce back, put it back to normal speed, and then add things as normal. That way, your initial 'inspiration' to overdub is coming from something that you hadn't conceived in the way that you played it. By doing that you get all kinds of things, in fact you don't actually know how it's going to end up."

"But I wanted the 8-track, and I needed a better desk — I had this old Canary desk that basically had bass, middle, and treble, whereas the Fostex 350's got two mid-band sweeps where you can select frequencies and then boost and cut, plus a fixed very high top and very low bottom. It's a bit weird getting used to the eq, the top and the bottom could do with a bit of variation. It's a matter of getting

the *right* sort of top from it, because you're really just working in the middle frequencies all the time and stressing the extremities of those: if you want bass you're stressing extreme low-mid. It's almost like thinking backwards at times, you have almost to adjust the middle frequencies to get the top and bottom sounding how you want, rather than adjusting the top and bottom and leaving the middle how it is. Once you get used to it, there's quite a variation.

"The only other problem with the mixer is that, as it's only got eight channels, if you're bringing back delay, harmoniser or whatever, and you want to do that up two channels for panning and eq-ing against the main signal, then you're stuck, because you've only got eight channels and there's eight tracks on the machine — and even with the auxiliary buss, it comes up in a fixed position. So a lot of the things I've been doing have been 6-track recordings, keeping two channels spare so I can use some delays and so on in the mixdown. If they put in an extra two channels on the desk I think it would improve it tremendously, I'm sure that it wouldn't put that much on the cost."

"The quality of the eight tracks on ¼-inch tape is unbelievable, although since the edge tracks tend to suffer from dropouts, anything that's going to be noticeable has to go in the centre. The footswitch for dropping in and out is invaluable for a one-man set-up: I've got this set of marimbas at home that I've been using a lot, and the footswitch is great for that — I'm always making mistakes! That's a simple mod that should be available on a lot of machines, I'm surprised no-one's thought of making it standard before."

"The other thing I could do with for it is a patchbay. All the plugging's round the back of the mixer, and when you've got the meter bridge on it's sort of fiddly when you have to repatch different things. It should either be on the front, I think, or you should have a separate patchbay. I mix down on to a Revox B77, and I've still got the Teac 4-track from the old system. I kept that so that, if I want, I can go from 8-track on to two tracks of the 4-

track, add two, and then on to the Revox, and so on. I can also use the Teac for the half-speed stuff, as I said, doing a basic 4-track mix using speed effects and then put it on to two tracks in stereo on the Fostex and dub on to that. I've not done any 8-track on to 2-track and then back on to the 8-track, sort of doing 16-track, I've kept it all in eight tracks; and sometimes, as I said, six."

"For 'Beauty And The Beast' there's no drum or drum machine rhythm tracks, the time's all in the playing, or it's drifting. When I've been doing demos at home I use my old Canary mixer with the Roland TR808, the separate outs to the Canary as a drum machine mixer. I eq all that, and split the toms and everything in stereo along with any panning that's moving about, and use the echo sends and returns on the mixer to treat the drums with harmoniser and delay. That goes from the Canary up two channels of the Fostex mixer and then out to two tracks of the 8-track, so that I have a stereo drum split with all the effects and movement on it out of the way."

"Then I'd dub up to six tracks, keeping the two spare for the effects. If there's a guitar or keyboard on there for a basic rhythm part, an essential structure, I put a short delay on it with the harmoniser, slightly detuned, and pan the extremes to give a real spread. That leaves a space in the middle for the detail. Obviously vocals and bass guitar go in the centre, and you can bring lead instruments in slightly too, moving them across if necessary. But it does mean, as I've explained, tying up two channels to do the effects at mixing stage, especially if you want to pan stuff. You can do it across the channels, plugging it in at the back right into the channel, but for that you need an effects unit that has dry signal coming off as well as the delay — the Fostex delay has that, but my harmoniser, for example, doesn't, so if you put that across the channel all you hear is harmoniser and nothing else."

"I've recommended the system to several friends who want an 8-track, I think for the money it's a better buy than any of the Teac or

Brenell 8s in that range — I just had a limited amount of money to spend to update from 4 to 8 and the Fostex seemed the best thing. I was toying with getting the Soundcraft, which is ½-inch tape and a lot more expensive by the time you've got a desk to got with it and everything. For under £2000, a mixing desk, delay line, and 8-track is great."

Beauty, Abrupt Edits, and the Drum Roll

"The previous Yorkshire Actors Company soundtrack that I put out on my Cocteau label, 'The Cabinet Of Doctor Caligari', had lots of people writing in because they just couldn't identify what the instruments are. There are some synthesisers on it, but a lot of it is acoustic instruments that have been treated in some way using tape techniques and recording techniques — for example, there's an autoharp in there which I'd hit with little hammers and things, tuning it to different chords and then recording it at half-speed, adding harmoniser to it with a pitch-drop and delay underneath it."

"The whole approach with 'Caligari' was one of using unorthodox techniques and instruments... for 'Beauty And The Beast' I wanted to use a different approach, the company were working quite closely to the script of Jean Cocteau's movie of 'Beauty And The Beast'. If anything, if Caligari was expressionistic, this is impressionistic, very soft-focused almost. Georges Auric did all the music for Cocteau's film, whereas the original of 'Caligari' was silent. There's no way you can compete with his score, to try to top that is folly."

"So I wanted to have things that sort of tied up with the original score, not in terms of melodies, but with little affectionate 'links', as it were. One of the things that Auric does in the movie is to use very long drum rolls at the start... so I thought, I'll do a long drum roll on a drum machine, (which I use sparingly throughout the play to emphasise the start of the big section). But for the introduction I thought I'd use blocks of sound that have drum roll feels — they don't sound like drum rolls, but do have that motorised kind of thing that a drum roll has. So I ended up recording some industrial looms, diesel trains, things like that, and doing tape montages and collages, and collages of chords, too. I'd spend ages setting up a sound on the string synth or something, and treat it in various ways, recording say 10 seconds of it — and I'd use chords that are actually physically impossible to play, by sticking matchsticks in the keyboard."

"There are abrupt edits in this introduction section, no smooth transition, and the whole thing is made up of these blocks of sound, fading in from a very delicate sound and building into this industrial thing, cutting to the drum roll — and then the action starts. It's much more melodic than 'Caligari', it has sort of semi-classical, Satie-esque kind of melodies linked with natural sounds: bird song, a running stream, and so on."

"I use two Casiotones on it — my main polyphonic instrument on it is the MT30, which is wonderful. I put it through a Roland Jazz Chorus amp with a slow, deep chorus on it, and reverb on. I've used that a lot, and I've got the little VL-Tone, tapping out the two buttons for real fast, rippling little runs of sequencer-like things. And again, for the price it's phenomenal. The one problem I've found with the VL is that when you get to the end of the 'sequence' it glitches as it goes through — the thing to do to get round that is to press the red 'reset' button just before you get to the repeat point, that way it returns to the beginning without a glitch. I first came across the Casios when I produced The Units in San Francisco — they have a remarkable synth player called Scott Reiser, very melodic



and expressive, constantly working his Mini in real-time."

"At home I still have my Yamaha SG2000 guitar, and a Veillette-Citron guitar custom built by Joe Veillette in New York. I've still got my Stratocaster, and a Guild D500, and various other less expensive guitars for odd sounds, like a Dan Armstrong perspex one. Keyboards are so expensive and I haven't had that much money to invest in them, but I've got my Minimoog which I've had for years, that's a standard thing, and I've also got an ARP Omni that I've had a long time. It has strings, but also a polyphonic section in it which is fairly limited but there are some nice sounds. And more recently, there's been the Casios."

"Also recently, I've bought a second-hand set of marimbas, as I mentioned — on 'The Love That Whirls' I wanted to use them for a slightly Japanese flavour. And I have other things, like the autoharp, which is really my wife's, a dulcimer, mandolins (which are good at different speeds), a drum kit, a TR808, and a Doctor Rhythm. I got the Doctor Rhythm first and upgraded it to the 808 — I don't use the Doctor Rhythm now at all. With the 808 I'm not really after a natural drum sound, whereas the Linn we used to re-do one

of the tracks from the new album for a single — Phonogram wanted a more 'commercial' version, sort of making it more danceable — produced a much more authentic, natural drum sound. When I work with the 808 I get into more interesting and treated sounds."

"I ended up with two-and-a-half albums' worth of material when I finished what became 'The Love That Whirls' in November 1981. I think that was one of the reasons Phonogram didn't immediately go bananas, there was so much there... so we've finally agreed after lots of hassling on a running order that has both instrumentals and vocals, using the instrumentals as bridges between the moods; 'Beauty And The Beast' will be packaged in too as a free album for the first 30,000 copies. Now they're starting to jump about and rave, but it's taken this long. It's really frustrating having to fight all the time for what should be your natural right (laughs). There's this kind of hypocritical thing, that there's been some kind of token revolution in the music industry and we're all hip now, we know what's happening. They change the colour of the sleeves and they wear different clothes and have different haircuts, but it's the same old dated attitudes underneath it all."

E&MM



ELECTRO-MUSIC ENGINEER

by Charles Blakey

Tuning Up — A Review of VCO Calibration Methods Part 1

There are several synthesiser kits available in the UK and the use of modern techniques in some make them a cost-effective choice for those with the ability to construct their own equipment. What seems to deter most would-be constructors, however, is the 'difficulty' of calibrating the voltage controlled oscillators (VCO's). The word 'difficulty' is in inverted commas because it is used by many potential constructors and not by the writer who in recent years has discussed the subject with many constructors and has usually provided them with a technique which suits their available resources.

Some potential constructors may have taken the trouble to read construction notes relating to calibration and usually end up being more confused. This is not because the instructions are unclear but simply, of necessity, they refer to 'R this' and 'RV that' and the whole thing becomes gibberish unless one is actually undertaking the calibration. To remedy this situation we review the main techniques available for calibration of VCO's so that constructors may more clearly assess which method suits the equipment available to them. In a later issue there will be a project which should fulfill most requirements for calibrating and keeping the synthesiser in tune.

The emphasis of the article is on calibrating exponential voltage controlled oscillators, that is, oscillators in which a unit change to input voltage will alter frequency in relationship to the equally tempered scale. Usually this scale is a one volt change of input voltage to alter frequency by one octave; as used in the E&MM 'Spectrum' and many other synthesisers. The methods may, however, be readily applied to other scales and also to linear oscillators in which the keyboard controller derives the exponential voltage required for the equally tempered scale.

For those wishing to relate the methods to a practical situation reference is made to the 'Spectrum' synthesiser and the appropriate circuits will be found in the January and February issues of E&MM.

Accuracy and stability

We referred earlier to cost-effective kits. A major part of their effectiveness is the ability to calibrate them to an accuracy which is suitable for musical application. There are some kits available which frankly are only suitable for making funny noises. One supplier



mentions that if the scaling is not better than a quarter of a semitone then there may be something wrong with the oscillator. In other instances the frequency drift is so bad as to make nonsense of calibrating. We will assume, however, that the VCO being calibrated is of good design and capable of attaining the required accuracy and stability.

Irrespective of the exact design the constructor should be aware of the several factors which affect the accuracy and stability of even the best VCO. The most important are:

a) **Supply Voltage.** Invariably within the VCO design a reference current is established, for example, in the 'Spectrum' (E&MM January '82, P.90, Figure 9) resistors R175 and R176 set up a reference current of 10uA from the +15V supply into pin 13 of the CEM 3340 VCO, IC15. At a frequency of about 1kHz a variation of 100mV into these resistors will cause a change of about 7Hz. Clearly the stable power supply used is essential. Other voltage controlled oscillators may be more sensitive to supply variations and in some instances the negative supply voltage will be the most critical. Thus before carrying out the calibration ensure that the power supplies are set as accurately as possible to their rated output voltage. Normally a drift in supply voltage will only affect tuning which can be counteracted by the 'fine tuning' control found on most VCO's. If, however, abnormal frequency drifting is encountered with a VCO which is known to be reliable then the first step is to check the stability of the power supply. Also beware of tagging on other

equipment to the synthesiser's power supplies. In some instances this may cause instability as its current limit is approached. In particular, avoid connecting equipment with high current surges, such as LED's and some low frequency oscillators since their intermittent drain on power may cause unwanted modulation effects.

b) **Control Voltage.** This will normally be derived from the keyboard controller. Again at about 1kHz a variation of only 10mV will alter frequency by about 7Hz. This 10mV will often be the limit of measurement with a three and a half digit voltmeter so if an external control voltage is used for calibration (see later) then one should be aware of the accuracy required. When the calibrating voltage is derived from a calibrated keyboard then usually the required accuracy is available. The output voltage must remain constant during the period of the calibrating step and this should always be checked.

Relating to the above is that all other variable voltage sources connected to the VCO should normally be disconnected during calibration. Even the fine tuning control may become disturbed during calibration and if possible it should be disconnected.

c) **Timing Capacitor.** The timing capacitor for IC15, mentioned above in the 'Spectrum', is C31. Although a temperature stable, low leakage capacitor is used there remains the possibility of leakage due to dirt and flux on the foil side of the PCB. The charging currents in modern VCO's are of low level, for example, below 100Hz the currents may be less than one microampere.

Continued on page 32



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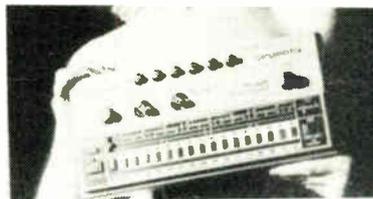
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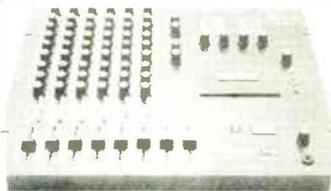


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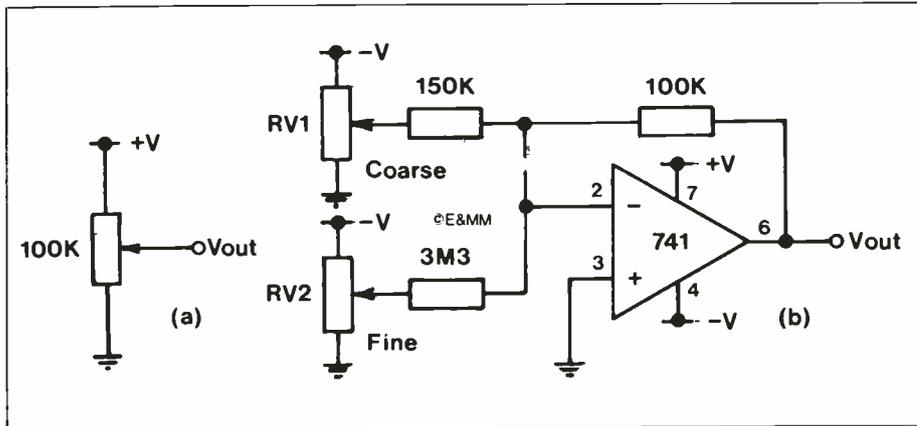


Figure 1. External Voltage Sources.

Additionally at high frequencies flux becomes more conductive. It is therefore desirable to clean the foil side of the PCB, at least in the area of the timing capacitor, using either a proprietary solvent or by careful scraping. d) **Temperature.** The CEM 3340 VCO IC has excellent temperature stability due to its unique compensating technique. The method compensates for variations in the temperature of the chip within the integrated circuit package and also for changes in ambient conditions which in turn will influence the temperature of the IC. In other designs external temperature compensating resistors may be used. While the package protects the CEM 3340 from rapid fluctuations in temperature, such as those occurring from draughts, other designs are more susceptible to such variations. Furthermore, some of the components external to the VCO may be more temperature sensitive than the IC. Before commencing calibration allow sufficient time for temperature equilibrium to be reached and protect the VCO from rapid variations in temperature.

The Calibrating Voltage

A Digital Voltmeter (DVM) is essential to achieve an accurate calibration. A reliable DVM will in any case be required at various stages of construction, for example, in setting up the power supplies, keyboard voltage and so on. Absolute accuracy of the digital voltmeter is not essential but reproducibility is, and most meters are satisfactory in this respect. In other words it does not really matter if the DVM reads 4.82 volts when the actual voltage is, say, 4.91 volts but invariably it will always read 4.82 for an input of 4.91 volts. If a calibrated keyboard is used for the calibrating voltage then connect the DVM to the keyboard voltage so that if the voltage is seen to drift the appropriate key may be pressed again to restore the original voltage. If an external voltage is being used then this will normally be derived using a potentiometer connected (usually) to the positive supply, as shown in Figure 1a.

Remembering that we have to adjust the voltage to within 10mV, or better, this can be an extremely tedious

operation with a single turn potentiometer. A ten-turn potentiometer would help but another alternative is shown in Figure 1b and this circuit may be quickly and cheaply constructed on a piece of stripboard. Adjustment of RV1 into R1 will give the same effect as Figure 1a but addition of RV2 and 3M3 acts as a 'Fine' adjust such that the full potentiometer rotation will only change the output by about half a volt when a -15V supply is used. The potentiometers may be virtually any linear single turn types, preferably in the range of 1k to 100k, which will make it much easier to derive and maintain a precise voltage. The writer uses ten turn potentiometers for RV1 and RV2 and a voltage accurate to 1mV can be established in seconds, although this is an expensive option unless one is frequently involved with calibration.

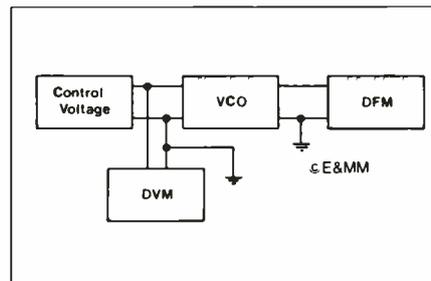


Figure 2. Practical set-up for Method 1.

Calibrating methods

Several methods are now described for calibrating voltage controlled oscillators. The headings briefly describe the equipment required for the method, in addition to a Digital Voltmeter. Irrespective of which is applicable to your resources it is desirable to read through all of the techniques, particularly Method 1. The latter contains information which is not repeated elsewhere and a study of all methods may reveal a combination of approaches which is more appropriate to a particular design of VCO, or synthesiser.

METHOD 1.

Digital Frequency Meter (DFM)

The arrangement of equipment is illustrated in Figure 2. If the voltage source is a keyboard then press key A = 440Hz and note both voltage and frequency. The latter may be considerably different from 440Hz at this stage

but preferably it should be within 50Hz of this value. If the difference is greater than this then press another key which will put you in the desired range. If a variable voltage source is used then increase the applied voltage until a reading of about 440Hz is obtained and again note both voltage and frequency. With the keyboard arrangement now press next lowest A, or a key an octave lower if A = 440Hz was not used, while with the variable voltage source decrease voltage by exactly 1.00 volt, or better. Again note readings. Divide the first frequency by the second and for a one volt per octave scale you should get an answer in the region of 2 at this first attempt. The VCO will have a scale adjust pre-set (RV23 for VCO 1 in the 'Spectrum') and moving its wiper in one direction will decrease the frequency ratio while turning the wiper in the other direction will, naturally enough, increase the frequency ratio. Suppose the ratio obtained at the first attempt is 2.1 then this indicates that the frequency of the VCO is too high, that is it is becoming progressively sharper up the scale. Thus the scale adjust pre-set should be turned to decrease the frequency of the second reading (which should still be present) but do not adjust it such that the second reading is exactly half the first because this will be too great an adjustment. Note the new frequency reading, having checked that the voltage has remained stable, and reverse the above procedure, namely, press a key an octave higher or increase external voltage by 1.00 volt. Divide the new reading by the original and the result should be closer to 2. Continue these steps of adjusting the scale pre-set and going up (or down) one octave, or 1.00 volt, until this step change results in a frequency ratio of exactly 2, ie, preferably a ratio of 2.00 and perhaps better with accurate equipment and a good quality VCO.

With VCO's based on the CEM 3340 (and some others) there is a facility to tune the high frequency end of the scale so as to maintain the one volt per octave relationship in the 5 to 10kHz range (RV55 for VCO 1 of the 'Spectrum'). To obtain these frequencies when using a keyboard for the calibrating voltage it will be necessary to alter the range of the VCO by using an octave shift or other type of range switch. Using a DFM the procedure is virtually the same and no more difficult than for the low frequency adjustment described above. The only difference is that of switching back and forth from nominal frequencies of 5kHz and 10kHz. It should be noted, however, that when this adjustment is fitted to the CEM 3340 the wiper of the high frequency adjust pre-set should be in the grounded position during the low frequency calibration stage. Additionally, if the low frequency calibration is not carried out accurately then one cannot expect to achieve satisfactory results with the high frequency adjustment.

Next month we will continue with several other practical methods for Tuning Up.

FACT FILE

John Walters *Landscape*



"My main concern is to produce music - by any means available. I consider myself more a composer and arranger than a player and I don't really mind what instruments I use if I get the desired effect. One of my main interests at the moment is using alternatives to the usual keyboard method of controlling synthesisers, and to this end I'm increasingly using computers as part of my overall approach to composition."

Instruments

"I use two wind synths, the original Lyricon designed by Bill Bernardi in the mid-seventies, and a Wind Synth Driver, which produces control voltages for a synth such as the Roland Promars. I also use the MC4 Microcomposer computer, which has a 48K memory and a digital cassette dumping facility: I can connect this to any synth working on a 1V/octave system."

"To get a wider range of sounds I like using the Roland Modular System 100M. This allows a wide variety of different sound patches and suits the band quite well at the moment, as modular systems are particularly suited to computer control."

Sequencers

"I don't really have any need for sequencers because computers do all that and a whole lot more! With computers you can actually get inside the program and I find the comparative inaccessibility of sequencers offputting."

FX

"Synthesiser sounds often only come to life when a few effects are added. The AMS digital delay is one of my favourites, but I'll try anything. It's important, though, that the noise levels are fairly low."

Drum Machines

Landscape member Richard Burgess co-designed the Simmons Kit and this is usually used, or occasionally a drum machine such as Roland TR606 Drumatix.

Favourite Studio/Engineer

"It's nice to keep moving and try different environments. Good maintenance and easy access to food are important!"

Home Recording

Teac 3440 4-track and Revox A77: the computer allows several instruments to be put on each track before any overdubbing is needed.

Tom Bailey *Thompson Twins*



"The band was down to a three piece again recently, and the only old song we're doing now comes from way back, from the first time we were a three piece! It's impossible to do the 7-piece songs, even using polyphonic synths such as the Oberheim OBXa and the Prophet 5, and in any case we can now get a more aggressive sound, which I like, using the Oberheim and the new drum computer. The trouble with the Prophet is that its basic sound quality is rather 'soft', and individual tracks tend to become blurred after a few track bounces."

Keyboards

"I take the OBXa, Prophet 5, Roland RS09 strings and a Micro Moog on tour. All the keyboards are direct injected both on stage and in the studio."

Sequencers

"I use the Oberheim DSX quite a lot, but when we were at Compass Point Studio I had trouble getting it to synchronise; in the end it wasn't worth the effort and I played everything by hand."

Drum Machines

"We had the Movement Drum Computer Mk. 1 on hire, and now we've got the new version on order. It doesn't matter that they can be a bit laborious to program, because once that's done you can move whole bars and choruses about and end up with a complete song. Again, the Movement has an aggressive sound which I like more than the Linn or Oberheim."

FX

"I've recently made two fantastic discoveries - the AMS Digital Delay/Reverb, which is made in Burnley somewhere, and Roland's Dimension D, which both help to keep the keyboard sounds clear and separate. Almost anything you do with them sounds great. Also I use the Roland Chorus Echo and the Yamaha 1010 signal processor live."

Studios

"We used Compass Point last time and mixed at RAK - Phil Thornley's a great engineer."

Home Recording

"I've just bought the TASCAM 8 track: the small reels on the Fostex put me off. Sometimes I do a demo myself, but most of the writing is done between the three of us."

Frank Tovey *Fad Gadget*



"I used fewer electronics on 'Incontinent' because I'd started to become frustrated with the limitations of conventional playing and triggering with a keyboard. I'm not really a musician, but I'm starting to get into the details of key changes and harmonies in a non-technical way, and I wanted to be able to write longer and more complex instrumental parts. Daniel Miller at Blackwing studios now has a Roland MC4 Microcomposer, and since that has the option of working in real time it was ideal for me, and now takes a lot of the keyboard parts."

Instruments

"I mostly use whatever's available in Blackwing studio. There's an ARP 2600, which provides sound effects such as the animal noises on 'Back to Nature', and a Roland SH1. Also there's a French synthesiser, the Kobol, used without a keyboard. I use tapes quite a lot, and like the idea of a Fairlight to sample real sounds, but I've heard that system isn't perfected yet."

Sequencers

"I used to use the ARP analog sequencer, but that was limited to 16 notes and tended to produce songs heavily based on a single riff. Instead of just putting layers on top of that I'm using more harmonies and key changes instead, so the MC4's ideal."

Drum Machines

"I started out with an old Mini Pops preset machine, but now I mostly use the Roland CompuRhythm at the studio."

Amplification

"When the band plays live we use a drum kit including some roto-toms and the old Simmons four-pad drum synth. Also we've got my keyboard player's gear and so on, so it's easiest to put everything straight into the mixer."

Home Recording

"I don't do demos as such anymore. I found it's impossible to capture the feeling of a song that we've started out by playing live when you're sitting at home trying to reproduce it, so now I write the albums in the studio. I start by programming the MC4 at home - I only had a week with it for the new album, which shows how easy it is to pick up - and dumping the program onto cassette, then re-loading it in the studio and playing the parts on synths like the Kobol."

A HISTORY OF ELECTRONIC MUSIC Part 8

When the German Music Invasion began at the end of the sixties, breaking the Anglo-American stranglehold, it was spearheaded by a handful of groups, amongst them Amon Düül II, Can, Tangerine Dream and Kraftwerk. This new German music was diverse, exploring many new and often startling areas. At home they were supported by a huge and highly active back-up featuring such talent as Ash Ra Tempel, Agitation Free, Embryo and Neu.

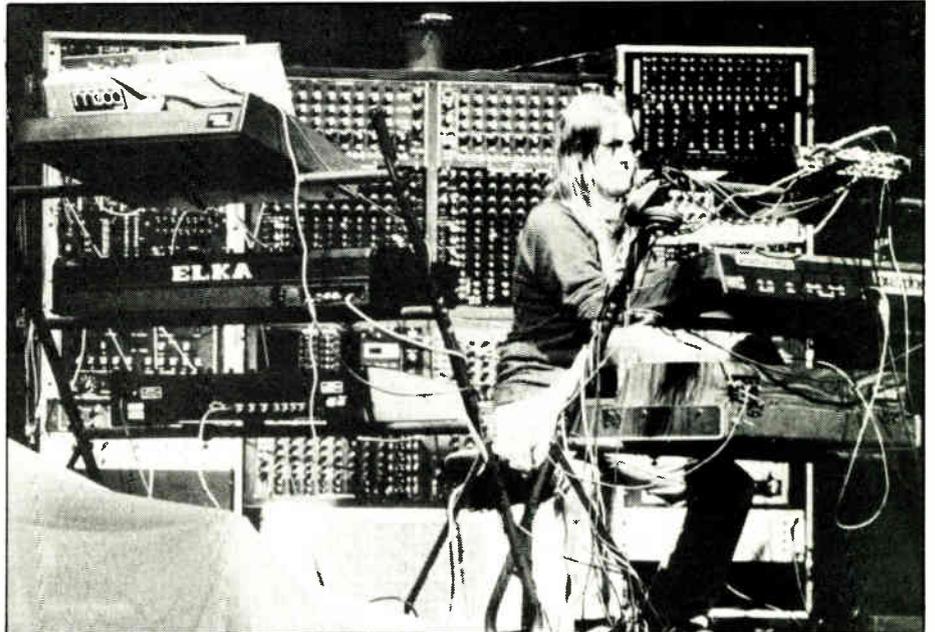
Tangerine Dream

Tangerine Dream probably epitomised more than any other group German electronic music in the late sixties-early seventies. Their founder, Edgar Froese, a trained artist and sculptor, entered music professionally in 1965. Influenced by British rock and roll, he formed a group called The Ones. After playing in Cadaques, North Eastern Spain, he met Salvador Dali and spent much time with him. The Ones did a concert in his villa, making music to go with his *Christ Statue* as well as working on a television film about Dali with the French producer J. C. Averty. This episode and Froese's increasing exposure to contemporary electronic music led him to break away from the limitations presented by a conventional rock band. With the break up of The Ones in 1967 he was in a position to form Tangerine Dream, a name he devised from the influential *Sgt. Pepper* album.

Initially Tangerine Dream were definitely a rock band, though often fluctuating inside and outside convention. Their first gig was in Berlin in January 1968 following four months solid rehearsal. The line up featured Edgar Froese - lead guitar, Volker Hombach - flute and violin, Lanse Hapshash - drums, Kurt Herkenberg - bass.

The student uprisings of that year were instrumental in determining the band's direction, demanding as they did a total break from the past. Songs that were structured were considered bourgeois! This philosophy led to free music, and Tangerine Dream often played five or six hours a night at the Zodiac Club in Berlin.

Despite its strong underground following this particular version of Tangerine Dream was not a commercial success and they split up in 1969. Two other formations were tried unsuccessfully, although the fourth version was successful and led to a recording deal with Ohr Musik. The line-up of Edgar Froese, Klaus Schulze (drums) and Conrad Schnitzler (cello, violin and flute) made an experimental tape which was released by Ohr in 1970 as *Electronic Meditation 1*. Schulze then left, making way for one of the best young jazz drummers in Germany, Christoph Franke. Franke was formerly with Agitation Free, a seminal group on the German scene. He had studied with the Strasbourg Percussion Ensemble and had done a six month experimental course in which equal numbers of musicians and theatrical people discussed the relationship between music and the modern theatre. This line-up with Steve Schroyder (who replaced Schnitzler) recorded *Alpha Cen-*



Tangerine Dream's Chris Franke.

tauri which was their first vaguely commercial success in Germany. Despite its success, Steve Schroyder left to be replaced by Peter Baumann. Peter had been playing organ with a rock outfit called The Ants. This line up became the most stable and went on to record for the next six years.

1972 saw Tangerine Dream recording *Zeit* their most experimental album to date. *Zeit - largo* in four movements - had a number of guest musicians on it; Steve Schroyder returned to play organ, Florian Fricke from the group Popol Vuh played Moog on one track, and there were four cello players. It was however the successor *Atem* that gave them the recognition they deserved outside Germany. British radio disc-jockey, John Peel, chose *Atem* as his album of the year. In early 1974 *Phaedra* their first international release on Virgin records, with whom they had recently signed, reached a vast number of people as a result of John Peel. Once again he was the only person playing the album on the radio. His airplay and enthusiasm led to its appearance in the Top Ten albums in Britain, although Tangerine Dream had neither played nor given press interviews in Britain. *Phaedra*'s success led inevitably to UK concert appearances. The first of these in London introduced the British to Tangerine Dream's tradition of performing totally improvised music in almost darkness, without acknowledging the audience. They did use, on some occasions, a unique video-synthesiser and a quadrasonic sound system, enveloping the audience in a total audio-visual environment. Tangerine Dream became established as a strange phenomenon on the international music scene, their records selling well and even going 'gold' in Australia.

The need to transform their performance into an 'event' rather than a concert led them

to play in some unusual venues, among them Rheims Cathedral, which was later to be reconsecrated as a result of a 'lack of respect', a Roman amphitheatre in Southern France, Coventry Cathedral and two concerts at London's Albert Hall.

Years of extensive touring and the release of *Rubycon* and *Ricochet* - the latter partly recorded live - established Tangerine Dream as the German electronic band. William Friedkin, director of 'The French Connection' and 'The Exorcist' had become a fan of their music. He proposed that they make the soundtrack for his next film. It was no ordinary soundtrack; he had them make it before the film was shot. He then shot the film in direct relationship to the music.

During 1977, Steve Jolliffe who had left an earlier Tangerine Dream to join Steamhammer contacted Edgar with a view to re-joining. He had not been idle since leaving and had written much music for film as well as learning animation and super-imposition techniques.



Peter Baumann.

European electronic music including Tangerine Dream, Kraftwerk and Giorgio Moroder.



Kraftwerk on stage.

Another new member, Klaus Krieger, an old friend of Froese, was interested in sculpture as well as drumming. These combined interests led to the building of his own unique drum set. This line-up released *Cyclone* in 1978; it included vocals written and sung by Steve Jolliffe. This experiment was not repeated and *Force Majeur* was a more traditional Tangerine Dream album than its predecessor. Their album releases since then have been less than inspired, but the recently reviewed *Exit LP* (E&MM, January 1982) is somewhat of an improvement showing their continued and innovative production of electronic music.

Tangerine Dream's personnel, both past and present, have produced many excellent and varied albums, the most prolific of these being original Tangerine Dream drummer, Klaus Schulze. His recording, *Irrlicht - Quadruphonic Symphony for Orchestra and Electronic Machines*² - represents the culmination of ideas developed with his original band, Ash Ra Tempel and Tangerine Dream. Whilst it has a very slow pulse rate and as such demands careful listening in a near perfect environment, it is extremely rewarding. Klaus Schulze uses a dense velvet sound base as a foundation for this work; from this base emerge vibrant solo voices. A series of electronic sounds manifest themselves only to disappear a few moments later. It is typical of his work although several of his other albums are easier to assimilate on first hearing, for example, the music from Lasse Braun's film 'Body Love'³, 'Picture Music'⁴, or 'Blackdance'⁵.

Founder member of Tangerine Dream, Edgar Froese, has also released several solo albums, amongst them one of the first to use the 'artificial head' method of recording. This method produces 'out of head' sounds when listened to on headphones. Entitled *Aqua*⁶, it consists of just four tracks. The opening track 'ngc 891' characterises much of his work, slow pulses, gradual timbral transformation and layers of sound superimposed. The stratification of sonorous elements produces a transformation from monophonic to polyphonic textures, orna-

mented by tape echo and filter sweeps. It bears little resemblance to rock music other than the inclusion of an extended bass sequencer ostinato, indeed it could be considered a 'classical' electronic composition.

Former member, Peter Baumann, has three solo albums to his credit, the latest of these being *Repeat Repeat*. Baumann's solo projects are much more aligned with the mainstream of pop/rock music, so it is no surprise that he has now left Tangerine Dream to pursue a solo career.

Kraftwerk

Whilst it would be true to say that Tangerine Dream's music is for the head, their contemporaries, Kraftwerk, have gone on to produce electro-dance music, particularly towards the end of the seventies.

Apart from being the first pioneers of synthesised rock music, Kraftwerk became the first German group to top the British singles chart. With a song entitled 'The Model' at number one in Britain they finally realised their quest to produce a hit with an all-electronic orchestra. Ralf and Florian who lead the group first met in Dusseldorf in 1968 and have worked together ever since. Working with producer Conrad Plank, they broke away from their original band 'Organisation' to form Kraftwerk - literally 'power plant', a reflection on their industrial background.

The first album *Kraftwerk*⁷ released in 1972, sounds fairly conventional by today's standards, but it was their third album which started them on the road to being the most successful German electronic band. An edited version of the title track 'Autobahn' just failed to reach the top ten in 1975. *Autobahn*⁸ was an electronic reconstruction of a trip down a motorway. Over a solid rhythm, its production and 'catchyness' appealed to a large number of the record buying public. Shortly afterwards the group changed record labels, moving to Capitol/EMI from Vertigo. They had a minor hit again in 1978 with 'Neon Lights', a track from their most successful album up to that time. *The Man Machine*⁹.

During the group's career they have explored technology more than any other group, having developed a stage set more akin to a studio and using computer controlled equipment to a greater extent than any other band. The last album released by them, *Computer World*¹⁰, featured a pocket calculator as a sound source. The tour to promote the album's sales proved without a doubt that Kraftwerk are capable of touring and releasing albums as much or as little as they wish in the future - as the least conventional electronic band of all, just about all electro-dance bands owe them a debt of inspiration.

Kraftwerk's determination to produce electronic dance music was to some degree pre-empted by fellow German, Giorgio Moroder. Working in Munich at his disco 'factory', he produced some of the most popular electronic music, 'Euro Disco'. Donna Summer's *I Feel Love* with its electronic, trance inducing beat, released in 1977, led to Moroder enjoying more than a little success in this field of music. He released a succession of albums in this genre and has also been called upon to produce soundtracks, the most notable being for 'Midnight Express' and more recently 'Cat People'.

Giorgio Moroder undoubtedly popularised the use of the synthesiser/sequencer in music and was to some degree responsible for the extended version of 12" singles soon to become known as a *Disco 12*. *Love to Love You Baby* was notorious at the time (1976) for Donna Summer's orgasmic groans over the top of Giorgio's insistent 4/4 beat lasting some 16 minutes. The 'Disco Version' often made use of musical drama and instrumental texture rather than vocal personality or complexity. Euro Disco, rather than lengthen conventional pop-songs, began structuring long compositions to fill entire album sides with music which ebbed and flowed in one beat-driven but melodically different cut. At times light and 'poppy', sometimes dramatic and cold, often as minimalist as the avant garde, Euro Disco freed disco music from its desire to cannibalize the past and develop new forms, for example in Cerrone's *Supernature*, Giorgio Moroder's *E = MC²* and Donna Summer's *MacArthur Park Suite*. The German electronic music scene has had a huge effect on pop music in general, and disco music in particular.

E&MM

Discography

1. Electronic Meditation, Import.
2. Irrlicht Quadruphonic Symphony for Orchestra. Ariola 27582ET (Brain 1077).
3. Body Love. ILPS 9510-A.
4. Picture Music. Brain 1067.
5. Blackdance. Caroline CA2003, Del.
6. Aqua. Brain 0060, 404.
7. Kraftwerk. Vertigo 6641 077.
8. Autobahn. Mercury SRM-1-3704.
9. ManMachine. EST-11728.
10. Computer World. EMC-3370.

GUIDE TO ELECTRONIC MUSIC TECHNIQUES

by Dave Crombie Part 2



Robert Moog demonstrating his pitchbend wheel.

Last month we looked at some of the various performance control hardware which manufacturers provide for us on their machines in order that we may exploit the full potential of the synthesiser as a musical instrument. The performance control is a device that can be used to modify a certain parameter of the instrument's sound whilst it is actually being played, thus it has to be ergonomically positioned on the instrument's control panel, and it must afford the right 'resolution' of control - what's more, it must feel comfortable and natural to use. This month we shall continue to look at some more types of performance controls.

Proportional Pressure Pads

The devices were developed by ARP for their range of monophonic synthesisers. Essentially these consist of small rubber pads that cause an element to change its electrical resistance when pressed. So it is a simple matter to design a circuit which will turn this varying resistance into a control voltage. ARP generally incorporated three pads onto their instruments - one for bend up, one for bend down, and the third for introducing modulation. ARP were rightly proud of their pads as they were very pleasing to use and by applying different amounts of pressure to specific areas of the pad you could very accurately determine the amount of effect you were going to induce.

Sprung Lever

Roland are the main supporters of

this form of control mechanism, which is essentially the same as the sprung wheel, only mounted from left to right, not up and down. Again this device suffers from the problem of not being able to be left in a 'bent' position, but otherwise most people quite like it.

The Joystick

This is probably the most obvious existing control device that could have been incorporated into the early synthesiser designs, however very few manufacturers saw it as a good idea (except for Korg, Polyfusion, and a few others). On the surface a joystick seems like a perfect mechanism to control the various parameters - you can use one plane (normally the X-plane) for pitchbend, and have it centre sprung, if desired, and use the Y-plane for modulation - one manufacturer (Jeremy Lord) on his ill-fated Skywave synth utilised a 3-way joystick, with rotation of the stick being the third movement, and he used this as a volume control (see Figure 4). The joystick is one of the best devices to go for if you are building your own synth, and aren't too keen on mechanical engineering - you can easily obtain ready made mechanisms, and you can decide as to which control pots you want to use.

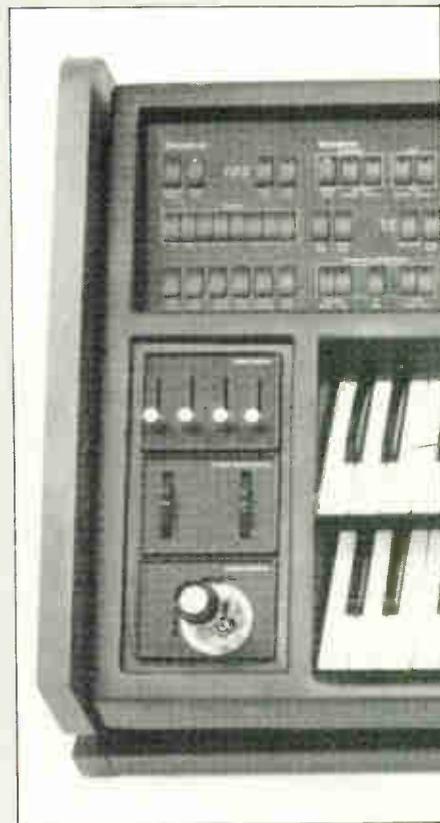
Some musicians, however, tend to dislike the joystick, possibly because it is too clever - preferring to have separate controls for pitchbend and modulation in order to see exactly what they are doing, even if it does mean doing the splits with their fingers.

We've now looked at the most popular control mechanism. However, there are one or two more worth mentioning, if only for the reason that they should be, if possible avoided. The rotary pot with a dead band, but no



ARP Proportional Pitch Control pads.

centre detent, is an undesirable control. It is often used as a pitchbender and operates either side of a central dead-



The Prism slider, thumbwheel and joystick controllers.

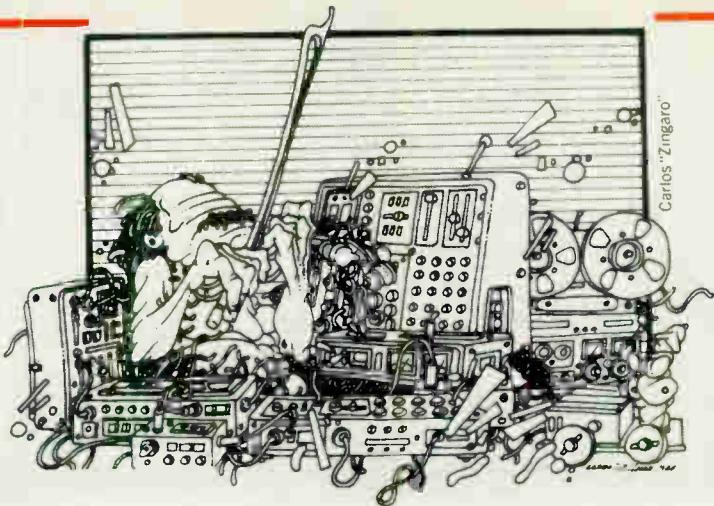
band - anticlockwise rotation lowering the pitch etc. This device has two problems - first it is awkward to use, and has no 'feel' to it; and second you can find yourself not returning the control exactly to its central deadband, so that consequently the synth goes out of tune.

The slider with the centre-detent is also very tricky to use effectively - sliders operating about a central position are clumsy to control. A slider can however be used as a pitchbender 'up' only from its stop position; in this mode it is perfectly easy to control (this might also appeal to the home constructor).

Velocity and Force Sensitive Keyboards

There is a long running debate concerning these types of keyboard as to whether they should be called touch 'sensitive' or touch 'responsive'. It would seem more logical to class them as being responsive to touch, but the general consensus seem to classify a keyboard whose action can be used to produce a modifying control signal as being touch sensitive. A touch responsive keyboard is considered to be one with no moving parts - i.e. one whose keys consist of a series of touch pads, that respond to 'fleshy contact', e.g. as on the Wasp and Gnat synthesisers. That then is the authoritative statement on the subject, but be prepared to find some musicians who use the terms round the other way.

Let's start by examining the velocity sensitive keyboard. This is the electronic design engineer's method of producing a keyboard that will generate



a control signal that varies with the strength the note is struck. In effect the keyboard is responding to the speed at which the note is depressed rather than to how hard it is to play, but most of the time there is little difference between the two. The way in which this device functions is, like all good ideas, simple. There are two contacts provided for each key, arranged such that one contact breaks before the second one makes. As the first contact breaks, a capacitor is allowed to discharge until the second contact makes and the decay is halted. It therefore follows that



Adaptive System's Synthia can be controlled by 4 joysticks.

the faster the key is played, the less time the capacitor has to discharge, and thus the greater the charge, hence the control signal, remaining on the capacitor. This is the basic principle behind the velocity sensitive operation. However, various manufacturers do have variations on this theme and certain electronic piano manufacturers (e.g. Yamaha and Crumar) have their own LSI chips incorporating touch sensitive circuitry.

The second type of touch sensitive keyboard is of the force sensitive variety. Here there is a sensor of some type present at the bottom of the key's travel. So, having played the note, by pressing harder against this sensor, a control voltage or signal can be generated. Unlike velocity sensing, force sensing is generally a monophonic effect, i.e. there is just one sensor for all the notes of the keyboard. This is generally due to

reasons of cost. In many cases you will find that the application of this force, or second touch as it is sometimes called, causes the entire keyboard to move, which can be a bit disturbing if you aren't used to it. This movement is because of the arrangement of the force sensor and makes it somewhat easier to incorporate into the instrument's overall design. One such example of this dipping keyboard can be found on the new CE20 from Yamaha.

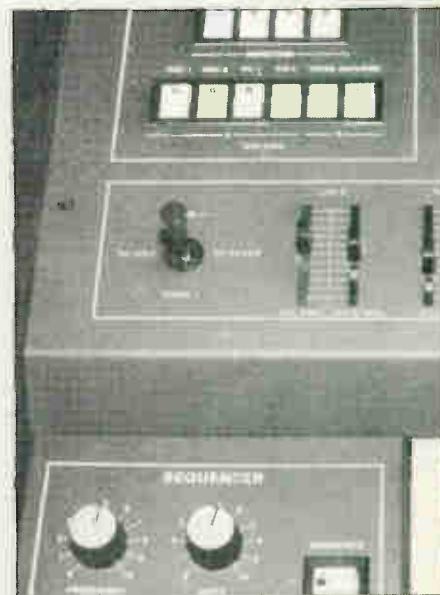
One of the main advantages of the touch sensitive keyboard is that it doesn't require the use of your second hand - you are still controlling the sound - pitch and performance effects, so you still have a hand free to make further modifications to the sound, or to use to play another instrument.

Pitchbending up and LFO modulation are the most common uses for the force sensing keyboard. Sometimes the velocity sensor is generally routed to the envelope generator/voltage controlled amplifier so that the output level of that note can be determined by the speed at which it is struck. This isn't always the case, as the velocity signal is often used to open the voltage controlled filter's cutoff frequency. This leads to the sound becoming brighter, which in turn makes it sound louder to our ears, therefore this effect has a similar result in terms of amplitude to routing it to the VCA, but with the added 'bonus' of enabling the player to simultaneously emphasise a note by brightening it. By sending this velocity con-

trol signal to both the VCF and VCA we can get as close an approximation to the action of an acoustic piano's keyboard that is financially realistic (i.e. without spending thousands).

The velocity control signal can also be used in conjunction with the filter to produce those characteristic overblow effects that are associated with woodwind and brass instruments; these can be further enhanced by using the force sensor to add filter and oscillator vibrato (if your synth is fitted with both features).

So, you can see that there is more to touch sensitive keyboards than you may realise. Their role in synthesis is most important, especially if you consider you've still got that spare hand if



Elka Synthex joystick controller.

you are using a mono synth. It is more natural to have just one hand controlling the various parameters of the sound than, as with the more conventional performance controls, splitting the functions so that one sets the pitch and the other is used to modify it; a pianist has control over each note with each finger, and you don't hear him complaining!

E&MM



Yamaha GS1 with velocity and pressure sensitivity.

EKO Ritmo 20

With the recent developments in drum machine technology bringing rhythm programming within the reach of any musician, you might imagine that we had seen the last of stand alone preset machines; EKO obviously do not agree and present us with their Ritmo 20.

This rhythm box has, as the name suggests, a selection of 20 preset rhythms to choose from. Three of these are in 3/4 time while the rest are in 4/4. This may sound fairly limiting but the machine also offers Intro and Fill-in breaks for each of the 20 rhythms.

Nine sound generators are built in, these are: Bass Drum, Snare, Conga, Tom-Tom, Hi-Hat, Cymbal, Rimshot, Claves and Cowbell. To adjust the overall sound balance a six channel mixer is provided. This is where the machine comes into its own, the percussion simulation is excellent, but more of that later.

The circuitry comes packaged in a very smart pressed steel case finished in matt black. All the rhythm controls are neatly arranged on a sloping front panel while the Mains input, Fuse, Headphone level and Output socket, Audio outputs and Foot-switch connector are on the back.

Control panel

The rhythms are selected by 12 black switches arranged in a 10 x 2 format, ie each of the 10 selects one of two rhythm banks dictated by the other two switches. All of the switches have built in red LED's to indicate the rhythm selected. The rhythms encoded in memory are; Bank 1: Beguine, Samba, Jazz Rock, Rock 1, Rock 2, Rock 3, Disco 1, Disco 2, Funky and Pop Rock, and Bank 2: Waltz, Jazz Waltz, Tango, March, Swing 1, Swing 2, Shuffle, Ballad, Bossa Nova and Cha Cha. Above the selection switches are the voice balance controls, these allow six channels to be mixed; Bass Drum, Snare, Conga/Tom-Tom, Hi-Hat, Cymbal and Rim Shot/Claves/Cowbell. The sustain of the Conga/Tom-Tom voices can also be changed for any rhythm with a Sustain switch. Two other switches are provided, duplicated on the dual footswitch supplied, one for, Intro or Fill in, depending whether the rhythm is running or not, and one for Start or Stop. The last two controls are Tempo and Volume (with power on/off at minimum setting). The Downbeat, or first beat in the bar is indicated by an LED situated by the Tempo knob.

Operation

The first thing you notice about the unit when it is switched on is how quiet it is! The output circuitry has a noise gate built in to prevent any voice breakthrough. The only disadvantage with this type of circuit is that when you stop the rhythm the gate mutes the sound immediately which is quite noticeable if you stop on an open Hi-Hat or Cymbal beat.

To start a selected rhythm you can either press Start/Stop, which will run the selection as normal, or the Intro/Fill-in switch, which will start the rhythm with an intro-



ductory break before getting into the normal beat. When the rhythm is running, hitting Intro/Fill-in again brings in another break, this time as a 'frill' which returns to the normal selection on the Down Beat. The Intro's and Fill-ins are all different, arranged to complement the selected rhythm.

The sound quality of the voicing is very good, especially the Snare, Hi-Hat, Cymbal and Cowbell! The option to mix the sound balance is also very valuable and fading in different channels during a rhythm introduces some interesting possibilities.

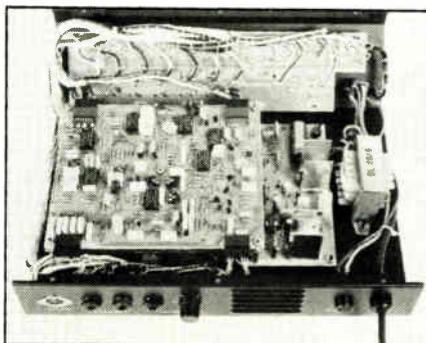
Although the rhythms cannot be mixed you can jump between selections while the unit is running. This again increases the versatility of the machine.

Circuitry

Internally, the layout is very impressive, being packed with electronics as can be seen from the photographs. The top circuit board contains most of the voicing and output circuitry. The board underneath holds the control circuitry, two EPROM's with encoded rhythm patterns, metallic voicing, Headphone amplifier and power supply regulation.

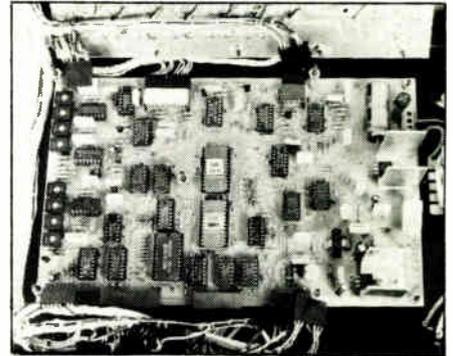
No less than 8 oscillators and 4 ring modulator type circuits are used to produce the metallic voicing! These circuits are mixed in different proportions to synthesise the Hi-Hat, Cymbal and Cowbell voices.

Each EPROM contains the data for one bank of rhythms, including Intro and Fill-in. The 4/4 rhythms are 32 steps long whereas the ones in 3/4 time are 24 steps long. Both the Intro and Fill-in's are 16 or 12 steps long. Since each EPROM can hold a total of 1024 bytes, it seems strange that the designers have not used this full capability as a total of 32 rhythms could be stored. This could be



An internal view showing neat construction.

accessed with the same number of switches on the panel but arranged in 8 x 4 format with 8 rhythms in each of 4 banks.



The circuitry with the top board removed.

Construction

It is difficult to fault the construction of this unit. Removable connectors are used extensively throughout to allow easy servicing and adjustment. All the wiring is neatly arranged in looms and all the IC's are in sockets. The voicing PCB's are even separated with an aluminium screen to prevent interference.

Conclusions

Although this machine is preset it does offer an interesting range of rhythms especially with the Intro/Fill options. The voices are excellent proving that a lot of time has been taken to develop what is probably the closest simulation possible with analogue circuits.

The foot switches are also a useful addition to break up the rhythm while your hands are otherwise engaged!

It would have been nice to see a programmable front end linked to such a good range of voices but this would obviously push up the final price. The Ritmo 20 complete with dual footswitch and signal lead retails at £189 inc VAT. A smaller version, The Ritmo 12, is also available, presumably with the same voicing but with only 12 rhythms and no Intro feature. This is priced at £125 inc. VAT.

Kenneth McAlpine **E&MM**

Both the Ritmo 20 and Ritmo 12 are distributed by John Hornby Skewes & Co. Ltd. They can be contacted at Salem House, Garforth, Leeds LS25 1PX. Telephone 865381. Please mention E&MM when doing so.



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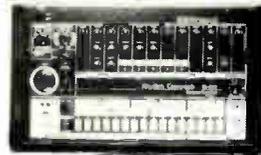
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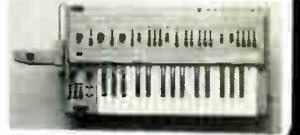
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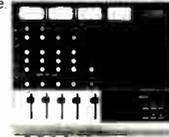
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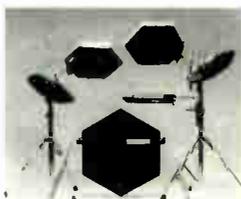
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World Radio History

NEW PRODUCTS

Sifam test gear

Sifam Ltd of Torquay is now marketing in the UK, under its own name, a range of test instruments and accessories.

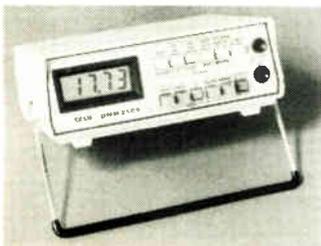
The first group of products includes bench and hand-held multi-meters and a digital logic probe.

Available now (all with one-year guarantee, prices exclusive of VAT) are:

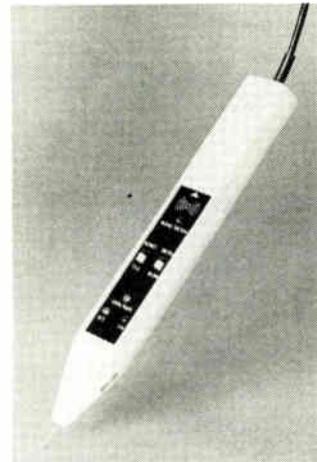
Hand-held 3½ digit multi-meter, model DMM2200B, priced at £43.43, which offers 21 ranges in five modes: DC & AC voltage and current, and resistance. With a basic accuracy of 0.3 per cent (DCV), the instrument will operate continuously for 1000 hours from a standard 9V radio-type battery, and has overload protection, autozero and autopolarity facilities as well as over-range and low-battery indications. It measures 165 x 110 x 43mm, weighs 360 grammes with battery, and is supplied complete with test leads, spare fuse, battery and operators' manual.



3½ digit bench multimeter, model DMM2500, priced at £66.04: 24 ranges in the same five DC/AC measurement modes, with the same order of accuracy and operational features, but with push-button function/range switching and 2000 hours battery life and circuit-breaker overload protection. It has a built-in bench stand/handle and measures 155 x 120 x 57 mm, weighs 383 grammes with battery. It is supplied with test leads, battery and manual.



Digital logic probe, model DLP50, is compatible with DTL, TTL and CMOS standards. It has an input frequency range of DC to 50 MHz, a minimum detectable input pulse width of 10 nanoseconds, high input impedance of 10 megohms, power range of 4.5 to 30V DC with input protection (including an audible warning) up to ± 120V DC or AC. Three-colour LEDs signal: high (red), low (green), open-circuit/bad level (yellow) and pulse/memory (red). The audible alarm sounds if an input signal exceeds the operating voltage of the circuit under test, or when a voltage in excess of 30V DC is applied to the probe input, if the power lead is connected in reverse or with AC line. The probe is fitted with an 800 mm long power lead, and has a consumption of 50 mA maximum at 5V DC. Dimensions of the probe itself are 195 x 26 x 16 mm and it weighs 70 grammes. Supplied in a moulded carrying case, it comes complete with ground and IC clip leads and operating manual.

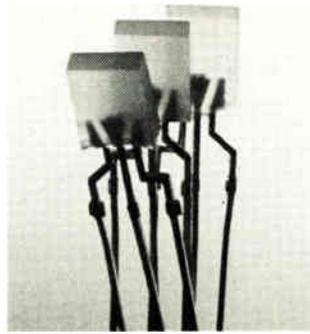


Sifam Ltd., Woodland Road, Torquay, Devon, TQ27AY. Tel. 0803 63822.

Rectangular Tri-Colour LED

Introduced by Zaerix Electronics Ltd. to complement their existing 5mm dia. tri-colour LED, the new L119HGW rectangular device, believed to be the only type available in the UK, measures 2mm x 5mm and is capable of emitting red, green or yellow illumination.

Although alternative chip colours are available to special order, the standard devices incorporate a red and green LED mounted on a common cathode 3-way lead frame enabling either independent or simultaneous

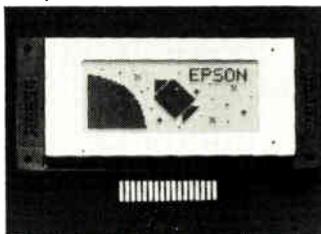


colour operation, the latter giving yellow.

Typical luminous intensity through the integral white diffused lens at 20mA is 3mcd over a 70° viewing angle with power dissipation between 105mW and 120mW. The 20mm long wire wrappable legs are on 0.1" (2.5mm) spacing and the operating temperature range of this new device is -40°C to +80°C.

For further details contact: Zaerix Electronics Ltd., Electron House, Cray Avenue, St. Mary Cray, Orpington, Kent, BR5 3QJ. Tel. Orpington (0689) 27099.

Graphic LCD Module



The new Epsom liquid crystal graphics display module designated ED-Y84320AT is available from Norbain Displays Limited.

Based on an 84 x 32 dot matrix within an effective viewing area of 76.3mm x 33mm, it is designed primarily for full graphics display applications but is also capable of reproducing alphanumeric characters.

Featuring the recently developed twisted nematic (TN) type FEM liquid crystal, the displays have a high, 10 to 1 contrast giving greater character readability and a wide 60 degree left to right viewing angle. Each device has a built-in 80 byte data RAM, as well as a CMOS and TTL compatible LCD driver and controller which operate on a single five volt power supply with a minimum power consumption of 0.6mA.

For further details contact: Norbain Displays Ltd., Norbain House, Boulton Road, Reading, Berkshire RG2 0LT. Tel. 0734 864411.

Education kit

A new educational kit designed to teach the fundamentals of digital electronics is based on the Experimenter 300 solderless breadboard from GSC.

The new kit, developed by Cambridge Learning Ltd. in conjunction with GSC, contains an

instruction manual, IC's, LED's, digital switches and passive components, allowing the user to build a wide range of digital circuits.

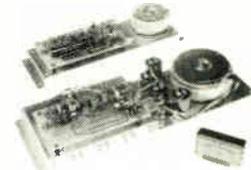
The kit is supplied in a pocket-sized plastic wallet, and requires only a 4.5V battery or a stabilised 5V power supply to produce operational circuits. No soldering is necessary.

Subjects covered in the manual include Boolean logic, Gating, R-S and J-K flip-flops, Shift Registers, Ripple Counters and Half-Adders.

The kit costs £19.90 including VAT, postage and packing.

For further details contact: Global Specialities Corporation, Shire Hill Industrial Estate, Saffron Walden, Essex, CB11 3AQ.

Power amp modules



Two new power amplifier modules have been introduced by BK Electronics. These are the OMP100 and OMP300 which can push out 100W rms and 300W rms respectively. Each unit comes complete with its own toroidal power supply and circuitry to drive an eleven element LED VU meter. Both amps are open and short circuit proof.

The OMP100 has a sensitivity of 500mV, measures 360 x 115 x 72mm and is priced at £26.00 plus VAT.

The OMP300 has a sensitivity of 1V, measures 460 x 153 x 66 mm and is priced at £77.00 plus VAT.

The VU meter module is priced at £5.65 plus VAT.

For further details contact: BK Electronics, 37 Whitehouse Meadows, Eastwood, Leigh-on-Sea, Essex, SS9 5TY. Tel. 0702 527572.

Digital reverb update

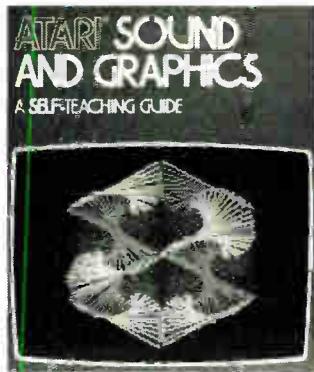
URSA MAJOR, Belmont, MA, USA, has just released its first major revision of the 8X32 reverb-eration programs.

Edition E4-1 programs are broadly improved: colouration is significantly reduced; diffusion (echo density) is increased, decay envelope smoothness is superior; and the sense of ambient spaciousness (incoherence) is better.

The new programs are in two IC PROM's (read-only memories) and are easily changed by dealer or user. In keeping with its original commitment, the new programs are available free of charge to all 8X32 owners, and will be installed where possible by the local dealer!

For further details contact: URSA MAJOR INC, PO Box 18/50 Trapelo Road, Belmont, MA 02178 USA. Tel. 617 489 0303.

BOOK REVIEWS



Atari Sound & Graphics: A Self-Teaching Guide

Herb Moore, Judy Lower,
Bob Albrecht
John Wiley & Sons
Price £6.75

'Sound and Graphics' is ideal for those interested in producing some kind of visual display to accompany their music, or in finding visual aids to musical composition. Primarily intended for the Atari 400 and 800 computers, which are capable of producing some extremely sophisticated and almost 3-dimensional graphic displays, it should be possible for the imaginative programmer to modify the details of its Atari Basic programs to Sinclair Basic or TRS 80 Basic if necessary; on the other hand, the book is also intended to be suitable for the absolute beginner to micros as well, in which case it would be best to follow the examples on one of the Atari machines mentioned.

The first chapter introduces 'Please Note', a smiling little musical character who helpfully serves to deliver summaries of whole sections, and to give occasional reminders of important basics - like remembering to use the 'Return' key to make the computer carry out a command. The 'Sound' command and procedures for correcting errors in instructions are introduced.

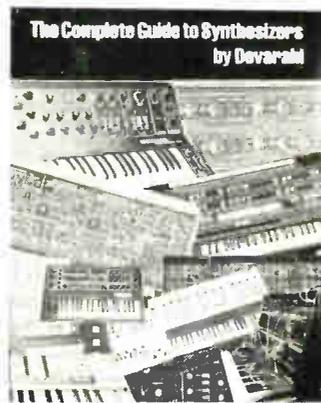
Sounds on the Atari are described by the four parameters V,N,T,L. The computer can sound four voices simultaneously, 'just like a barbershop quartet', using any one of 256 Notes numbered, in ascending order from 255 to 0. Not all of these numbers relate to notes on the Western scale, so a diagram relating numbers to keyboard notes is provided. There are eight different Tones available, from fairly pure musical sounds to buzzes and scratches useful in inventing sound effects for games programs. There are sixteen different levels of loudness, and note length is decided within the individual program by initiating a counting loop, during which the note is sustained.

Chapter Two introduces the Graphics mode, representing a point on the screen by a pair of co-ordinates, a colour, and a

graphics mode number indicating the total number of points in the matrix. The commands PLOT and DRAWTO allow simple figures to be drawn, and in a later chapter the more complex SET-COLOUR command and higher resolution graphics modes allow more colourful figures, with lines and sharp edges apparently transformed into curves and smooth planes, to be produced.

The next important step is to introduce the use of programs rather than individual commands, so that the computer will play a series of notes or join a series of points. The instruction here is very clear and easy to follow, and quickly leads onto combined programs which can give some kind of visual indication when a note is played.

Each section of the book is concluded by a Self-Test with solutions given underneath, and a Challenge which allows more creative thought and should let the imaginative programmer head off in directions of his own. No conventional musical knowledge is needed, although there is a brief appendix relating program parameters to musical intervals; whether this is a good thing or not is open to question, as it's often best to have an equal understanding of a QWERTY keyboard and a piano keyboard in your computer composition! However, the book certainly does its job of opening up and integrating the worlds of graphics and sound programming, and does it in an exceptionally clear and enjoyable manner.



The Complete Guide to Synthesizers

Devarahi
Published by Prentice/Hall
International
Price £10.45

The problem facing the author of an intended guide to synthesizers, as opposed to one for guitars or drums, lies in being general enough to cover all the instruments on the market while at the same time being specific enough to be of use to the individual owner who wants to get the best out of his Moog, Korg, Roland or whatever. There's an added problem here because the book is American, and has references

to standards, equipment and addresses which simply don't apply elsewhere.

Having said that, the cryptically named Devarahi, who teaches electronic music at Lane College, Eugene, Oregon, and gives synthesiser lectures and seminars throughout Europe and the USA, has done a good job of smoothing out a lot of these problems. Back cover endorsements from the likes of Jan Hammer and Craig Anderton of Contemporary Keyboard stress the clarity and educational value of the book, while making the point that it largely confines itself to analog synthesisers.

The book places much emphasis, quite rightly, on practical work, and prints in capital letters at intervals a total of 99 exercises to carry out on whatever synthesiser you have available. The initial exercises simply concentrate on making each 'module' work in turn, and should help produce an appreciation of, for instance, the sound of a given basic waveshape or of that waveshape with a given amount of filtering.

Chapter 2 differentiates audio signals from voltage control signals, but attempts to refer each scientific idea to an artistic or musical purpose in turn. A lot of the examples, for instance on harmonics, refer to the ARP 2600, and while this is an ideal synth to learn patching and other techniques, it appears quite likely that the author had some kind of interest in ARP at the time of writing. This needn't matter, as the examples could be carried out on most other synths, although footnotes have had to be added to cover Korg synths which operate on a logarithmic rather than a linear voltage control scale.

The American preoccupation with size and expense shows through occasionally, however. The 'Basic Synthesiser Modules' discussed in Chapter 3 are represented by Aries, Polyfusion, E-Mu and Moog Studio System, not many of which would be seen in this country! The basic treatment is again clear and precise, however, and there's a good explanation of different types of trigger pulse.

The section on sequencers and guitar synthesisers is slightly out of date now, as more and more keyboards (such as the Elka Synthex and Yamaha Polyphonic) have built-in sequencers. The 'Synthesiser Overview' contains some fascinating pictures, but can hardly hope to be comprehensive in a field which is so fast-moving. The Jupiter 8 is there but the Juno 6 isn't; where can you still buy an Oberheim 4-voice expander? And who's got a Wavemaker 6 modular system? Impecunious synthesists are advised to glue these pages together, as repeated viewing can bring on severe attacks of envy.

There's a good overview of digital keyboards which wisely doesn't attempt to go into technical details, followed by a series of Appendices. The first is on the ARP 2600 in detail (suspiciously confirmed) and the second is a list of manufacturers, which is very useful for US companies with no UK distributor but not so good for WASP (EDP, now liquidated) for ARP (now under Rhodes) PAIA (now with a European distribution outlet) Fairlight (who have a London distributor) and so on.

The glossary lists all the technical terms used in the book with reasonable definitions which almost (but not quite) escape from the effects of the American love of jar-

gon. Did you know that an A-B comparison was a comparison of two things that are generally similar, but have some differences?

Along with the general index and list of experiments, there's a discography divided into various sections by style. It's possible to have hours of fun with this section by disagreeing with the categories (Mythos' 'Quasar' is a great album but it's definitely not an example of 'Symphonic Pop') and by laughing at the funny American spellings (John Anderson, Orchestral Manuevers, Travelogue, Klaus Shultze, Rubicon etc. etc.) Still, it's a useful list, particularly in the areas of jazz, funk and the 'underground network' for those who are always trying to expand their tastes.

Finally, there's a bibliography of books and periodicals with very helpful comments on the degree of technical (or musical) knowledge required for a reasonable appreciation of each one. This section is a must for those synthesists who feel they're working in a vacuum (apart from contact with E&MM, of course). If you can afford £10.45 for a well-produced, large format paperback which will contain a lot you don't know however experienced a synthesist you may be, this book is for you.

Cabinet Handbook Published by Celestion Price £1.00

Rock musicians are traditionally renowned for their zestful late night activities in garden sheds and under railway arches. Fortunately, the fabrication of speaker cabinets is currently (according to the latest EEC directive) legal, decent and an honest way to save money, so you need have no worries about ordering Celestion's excellent cabinet handbook.

Designs include 1", 2" and 4" x 12" direct radiator cabinets, a 1" x 15" Theile cabinet (bassists please note!), a version of the ancient 1" x 15" JBL 4560 bass horn and the 1" x 12" low midrange horn, together with plans for a wedge monitor and a comprehensive tabulation of Theile-Small parameters, enabling the mathematically inclined to design their own vented (or 'reflex') cabinets. The gamut of plans should cover most musicians' requirements, from cabaret to large PAs.

There's nothing especially original about any of the designs, but what's important is that every one has been optimised for Celestion's readily available, and above all, *affordable* drive units. Of course, this overcomes the sorry stories of musicians who build immaculate copies of classic JBL or Western Electric cinema horns, only to find that they're no longer suited to currently available drivers, or that the requisite American speaker is far too expensive. As many readers will know, attempts to use a cheap British guitar speaker as a substitute are doomed to failure, simply because the differences in a host of subtle mechanical parameters calls for an intricate and sinuous overhaul of the cabinet design. With all this in mind, you'll have to load these cabinet designs with Celestion's drivers, but you will be guaranteed above-average results.

Price £1.00, available from Celestion Ltd., Ditton Works, Foxhall Road, Ipswich, Suffolk IP3 8JP. Tel 0473 73131.

E&MM

MAKING NOTES

by Brenda Hayward

Part 9: Modulation, Intros and Passing Notes.

The Musical Ladder from my 'Making Notes' Part 6 will be used this month for creating 'Modulations', the musical term for a smooth movement in Harmony from one key of music to another. The Musical Ladder is reprinted in a reduced form at the end of this article for readers who do not have the original.

It will be necessary to understand key signatures and left hand chord progressions before attempting to form the 'fill-in' bars of a modulation.

To briefly recap, the sharps and flats of a key signature represent the scale from which the sharps or flats are taken. The name of the scale will also be the name of the key that the music is written in (see 'Making Notes' Part 3).

Left hand chord progressions ('Making Notes' Part 6) dealing with harmony, were created by adding a seventh note to each keynote chord on the Musical Ladder. Moving smoothly, one step at a time in a downward movement, each seventh chord literally 'opens the door' to the next keynote chord on the Ladder to form the chord progressions. Try to learn the keynote sequence on the ladder and memorize for use with chord symbols as a simple, easy method of embellishing music without the visual guidance of notation upon the staves of a manuscript. A great advantage to the mature learner musician, the use of chord symbols can avoid studying specific grades of music for many years.

When starting to create a 'modulation', choose two musical arrangements with identical time signatures. The first piece written in the key of C major and the second written in the key of Eb major. The 'fill-in' bars of the modulation will be formed between the last chord of C major in the first arrangement, and the first chord of Eb major in the first bars of the second arrangement (I am assuming you have chosen music beginning and ending with the major chord of the key).

Referring to the Musical Ladder, identify the keynote of C in the middle section of the Ladder to represent your first musical arrangement in the key of C major. The modulation movement will be achieved by moving in seventh or minor seventh chords, one step at a time, down the Ladder from the keynote of C to the keynote of Eb, which is representing the new key of music that you are changing to.

The chord of C major, last chord of the first arrangement, is adapted to C seventh or C minor seventh, followed by the chord of F seventh or F minor seventh. Move one more step down on the Ladder to form a Bb seventh chord which will move smoothly to the chord of Eb major, the first chord of the second arrangement.

Original 'keynote' chord C becomes C7 or Cm7, F becomes F7 or Fm7, Bb becomes Bb7 (not m7).

The new 'keynote' chord becomes Eb major.

See Figure 1. Maintain the time signature for the new bars of music.

The seventh and minor seventh chords, which belong to a group of chords known as 'discords', require a resolution as their combination of notes creates a restless sound with the need to move on to another chord, as against the major chord where the notes are in complete agreement and do not need a resolution (Making Notes, Part 6).

The minor seventh chord moves smoothly in harmony to a seventh chord but will not normally move directly to a major chord, hence the Bb seventh chord, not minor seventh, preceding the chord of Eb major in Figure 1.

More advanced chords can be used as an alternative to the basic chords in the first modulation. Adapt the first chord of C major to C ninth, followed by F ninth and Bb thirteenth with the 9th note included, as a substitute for the Bb seventh chord. See Figure 2.

The C ninth and F ninth chords in the modulation may need to be inverted to be played in the nearest position on the keyboard to the Bb13(9) chord, to achieve a smooth downward movement.

To continue the smooth progression, the Bb13(9) chord could be followed by the Eb major ninth chord before resolving to the Eb major chord in the last bar of Figure 2.

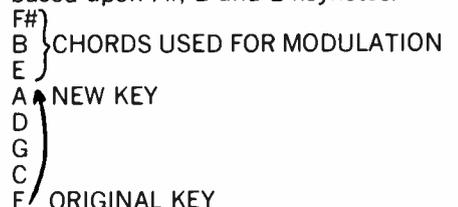
C9: Bb - DE - G: Pedal C root.

F9: A - Eb - G: Pedal F root.

Bb13(9): Ab - CD - G: Pedal Bb root.

Ebmaj9: G - Bb -- Eb: Pedal Eb root.

A similar movement to the first modulation can now be used for changing key to a keynote in a higher position on the Musical Ladder than the original keynote, when for example, a modulation is required between the keys of F major and A major. As before, the chords will be formed upon the three preceding keynotes to the new key, between the chord of F major or F sixth, the last chord of the original key, to A major, the first chord of the new key. The three modulating chords are based upon F#, B and E keynotes.



The ending chord of the first key, F or F sixth, will move easily to the first chord of the modulation, F# minor seventh with the notes of F# - A - C# - E, moving to the B minor seventh chord, F# - AB - D, followed by the E seventh chord G# - B - DE into the A major chord. See Figure 3.

Substitute advanced chords for the basic chords, as before, after creating inversions of the F# minor seventh and B minor seventh chords to move smoothly to the E13(9) chord, followed by the A major ninth chord before resolving to the A major chord in the last bar of Figure 3.

The F# keynote appears to be the highest point of the Musical Ladder which would make a 3 keynote modulation into the key of B major impossible. However, the upward keynote sequence of the ladder is formed upon dominant fifth notes. So, to extend the ladder above the F# keynote, the dominant fifth note of C# would be the next step up, followed by the dominant fifth

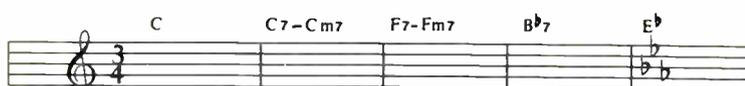


Figure 1.

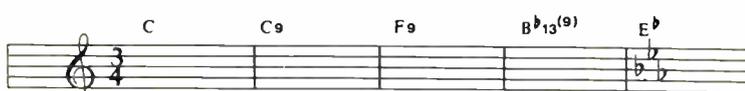


Figure 2.

Figure 3. F F#m7 Bm7 E7 A

Figure 4. D Dmaj9 C#m7 F#7 B

Figure 5. Eb Cm7 Fm7 Bb7 Eb

keynote of C#, which is G#.

- G#
- C#
- F#
- B

The 3 keynote modulation is now possible - G#7 or G#m7 - C#7 or C#m7 - F#7 into B major.

The chord symbol method of tuition provides a comprehensive knowledge of the notes used in the formation of all left hand chords, which could prove to be especially helpful in the musical exercises this month for instant recognition of recurring notes between chord changes.

In a modulation between the key of D major and B major, the D major chord of F# - A - D can be adapted to D major ninth, F# - A - C# - E so that the notes of C# and E in the chord are sustained when moving to the C# minor seventh chord G# - B - C# - E and also the F# seventh chord F# - A# - C# - E leading into the B major chord F# - B - D#. Maintaining the original keynote of D for the first bar of the modulation, only two preceding keynote chords into the new key of B major (C# and F#) need be used. See Figure 4.

Music Intros

The Musical Ladder can now be used to compose all forms of modulation without sitting at the keyboard. The new "fill-in" bars can be written directly onto manuscript as in the illustrations.

As an alternative to using the Ladder, look at the keyboard to play a 'chromatic' modulation where each note of each left hand chord will move by a semitone distance.

Look at the keyboard to form a 'chromatic' modulation between the key of C major and the key of Eb major.

- C CHORD: G - - C - E
- (Cb) B CHORD: Gb - B - - Eb
- Bb CHORD: F - - Bb - D

add seventh note into Eb major.

It has already been established that the Bb seventh chord moves in harmony to Eb major, so by adding the seventh note to the Bb major chord the otherwise lengthy 'chromatic' movement is shortened.

'Whole Tone' movement between chords, when each note of each chord moves one tone at a time, can be completed in two steps from the previous modulation. The C major chord moves tonally to the Bb major chord before adding the seventh note to

complete the movement into Eb major.

The tonal movement is complete when modulating between the key of F major and the key of A major, with the chords of F - Eb - Db - Cb(B) into A major.

The Musical Ladder can also be used to compose an 'introduction', the term for bars of music preceding the first bar of an arrangement, to introduce the theme of the music to the listeners.

Classical music and light classics do not require an introduction, but 'middle of the road' and 'standard' music is ideal for this form of embellishment.

As very few arrangements have an introduction already written into the music, you can now learn how to compose your own.

An introduction, normally of four bars duration is formed in a similar way to modulation. The chords in each bar of the introduction will follow in harmony on seventh and minor seventh chords leading into the first bar of the music as before, with the exception of the first bar, which will contain the major chord of the key the music is written in, hereafter called the home key chord i.e. playing music written in

the key of Eb major, the first bar of the introduction contains the Eb major (home key) chord. The second, third and fourth bars of the introduction are formed upon the three keynotes preceding the home key chord on the Ladder. C - F - Bb as in Figure 1. The four bar introduction will contain the chords of Eb - C7 or Cm7 - F7 or Fm7 - Bb7 into Eb major, the first chord of the music.

Therefore the basic steps for forming an introduction into any key of music are, identify the key of the music and locate its position as a keynote upon the Musical Ladder. Jump three steps up the Ladder to form a seventh or minor seventh chord on each keynote, in a downward movement, into the home key chord. The chord preceding the home key chord must be a seventh, not a minor seventh chord.

Advanced chords can again be used in an introduction providing the keynote names remain the same i.e. Ebmaj9, C9, F9, Bb13(9).

Left hand chords alone can be adequate for either a modulation or introduction with a bass pedal note naming advanced chords on an instrument such as the electronic organ or synthesiser. Full right hand chords using the same notes or an inversion of the left hand chords can sound effective on either manual of the organ.

Alternatively, you may like to compose your own melody line to play with the left hand chords.

While maintaining the timing of the music for the 'introduction' bars, the melody note, or notes, will be note(s) from the left hand chord. For example, to compose the melody line for Figure 5, the melody notes of Eb and Bb for the first bar were chosen from the notes of the accompanying Eb major chord (G - Bb - - Eb). For the second bar, with a choice of G - Bb - C - Eb notes from the Cm7 chord, the quaver note of F has been included as a 'passing note' to the G note of the Cm7 left hand chord. In the third bar the 'passing note' of G has again been included to resolve to the note of F from the Bb seventh chord.

A 'passing note' is a note which does not belong to the chord and is not essential to the harmony of the music. A 'passing note' will be used to 'pass over to' or resolve onto, a note in agreement with the left hand chord being played or the next chord of the music.

The second and fourth degrees of scale are passing notes. As already established, when the second and fourth degrees of scale are included in a chord, the restless discordant sound requires a solution. The melody 'passing note' will need the same movement as they too are discords and need resolving.

Extra melody notes to play in the four bar introduction are a personal choice but should be selected with care to ensure they are in harmony, or resolving to harmony with the chords of the music.

	KEY
F# C# G# D# A# E#	F#
F# C# G# D# A#	B
F# C# G# D#	E
F# C# G#	A
F# C#	D
F#	G
	C
Bb	F
Bb Eb	Bb
Bb Eb Ab	Eb
Bb Eb A# D#	Ab
Bb Eb A# D# G#	Db
Bb Eb A# D# G# C#	Gb

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The Musical Ladder.

E&MM

Corrigendum. Please note that in our August news item regarding Brenda Hayward's cassettes the telephone number should read 0284 64588.

Alligator AT150 Amplifier

KGB Speaker Cabinet

Alligator is a new range of amplification equipment manufactured and distributed by Musicians Direct Supply Co.

This company was set up, as the name suggests, to supply musical instruments direct to the musician, therefore keeping the final cost down. The concept was put into practice by managing director Pete Tulett, who has been some 15 years in the music industry and incidentally introduced Aria Guitars to the UK with Gigsville Ltd.

Five Alligator products are currently available: the AT150 Amp top, KGB Cabinet, AC150 Combo, AST150 Slave Amp, and the ASC150 Slave cabinet.

The first thing that strikes you about this equipment is the colour. All the cabinets are covered in a very attractive Alligator green rexine material, the panel are finished in green, even the LED's are green!

The gear really looks ready for business, with chunky black handles and tough ABS corner mouldings which mate to provide a stable, stackable set-up.

We are looking at the AT150 Amp top and the KGB cabinet, but since the AC150 combo uses the same parts, fitted in one cabinet, this review covers both.

AT150

The amplifier is an all purpose unit which can be used for just about any instrument that produces an electronic signal through a standard jack plug. It is rated at 120W rms into 8ohms or 160W rms into 4 ohms, measures 21" x 6" x 10", and weighs 18lbs.

Starting at the back (or tail) of the Alligator, from left to right, we have: the mains connection, made via a standard euroconnector, a 20mm 3A anti-surge

protection fuse, the power switch, which has a steel toggle with good positive action, speaker outputs, two jack sockets wired in parallel, protected with a 20mm 6.3A anti-surge fuse, and lastly, three sockets on the right of the panel which are Send and Return for effects loop, and Mixer/Slave. The pre-amp section output is connected to the Send and Slave sockets while the power-amp input is connected to the Return socket. With no jacks connected, pre-amp is connected to power-amp as normal. Inserting a jack into Return breaks this connection. The Mixer/Slave output can be used to drive further power-amps or to provide a signal compatible with mixer inputs.

The front panel offers an interesting selection of controls with two equalisation sections. Starting, again from left to right, we have: the Boost section, which can be operated by the toggle switch or optional footswitch, operation indicated by the LED, the Input socket, Gain and first stage equalisation; Bass and Treble, followed by the second stage of equalisation; Low, Mid 1, Mid 2 and High, Master Gain control, mute switch and LED indicator.

Circuitry

The amplifier is constructed in two parts which can be removed separately for servicing. The first part, the pre-amp and associated circuitry, is mounted on the front panel with the second part, the power supply and power amplifier, on the back panel.

Taking the pre-amp section first, the input signal is passed through an RF filter to remove any interference before being amplified by the Boost stage, the gain of this stage being increased by a factor of 10 when the Boost is operated. An active filter network then provides a 12dB boost or cut at 50Hz



AT150 with the KGB cabinet.

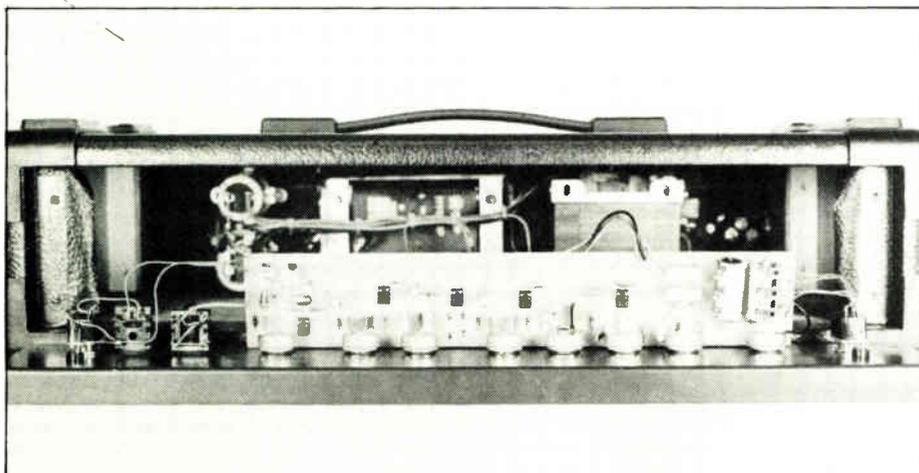
and 4kHz for Bass and Treble respectively. The filtered signal is further amplified through a clipping circuit which provides distortion or fuzz when the Gain control is adjusted above the clamping threshold. After this stage comes the second active filter section with boost and cut at 100Hz, 500Hz, 1.5kHz and 5kHz for Low, Mid 1, Mid 2 and High respectively. This output is fed to the Master Gain control which can be shorted out with the mute switch. Connections from this board go via a molex 4 way connector to the back panel.

The transformer input is set for 240V mains but a link can be changed to allow for 120V/60Hz operation. The output from the transformer is rectified and smoothed to provide the dual power rails for the power amp and then further regulated to supply the pre-amp section. The power amp is encased in epoxy and bolted directly to the rear panel. This module is in fact capable of driving 250W rms but is deliberately under driven to ensure reliable, high quality performance.

Construction

Externally the amplifier is well made, built to survive a lot of bashing. None of the knobs or switches protrude from the cabinet, which is a nice point, minimising the chance of them being damaged or causing damage!

Internally high quality components are used throughout, with the important power wiring bound together.



A dissected Alligator!



Alligator obviously have great faith in their products since they are providing a 5 year guarantee on amps and a 2 year guarantee on speakers.

KGB Cabinet

Alligator complement their all purpose amp with a multi-purpose speaker cabinet. The cabinet has a special Horn loaded section which emphasises Bass frequencies. Two Fane 10" heavy duty speakers with 1½" voice coils are fitted,

protected by strong steel grilles.

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There is even a storage compartment for the cover and leads etc.

Sound

So much for the facts and figures, what does it sound like?

Actually, its hard to make this amp sound bad, no matter what signal you present it with, Bass, Guitar, Percussion machine or Synthesiser, they all sound clear and true. The secret of this appears to be in the layout of the equalising chain. The sound can be modified with the initial Bass and Treble filters, amplified to clipping levels and then tailored again with the second 4 band equaliser. This allows a large range of tone colours to be obtained to bend the instrument connected to your own personal taste. (The owners handbook supplied gives a list of settings to start you off).

The two Mid controls are excellent for bringing out the 'body' of the sound, giving it a real bite (no pun intended!). The Initial Gain control can also be used to give some great 'overdriven' sounds without having to use earsplitting volume levels.

Conclusions

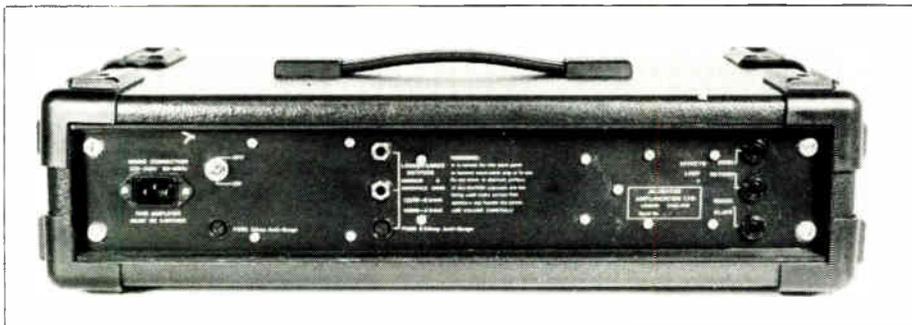
A lot of thought has gone into the design and development of this range with much attention being paid to the practical needs of the musician; sound quality, reliability, versatility, looks and last but certainly not least, price.

All of the Alligator range represent excellent value for money, mainly due to the fact that you are buying direct from the manufacturers. The gear comes complete with spare fuses matching green covers, leads (with green jack plugs!), the 5 year guarantee and is delivered direct to you by Securicor.

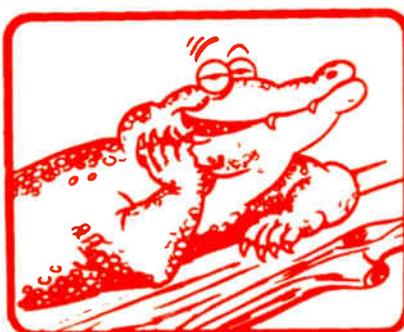
Kenneth McAlpine

E&MM

Alligator equipment is available direct from Musicians Direct Supply Co., 176B Field End Road, Eastcote, Middlesex HA5 1RF. Telephone: 01 866 7414. Tell them E&MM sent you!



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Specifications

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1.5mV with Boost

Maximum input level
Tone Control ranges

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Bass 50Hz ± 12dB

Treble 4kHz ± 12dB

Low 100Hz ± 12dB

Mid 1 500Hz ± 10dB

Mid 2 1.5kHz ± 10dB

High 5kHz ± 12dB

Maximum Signal levels

Send/return

1V rms

Slave/mixer

1V rms @ 1K

Prices (inc VAT)

AC150 Combo £249.00

AT150 Amp Top £169.00

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ASC150 Slave combo £215.50

KGB120 Speaker Cabinet £99.50

Footswitch £5.90

HOME ELECTRO-MUSICIAN



Paul Nagle

I have been recording my own music for about five years now. I began with a 90 minute epic of music inspired by 'Lord of the Rings' using an old Welson organ and various effects (such as the really imaginative 'blowing water through a pipe' which featured prominently in 'The Dead Marshes') recorded onto two hissy old cassette decks. Sometime later I got my first synthesiser - the Korg Micro Preset - which enables me to sound 'just like Bo Hanson', or so I thought. Since then I have added a thing or two to my bedroom studio.

During the last three years I have spent almost all my money on equipment and by the end of this year should have finished my ambitious buying programme (I said this last year). I also played for a while with a band called Oasis who played harsh, uncompromising electronic music along the lines of 'Nights In White Satin' and 'I Wanna Stay With You'. I got the name 'The Soft Room' from the computer game 'Adventure' (the original mainframe not the watered-down Atari version).

The synthesiser is such a versatile instrument that it sometimes seems necessary to use both hands and feet to produce a simple monophonic lead line and to be in complete control of the various parameters of sound which, on an acoustic instrument, tend to be taken for granted but on an electronic one are often neglected. Why doesn't someone bring out a cheap, fully-variable monosynth with a touch sensitive keyboard? The main drawback to conventional subtractive synthesis (i.e. the only kind you and I can afford) is that it utilises the same basic waveforms all the time. These wave forms are used because of their high harmonic content, which can be filtered off as required.

However, it is possible to generate a completely new harmonic series by this method. Subtractive synthesis can produce its most interesting sounds when waveforms are added, multiple oscillators combined and used in sync., ring modulators used to create a strange interaction of harmonics, and when various low frequency waveforms are introduced. In a two oscillator synth with a synchronisation facility, if the second oscillator is at a different frequency than the first, the sync switch 'pulls them together', altering the phasing of the second oscillator.

Instruments that make use of additive synthesis techniques (e.g. the Fairlight CMI) can produce any harmonic series you programme into them by building with ultra-stable sine wave generators. It takes many such oscillators to produce a waveform as rich as a sawtooth and the price of computer-assisted instruments will be prohibitive for some time yet. There are two ways of getting a lot of sounds on tape in a budget system. One is to have a few instruments and spend all your money on a multitrack tape recorder; the other is to have more modest recording facilities and lots of instruments.

I prefer the second method where I play and mix several keyboards as well as simultaneously co-ordinating sequences. Its disadvantages are that mistakes cannot be removed, so the whole thing must be done

again (after a cooling-off period - mistakes make me mad which makes the music get worse)! Doing it this way requires fairly precise pre-planning as reverb, for example, cannot be added to an individual instrument after recording one 'track'. I use two reel-to-reel machines with a Roland mixer - there would be little gained by having a four-track although it would be more easy to handle. Eight-track is the minimum I would use and the appearance of Fostex on the scene means it is more than likely I will have one in a couple of years.

To explain how my studio works I'll go through the recording of an individual piece - in this case it's 'A Journey In The Dark' (yes, more Tolkien) from the Flowmotion album (my first piece on vinyl, hopefully not the last).

Most things I do are done in three stages, which I call Tracks for want of a better word. Thus I record Track 1 onto my Akai GX4000DE, which consists of a multichannel sequence (featuring a borrowed Korg SQ10/MS20 linked to my Korg SQ10/MS50/MS20/Delta set-up) in stereo plus a solo piano piece (the piano - a Roland MP600 - is also borrowed!). I tend to draw a diagram of the link-up for complex sequences.

Track 1 is then passed onto the line in on my Akai GX4000DB (alas without Dolby although I'm hoping to construct a nice stereo noise reduction unit from the May 1981 issue. Being blessed with two left feet, so to speak, with a soldering iron it's good to have a friend to build things). The output from my Roland KM60 goes into the microphone socket on the 4000DB containing the basic chord progressions of the piece played on the Delta (partially) Polyphonic. I'm very conscious of the fact that most electronic music uses the same old chord progressions so I try to vary this a little by throwing in the odd major sixth or diminished with added 13th or whatever; I've decided it doesn't really matter which. This then becomes Track 2.

The process is repeated back onto my 4000DB with the melody being added on my Wasp/Caterpillar and Korg MS 20 (with the filter being controlled by the MS50's envelope generator). I actually prefer to do the melodic lines on my Octave Kitten synth because of its fat 24dB filter but since it's usually either being repaired or malfunctioning I tend not to bother. This final track becomes the 'master'. Often on the last track I put in special effects for 'atmosphere'.

I no longer use a drum machine since I prefer to make my percussive sounds with the synth/sequencer. I think this makes a more individual sound and anyway the DR55 only has one voice which I like (the bass drum - well it's hard to get that wrong)! Doctor Rhythms can be heard on most DIY tapes so I really had to get rid of it.

I write music at the strangest times - being a shift worker I find the night shift to be the most productive. I then take my grubby pieces of music paper home and work out the piece on piano until it's ready to record. I rarely sit and play synths for pleasure - they only get switched on when I'm recording,

working on a sound or technique I've thought up or even on the rare occasions when I force myself to practice something. Monitoring is done with spaghetti-like Sony MDR3 headphones (which I trip over at least once a day) and often recording is done late at night since, despite attempting to construct my own mains-interference filter, a tape can be ruined when any electrical appliance is switched on or off in the house (causing 'pop' or 'crack').

I've always been a lover of classical music and would like, in future, to utilise more classical-based compositional techniques as I learn better control (and restraint) of my instruments. Much of today's music makes use of 'a wall of sound' where everything is going at once. I'd like to rediscover the crescendo and sudden dynamic changes (to wake people up) and quiet passages. I'd also like to break away, if possible, from the predictable slow-fading techniques which are over-used especially for bringing sequences in and out. If I know myself at all I'll probably just continue cheerfully doing Tangerine Dream impersonations! Oh well...

Originally I tried sending tapes to various magazines including Face Out (who were encouraging and who put me in touch with Dennis Emsley), Sounds (who simply ignored them) and Mirage (who weren't impressed). Finally, I made contact with David Elliott (Neumusik) and Ian Dobson (Flowmotion) who - (thank goodness someone liked me) - offered to distribute them on their own cassette labels. I can now reach anyone who's interested and, perhaps, begin to justify this expensive hobby (obsession?). More people are getting involved in the same way which must reflect a growing disillusionment with more established and expensive commercial music. I hope this trend continues and, at the same time, that the small fanzines and labels stay true to their aims. So if you have a craving to produce your own original music, or to hear some done by someone else without profit as the main *raison d'être*, then check out the various dedicated publications (no - not at your local newsagent) which are around if you look. Of course, you can simply spend your time watching TOTP - but when was the last time you came away satisfied?

Paul Nagle

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RECORD REVIEWS

Reap the Wild Wind/Hosanna Ultravox Chrysalis 7" CHS 2369 12" CHS 12 2369

Ultravox could have chosen no better in selecting a taster for their next album than these two tracks. Together they illustrate the two contrasting faces of the band admirably - the catchy, high-gloss pop sound, and the symphonic approach, which were combined on 'Vienna', for instance.

The A side opens with electronic hi-hat and simultaneous introduction of bass, strings and drums. As usual the overall sound is clear, precise, almost clinical, with the vocals insinuating themselves into the foreground as the synthesisers bow out for the first verse. It takes a couple of listenings to appreciate how many vocal sounds there really are, and the use of reverb and harmoniser on these different voices is subtle but effective.

Strings and harmony vocals sweep back in for the chorus, and as usual the electronic and acoustic percussion 'bounce off' each other while the piano alternates between rhythmic and ornamental patterns. There are some subtle but interesting stereo effects during the fade-out, which re-occur on the B-side, 'Hosanna (In Excelsis Deo)'.

The opening here is of stereo panned bird and animal sounds, together with machine noises produced by treatment of cymbals. Overall the track is sparse and grandiose, relying heavily on the bass, thin string sounds and slightly reverberating percussion which are introduced next. This one needs a lot of listening to, as there are acoustic and electronic sounds moving subtly in the background which would be missed on a superficial listening. Pay careful attention - and look forward to the album.



A Broken Frame Depeche Mode Mute STUMM 9

Depeche Mode's second album, the follow-up to 'Speak and Spell', again relies entirely on synthesisers, drums and voices,

and inevitably features the successful singles 'Leave in Silence', 'See You' and 'Meaning of Love'. The sound is unmistakable, again relying heavily on the influence of producer Daniel Miller and engineers at Blackwing Studio, John Fryer and Eric Radcliffe. This time around, with the departure of Vince Clarke to form his successful duo Yazoo, the song-writing has been left to Martin Gore, with David Gahan on lead vocals and Andrew Fletcher also on keyboards.

As regular viewers of Top of the Pops will know, Depeche Mode are quick to pick up on the latest gadgets available, and premiered both the Moog Source and the PPG Wave 2 on television. The distinctive sounds of the smaller Moog Prodigy and Yamaha CS5 are still there, however, and it's clear that new technology hasn't brought with it a radical change of approach. The rhythm backing is a combination of electronic and conventional percussion, with a more noticeable use of disco 'space drum' sounds, and of course the heavy bass beat which makes the singles so danceable.

Depeche Mode's 'human feel' comes largely from playing bass lines by hand rather than using sequencers, although nowadays the work is probably done by Blackwing's MC4. However, there is quite a lot of sequencer work to be heard, mainly in the higher registers and never to the point of excessive repetition. Around these, for instance on 'See You' and 'My Secret Garden', the Wave 2 provides archetypal digital sounds resembling some futuristic harpsichord or marimba, while the flute and trumpet sound of the earlier singles are still much in evidence.

While the singles are spread evenly throughout the album, there's a good deal of obscurity surrounding in intermediate, less up-tempo tracks. One of the more interesting ones is 'Satellite', which begins with a repeated G/C/Bflat chord sequence sounding for some reason as if it's placed on the third beat of a bar, which when the electronic percussion is introduced we can hear it indeed is. The inevitable feel is reggae-ish, although the song's imagery is Russian, and whether the line "I will be a satellite of hate" is a reference to Lou Reed's classic 'Satellite of Love' is anybody's guess.

'Shouldn't have done that' also attempts to evoke a particular background, as the percussion turns into stamping jackboots and the lyrics suggest a political message. David Gahan's voice, as usual, is well upfront and a little too dry. Clearly a great deal of vocal expression isn't necessarily called for, but

more variation would be welcome. The Depeche Mode sound is still the same as ever, the change made by the departure of Vince Clarke remaining perceptible but indefinable; no unpleasant shocks, but no surprises either.



Fur Immer Deutsche Amerikanische Freundschaft (DAF) Virgin V2239

The last DAF album ever, and a sad occasion for those genuinely interested in the hard core of European experimental/minimalist pop. Instrumentalist Robert Görl has placed himself in an unusual position by eschewing the use of all but the most basic musical forces, and then taking as his chosen instruments the sequencer, the drum kit and the human voice - an odd combination of high, mid- and low-technology! Now he feels that, after several successful LP's ('Gold Und Liebe' and the single 'Der Mussolini' being particularly worthy of note) the formula has been exhausted, so he and vocalist Gabi Delgado-Lopez intend to go on to greater things.

As usual, all the titles and vocals are in German, which, for those who don't speak the language produces the experience of an odd sound-texture in which the organic (vocals and acoustic percussion) compares or contrasts with the inorganic (synthesisers and sequencers). The guttural grunted vocals on 'Im Dschungel der Liebe' ('In the jungle of love') for instance, can be quite offputting at first, and it's not until the fourth track of side one 'Verlieb Dich in Mich' ('Fall in love with me') that it becomes clear that (a) Gabi can in fact sing, and (b) Görl can in fact play in different keys.

This track and the next, 'Geheimnis' ('Secret') are relatively full, using little synthesiser melodies, roto-toms on the drum kit and a touch of xylophone in addition to sequencer and voice. Görl's typical sequencer sound is thick with pulse width modulation and judicious use of detuning, and the vocal on 'Kebabtraume' ('Kebab Dreams') seems to intentionally echo it as it is broken up by harmoniser and ADT.

Side 2 is generally a little slower, but has the advantage of slyly satirical titles such as 'Verehrt Euren Haarschnitt' ('Adore your haircut') and 'Wer Schon Sein Will, Muss Leiden' ('Suffer is you want to be beautiful'). DAF always seem to be in control of fashion, of their audience, of their instruments, and having exhausted the potential of the 16-note sequence to their own satisfaction it should be fascinating to see where they turn next. Certainly if you're addicted to this style of music the album will find a permanent place in your collection - 'Fur Immer' is for ever.



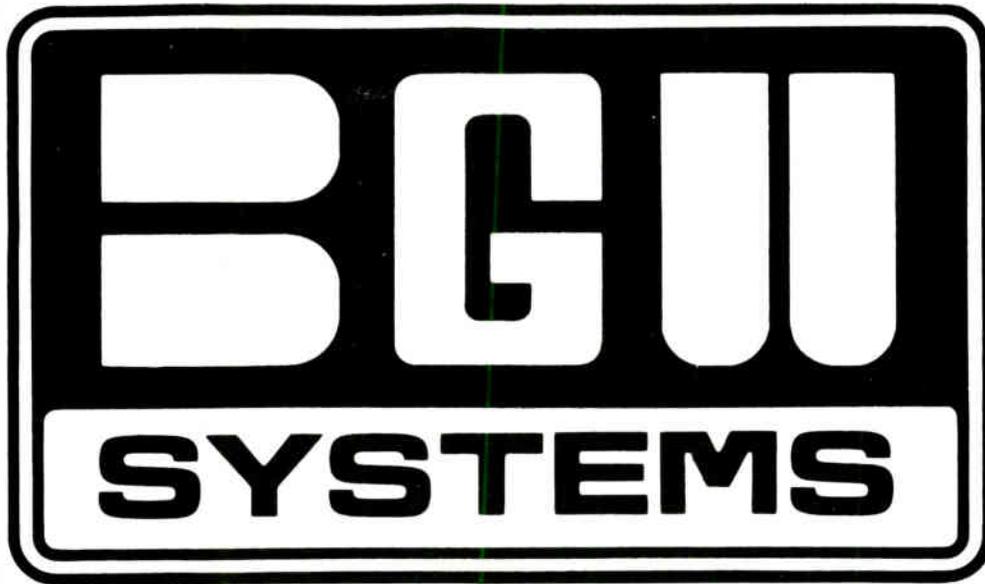
Live in London Deep Purple Harvest SHSP 4124

Obviously a collector's item for Deep Purple fans, the main interest of this album lies in the way it captures the live sound of the erstwhile 'World's loudest band', and more specifically in Jon Lord's performance on keyboards. The original tapes were made on May 22nd 1974 for the BBC's In Concert programme at the Kilburn State Gaumont, and involve the Mk 3 version of the band after the departure of Ian Paice and Roger Glover and before Ritchie Blackmore himself left.

Throughout the album, which at 57 minutes running time includes the entire original broadcast with the exception of an overlong version of 'Space Truckin', Jon Lord's keyboards weave a backing which points to his own classical training and to the style which emerged on Deep Purple's 'Concerto for Group and Orchestra', on the solo album 'Sarabande', and on the recent 'Before I Forget' (E&MM August '82).

Lord uses the faithful old Hammond C3 together with the ARP Odyssey synthesiser (the rather cantankerous Mk. 1 at that time, of course) to create a backing which is sometimes choppy and rhythmic, sometimes gentle and sinuous.

The album should serve equally well as an introduction to Deep Purple, or as yet another high point to add to the seasoned fan's collection.



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Concert Review

King Crimson

Hammersmith Palais,
12th September 1982

The name King Crimson has been known to the music world for well over a decade. During this time the line up has undergone many changes, but has always boasted fine musicians and specialised in the intelligent use of electronic music. The original King Crimson was at the vanguard of the progressive music movement of the late Sixties/early Seventies, and was one of the first rock bands to explore the possibilities offered by the Mellotron and VCS3 synthesiser.

The Hammersmith Palais concert was opened by percussionist Bill Bruford, who wove a complex pattern of African percussion like sounds using a small set of Simmons drums set up towards the front of the stage. He was joined by Adrian Belew, who then

transferred to guitar and vocals as the pair were joined on stage by bassist Tony Levin and guitarist Robert Fripp.

Fripp remains the driving force of the band, and perched on his high stool on the left of the stage appears totally in control of the proceedings. His distinctive guitar style is less instantly recognisable now, being submerged in effects and treatments, but works equally well within the confines of this exceptionally polished and precise live band and on his more experimental, free-ranging solo albums.

On this occasion both Fripp and Belew were using Roland guitar synthesisers and a selection of other effects including Electro-Harmonix flanger. The range of guitar sounds obtained was enormous, from a heavy fuzz coupled with a slow attack to high-pitched 'seagull calls'. Tony Levin had chosen to complement his stick bass with a complete range of Yamaha PSE effects pedals, and on later numbers was able to produce slow legato cello-like notes which perfectly matched the mood of the more sombre tracks.

Bruford maintained the 'African' feel by accompanying one number entirely on a 'talking drum', which uses a flexible metal strip to alter the pitch and tone of the sound

produced. Also at his disposal were an entire Simmons electronic drum kit, coupled with parts of a conventional kit including rototoms and an additional bass drum mounted in mid-air as a tom-tom; as usual nowadays he does not use a hi-hat, preferring to rely on the wide range of electronic sounds available and using a footswitch to move from one sound to another.

Material was taken from their latest Polydor album 'Beat' and from previous releases, including 'Red', a particularly dramatic piece from the album of the same name, to make up a well balanced set. A high level of excitement was maintained throughout most of the evening, with the occasional slower number adding emphasis and contrast. Intense, rhythmic layers of sound, sudden changes of tempo (now funky, now moody) within the same song, forceful vocals and the careful and sparing use of vocal harmony held the audience's attention from start to finish.

Overall, the sound quality was unusual, although crystal clear, with the use of 32 channels in mixing and a back line of Ampeg and Roland amps. The predominantly glassy sound of the rhythm guitar (distinctively Fender despite all the effects devices) was overlaid by repeated short sequences, hypnotic offbeats and rondo or fugue-like forms to produce music which was rhythmic, if not always danceable!

The encores provided a showcase for the versatility both of the musicians and of their instruments. Guitars became flutes or saxophones, the bass produced slaps and twangs or slow string bass sounds with equal ease, the drum kit took on a metallic sound to produce machine-gun like effects, and Adrian Belew's 'rap' vocals pulled everything together. Finally, a descending series of chords pointed inevitably to a stock heavy metal ending which never came; Fripp was on his feet with his bow tie not a millimetre out of place, seemingly satisfied that King Crimson had successfully defied convention once again. Despite all the changes of line-up and style, the band are still in the forefront of progressive music, and still making innovations with electronics without rendering themselves inaccessible or uncommercial.

E&MM

Klaus Schulze

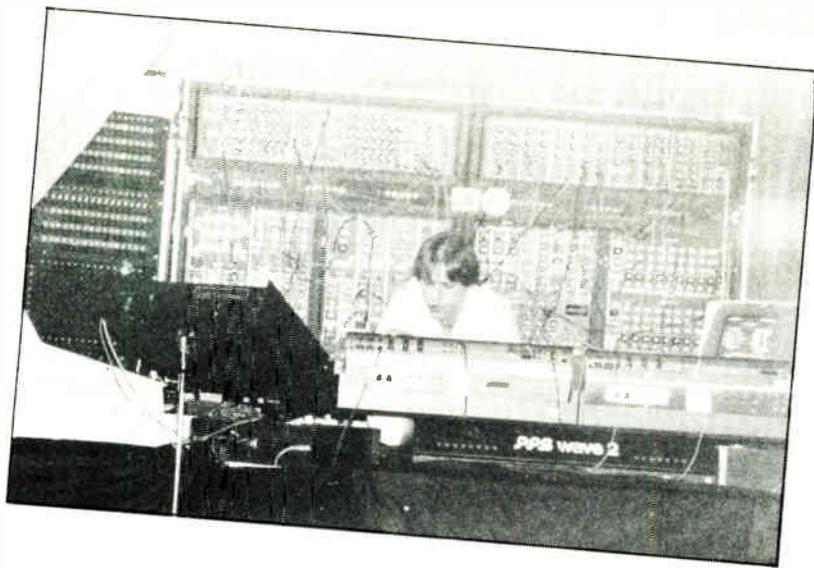
The Venue, London,
22nd September 1982

When a cult figure who hasn't played in this country for five years decides at short notice to play a single concert at one of London's smallest name venues, there's a serious danger of over-estimating the quality of his performance and failing to apply the critical values that would be used for a more easily accessible musician.

Klaus Schulze fans can relax. Schulze is playing better than he has for the last three years, he's still in the technological vanguard of electro-music, and he's still coming up with new musical ideas which have the power to move and excite an audience. The first surprise of this concert was the dual keyboard set-up, which included a Yamaha Electric Grand piano, Roland Promars, Korg Vocoder, Emulator and Mini-Moog played by an unknown classical musician, Rainer Bloss, who will be accompanying Schulze in the immediate future.

Schulze's own set-up was a slightly scaled-down version of his usual concert equipment, and formed the usual square around the Persian carpet on which he sat





throughout the concert. In front of him, two Mini-Moogs resting on a PPG Wave 2, which has replaced the faithful Polymoog; to the right, an ARP Odyssey and the onstage mixing desk, to the left a Yamaha CS80 polyphonic and the keyboard and terminal of the Crumar General Development Systems computer. The backdrop, as usual, was the huge modular system comprised of Moog, Roland and PPG equipment, with a PPG custom sequencer controller and keyboard, and almost as an afterthought a keyboard-less AKS synth for sound effects.

Although there was no light or video show as such, those of a meditative frame of mind could while away the time watching the complex displays of indicator lights on the modular system, which often seemed to have more of a decorative than a practical function!

The opening was of massed string chords on the PPG, overlaid by fragments of melodies on the Yamaha piano reminiscent of 'Blanche' from the 'Body Love 1' album. As the piano became more staccato and rhythmic it was underpinned by synthesised drums and then hi-hat, building up to an almost funky rhythm which powered along beneath a succession of different melodies which finally emerged as 'Friedemann Bach' from the 'X' album. Schulze's distinctive Odyssey lead sound, with slowly opening filter and a sudden cut-off, turned into a morse code message - and then, with a great swoop of digital sound, The Venue became filled for the last twenty minutes with the drums of Harald Grosskopf and the orchestra of 'Ludwig II Von Bayern', again from 'X', all reproduced in exact detail by the GDS computer.

The second set opened with a fog-horn like drone on the AKS, followed by deeply bending chords on the PPG and a quick fade into the 1981 concert set, with insistent percussion and rapidly pulsing sequences overlaid by quick arpeggio fragments on the Promars. The Emulator locked onto chords suggesting a cross between human voices and strings, while the third MiniMoog was used for basslines. Towards the end of the set Schulze's MiniMoog solo became quite impassioned, with a liberal use of modulation and pitchbend and a degree of head-banging both on and off stage! As the sequences died away they were replaced by the detuned xylophone sound from 'Digit' over a backing of gentle strings playing expressive upward chord resolutions, and finally by the opening AKS drone which eventually rose upward and 'out of sight'.

The inevitable encore began with strong 'reversed piano' sounds on the PPG, and rapidly developed into 'A Few Minutes After Trancefer' from the current 'Trancefer' album. Again the GDS provided percussion and cello (originally by Mike Shrieve and Wolfgang Tiepold respectively) and it was left to the 'live' musicians to weave ornaments around the tinkling sequences and woodblock-like percussion sounds. A final sweep of white noise left only the PPG again, this time bending gracefully downwards to a sudden cutoff and enthusiastic applause.

The whole concert lasted a little under two hours. Half the audience had to sit on the floor, the bar was shut, there was no light show, the musicians acknowledged the audience gratefully but didn't speak a word all night. Nobody cared; the capacity audience could see that Klaus was back on form. Musically, technologically, he's still on top.

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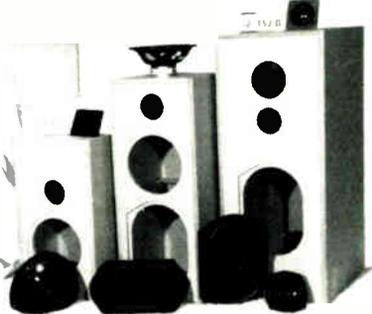
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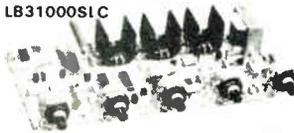
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E&MM NOVEMBER 1982

World Radio History

51

America

Jerry De Muth

Music companies continue to develop and release new synthesizers and electronic keyboards faster than confectioners come out with new candies. And although the music products are just as sweet, the prices are a bit more steep, ranging upwards from a few hundred to tens of thousands of dollars. Two new models recently came from the Korg lines - one a keyboard with various piano voicings and the other a polyphonic synthesiser.

Keyboards

The EPS-1 Korg Strings Keyboard is a 76-note, 6½ octave portable instrument with six different voices, selected by LED push button switching, that range from rich acoustic piano sounds to mellow electric piano, vibraphone and funky 'clav' sounds. The EPS-1 also offers string layering effects. A front panel variable keyboard dynamics control allows the performer to shape the weighted keyboard response to his or her own touch. A built-in three-band equaliser tailors the sound for any musical situation and a special overtone boost control renders a totally different sound by variably emphasising the harmonics portion of the selected voice.

The separately articulated string section features touch sensitive string attack time and strings may be layered with piano sounds or used separately. Other features include a key transpose switch and stereo tremolo and chorus effects, with variable speed and intensity controls.

The Korg X927-B Trident Mark II features the same programmable polyphonic eight-voice capabilities with triple-layered sounds as its predecessor. Totally independent synthesiser, string and brass sections, split keyboard, built-in flanger, four-way joystick controller and stereo outputs are also featured. Added to this new model is more programming capability, double the amount of program storage space, and full edit and tape interface capability. Also included is an all new synthesiser section featuring two ADSR envelope generators per voice, programmable attenuator and auto damping, plus improved 24dB/octave filtering and enhanced signal-to-noise characteristics. The memory has been expanded to hold up to 32 programs. The tape interface operates in eight seconds and has partial load capability to allow mixing or programs from different tapes. Price is \$4,595.

Synthia, a computer-based electronic keyboard instrument designed for both composers and performers, has been introduced by Adaptive Systems. Programming can be done three different ways - each key can be programmed individually, or one or two keys can be programmed and the computer will then automatically program all the other notes. The single 61-note polyphonic keyboard is both pressure and velocity sensitive and can control voices and effects on key up as well as key down. Its eight-voice system can be expanded to 16 keyboards and 64 voices, with eight harmonics per voice.

Each voice may also be assigned a full range of effects including envelope, noise,



Korg Trident Mk. II.



Korg EPS-1 Electronic Piano & Strings.



Adaptive Systems Synthia.

vibrato, tremolo, portamento, pitch offset and a new ASI development, Time-Slicing Voicing, which allows the performer to change the character of the note in segments as small as 10 milliseconds each. Under this change, which can be subtle or radical, a note can become several different instruments as it is held.

A wide range of string and chorus effects, including an accurate duplication of the old tape loop keyboard string sound, can be produced on Howard W. Cano's new electronic string synthesiser. Each key on this completely polyphonic instrument has its own waveform generator, envelope generator and VCA. Other features of these individually hand built and tested synthesisers include a specially designed chorus circuit, two VCFs, adjustable vibrato, an octave switch, a sustain pedal and a hand crafted, oiled walnut case. The \$1,750 price includes a flight case and one year warranty.

Hohner's new P100 portable electronic keyboard can be powered by either AC current or batteries. Through its self-contained speaker, this 49-key instrument delivers 12 different pre-set sounds, including

Piano, Harpsichord, Organ, Accordion, Vibraphone, Strings, Brass, Clarinet, Oboe, Guitar, Trumpet and Flute. Its auto-rhythm capability produces the sound of drums, including snare and hi-hat, and other percussion instruments, providing waltz, rumba, bossa nova, swing, disco, rock and slow rock rhythms. Other features include auto-arpaggio, single finger chords, auto-bass/chord with built-in memory, bass variations and separate volume control. The suggested price is \$695.

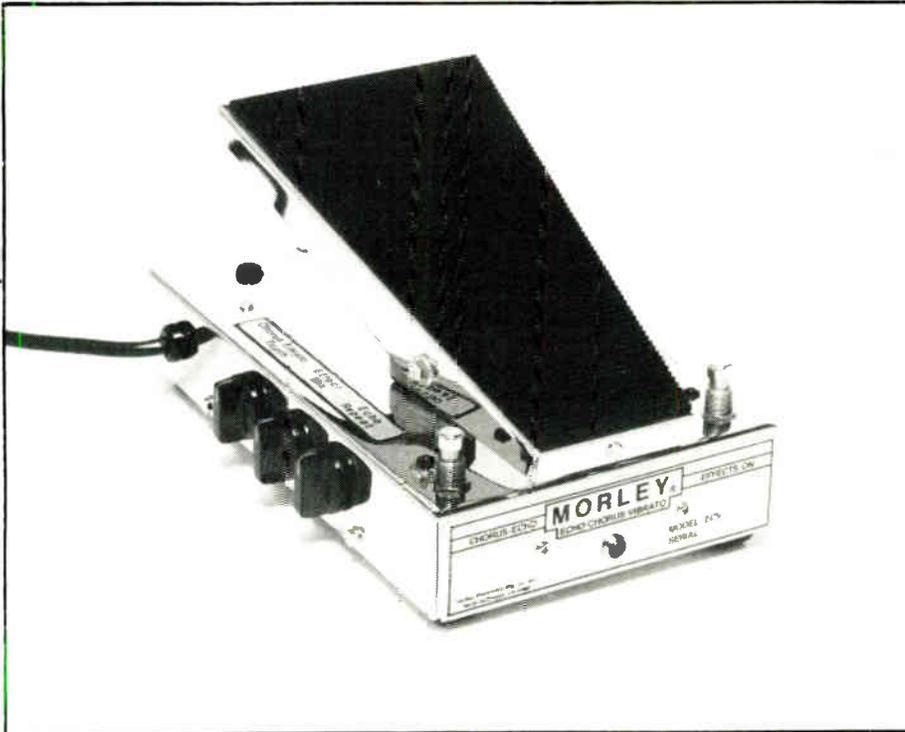
Moog, which has introduced several synthesizers during the past year, is now making available a series of artists programs for one of them, The Source. The digitally recorded cassettes for this micro-processor controlled, programmable monophonic synthesiser contains pre-sets as programmed by such artists as Jan Hammer, Devo and Gary Wright, along with written explanations and suggested applications.

Accessories

As keyboardists take advantage of this growing variety of instruments and add to the keyboards they play, there is an increasing need for support racks and companies continue to meet this need. While some racks stand on the floor, the latest from Ultimate Support Systems, the KS-88 Keyboard Stacker Kit, is an adjustable rack for stacking keyboards on top of a piano, organ or synthesiser. Standing 13 inches high, the Stacker Kit accepts either one or two tiers and allows infinite height and tilt adjustments. The base is 12 inches but can be angled to fit on instruments with a top less than 12 inches deep. Although the KS-88 kit weighs only 1¼ pounds, it can safely hold up to 100 pounds of equipment. Vinyl feet protect the piano top and also hold the rack securely in place.

Effects

The Echo Chorus Vibrato (ECV) and the 747MS Delay are the latest guitar effects from Morley. The ECV is a foot switch control mechanism for a wide range of delay times from 15 to 300 milliseconds. Additional



Morley ECV Echo-Chorus-Vibrato.

controls are options of a repeat throughout the delay range and a mixture control for a louder or softer echo. The chorus vibrato mode offers more and continuous variability determined by the position of the pedal.

The 747MS is a delay echo reverb system capable of eliminating echo effects caused by distance between speakers in large concert halls, open arenas and other expansive locations. It may be used with any amplified instrument, PA system or microphone. Input, delay and repeat controls offer added adaptability.

Guitars

To go along with all these new accessories guitar manufacturers keep turning out those instruments in an array of designs. Silver Street recently added three new guitars to their line of fretted instruments. The Taxi features a full 24¾ inch scale, 22 fret rosewood fingerboard, brass nut, balanced 2½ inch thick maple body, four bolt maple

neck, Schaller bridge, Gotoh Gut tuners, Bourns master volume and tone controls and a choice of Dimarzio pickups. The control cavity is completely shielded with 10 mm lead foil.

The futuristic Cobra's specs are identical except that its maple body is only 1¾ inch thick.

The versatile Spitfire, a traditionally styled double cutaway with a modern flair in body designs, offers nine distinct sounds which are achieved using both three position pickup and coil tap switches. Its maple body is 11 inches wide by 1¾ inches thick for sustain and comfortable performance. Other specs are as for the Taxi and Cobra. All Silver Street guitars are finished with nine coats of lacquer and are available in Silver, Dark Blue, Steel Blue, Gold Top, Green, Champagne, Mercedes Red and Apple Red in metallic colours, plus Sky Blue, Yellow, Turquoise, Black, White, Red and Orange Red. In addition custom colours are available.

The popular Flying-V design has been adopted by Melobar Guitars for its Power-Slide series to provide slide and steel players with dramatic stage appearance and mobility. The tilt-neck design enables a performer, using "over-the top" barring with precision control, to play slide in either a sitting or standing position. Other features include two pickups with three-way switch control, Grover tuning machines, chrome-plated brass hardware, standard 10 strings with custom 6 and 8 strings available, and bridge and nut mounted on continuous hardwood stem for added sustain. Suggested retail prices range from \$675 to \$850, with custom models priced up to \$1,200.

Sierra Guitars of California has turned Excalibur from a sword into an "axe", for that's what it has named its new line of guitars and basses. Crafted from top exotic hardwoods for tonal content and structural integrity and designed for superb balance and playability, every Excalibur model has a three-piece laminated neck which goes through the body, 24 frets, Schaller tuners, precision-made chrome-plated solid brass bridges, dual acting stainless steel truss rod and high quality pickups, some of them specially designed for the series.



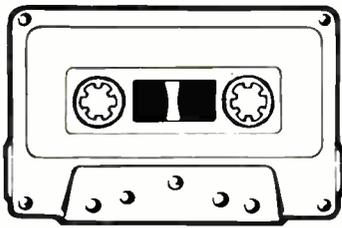
Sierra Excalibur Bass.

Personally made, handcrafted custom guitars are usually acoustic models, but Michael Jacobson-Hardy, working in the mountains of western Massachusetts, constructs electric as well as acoustic guitars, tailoring the electronics to individual needs and desires. All details of construction, including body shape, finish and wood, can be specified; woods available for both acoustic and electric instruments include flamed, curly or bird's-eye maple, rosewood, mahogany, koa, walnut, Sitka and European spruce. No plastic is used anywhere.

The new S-500 electric solid body guitar from Leo Fender's G&L Music Sales incorporates three patented single-coil pickups, a five-position selector switch and G&L's patented vibrato. The selector switch allows the performer to choose single coil position on either the rhythm, centre or lead pickup. In addition, two humbucking positions are available by combining the centre and lead pickups or the centre and rhythm pickups. Controls are volume, treble and bass. The S-500 is available with maple or ebony fingerboards and in a selection of nine different colours.



Sierra Guitars Excalibur.



CASSETTE REVIEW

Electronics and Music Maker's CASSETTE REVIEW continues to look for music from readers whether recorded live, on a couple of cassette decks, in a 16-track studio or anywhere in between. Again we've increased the space available and included some shorter reviews in the belief that a brief mention is better than none at all. If your cassette hasn't been mentioned yet, don't panic; we've received a large number and are trying to mention every one. 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 used and recording method adopted, and a relevant black-and-white photograph; E&MM Review, 282 London Road, Westcliff-on-Sea, Essex, SS0 TJG.

Although the standard of cassettes has been very high, electro-pop seems to dominate again this month. Where are all the

budding Jean-Michel Jarres and Tangerine Dreams of this world? A few more live tapes would be interesting too!

Unfortunately, it's no longer possible to return tapes, but readers should note the details of our Electro-Music Compilation cassettes which will ensure international promotion of the music reviewed in these pages.

Subjective scores are out of a maximum of 10 for each category.

Tape of the Month

UMO VOGUE (Bristol) 'Tonight', 'Erotica'. Roshi Umo, vocals. Stig Manley, keyboards, guitar, vocals. Neil Deamer, bass. Russ Cooke, synthesisers, guitars, vocals. Two extremely polished pop/jazz-funk tracks characterised by an extremely clear and well-balanced sound and imaginative vocals. Although Umo Vogue have a Bristol management company their recordings are still made on a TEAC 3440 "in Russ' Mum's front room, much to her disgust!" The drum tracks, a combination of rhythm machines and hand percussion, were mixed down from the 4-track tape used as backing on stage, with the bass and synthesisers added. Despite this the whole of the back line is clear and well separated, with a rich slap bass sound, and the Roland SH09 synth weaves fluid lead lines over it in between the harmony vocals. The overall effect is one of confidence, professionalism and total control of sound balance - we'll probably be hearing more of Umo Vogue.

Music: 8 Production: 8 Presentation: 8 Tape: 8



Umo Vogue; Russ Cooke, Stig Manley, Neil Deamer and vocalist Roshi Umo



The Pals; Sheena Gould, Royston Hollyer, Simon Thomas, Brendan O'Sullivan, Len Satch.

THE PALS: 'The Dolio' (Enfield, Middx.) One track: Sheena Gould, 200 year old violin and vocals. Royston Hollyer, electric guitar and vocals. Simon Thomas, bass and vocals. Brendan O'Sullivan, vocals. Len Satch, drums. This really should have been tape of the month, but it's not so much electro-music as very imaginative electric pop/folk. It is STUNNING. These people have a home-made 8-track (EL 3504 15ips tape transport milled up to 1/2" with a Black & Decker, 8 Philips valve amps and old red oxide tape at £3.50 a reel), a plate reverb made from ten sheets of metal hung from the ceiling with a ceramic cartridge glued to each one, and an ADT system consisting of two loudspeakers swung round the head on a piece of string. The overall sound is crystal clear, the voices are by turns angelic and impassioned, and if somebody doesn't give them enough money to cut a single very soon there's no justice in the world.

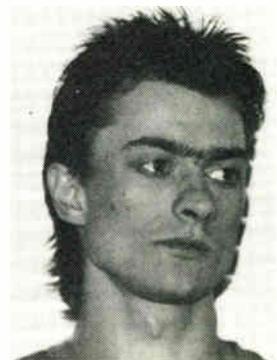
Music: 9 Production: 9 Presentation: 6 Tape: 8

NEIL K. HEATON (Hemel Hempstead, Herts.) Four tracks. Korg Polysix, Korg Delta, SCI Pro-One, Roland CR8000 and TR 808 rhythm machines, Aria SB1000 bass. Electro-voice DS35 mike, Roland Chorus Echo and Dimension D stereo image processor. Teac Portastudio, mastering on Aiwa M 450 cassette.

Neil's four songs are intensely commercial, striking a balance between the Human League and the gloomier feel of Ultravox or Visage. He feels

he's "achieved maximum quality available within the restriction of the present set-up", and certainly the sound is crisp and clear, with the rhythm machines sensibly helped along by bass synth sounds. However, the clear sound has to some extent been paid for by the sparseness resulting from a lack of overdubs. "Don't Want to Let Go" is best - very catchy, with a clever imitation of pizzicato strings juxtaposed with abstract 'space sounds'.

Music: 7 Production: 7 Presentation: - Tape: 8



Neil K. Heaton

EXCLUSIVE OPPORTUNITY FOR E&MM READERS!

Each month our Tape of the Month Winner will have the chance to discuss their music with Martin Rushent, top producer for Human League, Altered Images etc. at his Genetic Sound Studio!

LE POP SPORTIF (Cambridge) One track, 'Rope the Rope'. Recorded at Spacewood Studios 16 track. Tim Burrage: Gretsch drums, Simon Clark: Fender Precision bass. Adrian Mathie: Gibson guitar. Richard Green: Korg Polysix, piano. Julian Marley: Vocal. Nick Jonson: Saxophone.

Not exactly a 'home recording' as the band cheerfully admit, but a very polished 16 track production in a funky pop style, with hints of Talking Heads and American 'rap' artists in the vocals. Some unusual sounds on the Polysix, resembling plucked strings followed by a flanged sustain. The overall mix is very clear, a little too dry if anything, particularly on the vocals.

Music: 6 Production: 6 Presentation: - Tape: 8

CHERYL CHARLES DUO: 'Rhapsody' (Huddersfield, W. Yorks) Pro-duplicated, 8 tracks; Yamaha CS60, ARP Pro-Soloist, Pro DGX and Omni II, Logan String Melody, Multivox Bass Pedals. Teac A3340S, Revox VHS 77, Shure SM58 & SM59 mikes.

Cheryl and Peter Charles have produced a very professional-sounding album and cassette of their stage act which covers pop standards from 'Chattanooga Choo Choo' (complete with pistons and steam whistles) to 'The Empire Strikes Back' (complete with whatever noises TIE fighters make). They now hope to make a 16 or 24-track studio album, and feel "it is possible to use home taping successfully as a stepping stone to more advanced things."

Music: 6 Production: 7 Presentation: 5 Tape: 6

E. G. OBLIQUE GRAPH: 'Piano Room' (Swinton, Manchester) Bryn Jones: synths, tapes. Pro-duplicated, 7 tracks. Very accomplished tape of ambient/minimalist music along the lines of Conrad Schnitzler or Eno. Comes with sinister all-black packaging and a minimum of recording information, but perhaps it's best to be allowed to speculate on the exact origin of the industrial sounds, reversed noises, clanks and disembodied voices. Quite relaxing at times if this is your sort of music.

Music: 5 Production: 6 Presentation: 8 Tape: 6



Jonathan Rush

JONATHAN RUSH: 'Tales of Hockroot' (Bristol, Avon) Pro-duplicated: one long narrative track (Side 1) and instrumental version (Side 2). Casio MT40, Roland SH1000, Roland RS101 strings, Cramer Baby Grand Piano, E&MM noise gates and effects. Teac A3340S. Simon Bridge-water, narrator. David Rush, engineer. Mandy Rush, artwork.

A family effort which has produced a very attractive musical drama with an overall style reminiscent of Genesis around 'Trick of the Tail'. Good to hear electro-music used for something which could be applied in the area of school drama/music teaching. Only the passive Turnkey 4 channel mixer was used for what must have been quite a complex production; full marks for inventiveness and originality.

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

E&MM NOVEMBER 1982



Paul Klein

PAUL KLEIN/THE TOY SHOP (Sheffield, S. Yorks) Four tracks. Gibson guitar, Wasp Deluxe, Spider sequencer, Boss Dr. Rhythm, percussion. Teac Portastudio, or 16 track studio (Ric-Rac, Leeds).

Paul's written his own review from which we'll freely quote; "the self-styled 'one-person trio's version of Donna Summer's electro-disco classic 'I Feel Love' would sound great as a 12-inch single; his latest independent single release, 'The Maze' bubbles along in fizzy pop effervescence, but lacks the sparkle of a big studio production. 'Live Wires Kill' is short, fast, and almost entirely sequenced, while 'Observing Europe' is a lively, disco-ish instrumental underpinned by a cute sequencer riff. Paul plans to go all the way with his music and longs for commercial success; on our reckoning he should have little trouble in achieving it."

The marks, however, are our own, except the last which Paul also thoughtfully provided.

Music: 7 Production: 7 Presentation: Tape: 7 Cheek: 10

ROGER GREEN (Chalfont St. Peter, Bucks) 6 tracks. SCI Pro-One, Casio 401, Univox Rhythm Box, Aria Bass, lead, slide and rhythm guitars. R. J. Lloyd, guitar. A. Oliphant, drums. TEAC Portastudio, Accessit Companders, Tandy mikes. Very wide-ranging tape, from fizzy pop ('One day Love') to part of a concept album about Marco Polo ('India') to Dalek I Band-type melancholia ('Ultimate Love Song'). Roger remarks, "I've had to sacrifice a certain amount of dynamics for a full multitrack sound, but the companders help avoid the loss of dynamics inevitable when tape transfer may occur up to 6 times." Common factor is a sparkling treated guitar sound with lots of fast, shallow phasing, which tends to distract the listener from the lack of bass response which Roger admits is inevitable, particularly with a cheap drum machine.

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

STEPHEN PATTLE/D. RECTOR'S Guide to Boring Pubs' (Bromley, Kent) Pro-duplicated, 14 tracks. Cheap electric guitar (ashamed to say name) Hofner semi-acoustic bass, Casio VL tone, Soundmaster SR88 Drum Machine. Teac Portastudio, mixdown at Canon Rd. Studio.

There's not much amusing electro-music about, but this one had us in stitches. Imagine a cassette insert folded the wrong way round, depicting two bored-looking individuals slumped outside a pub in Bromley, a cassette full of songs like 'We're Boring', 'Looking for the Easy Life' and the eponymous 'Guide', a 'wall of sound' technique full of fuzzed guitars and wailing VL-tone, and you have some idea of the magnitude of D. Rector's awesome achievement. Sometimes it's so awful it's wonderful: we hope that was the intention!

Music: 0-10 Production: 7 Presentation: 7 Tape: 6

Of the scores of tapes we've received, the following also deserve a mention:

Paul Dean 4 middle-of-the-road tracks showing a very imaginative use of 'drum drops' backing tapes.

Paul Highfield 2 songs with a basically very clear and rich mix, and so a pity to use such a low-grade cassette, which takes the edge off the production a little.

Derek A. W. Knott A good selection of sounds from relatively limited equipment on the instrumentals, but the vocal is mixed a little too high on the one song of this tape.

Marl. Sinister Two tracks of highly atmospheric 'ambient' music recorded without overdubs.

John Wyburgh Five instrumental/ambient tracks with an imaginative use of stereo effects.

Red Tips through the Night 'Landing Music'. Interesting and unsettling sound/voice landscapes which now need a greater variation of sounds.

Continuum/T. Barrett Basic instrumental electro-pop livened up by imaginative use of the Korg MS10/E&MM Harmony Generator combination.

Stewart Wallace Unusual set of live improvisations using Sharma HX80 organ and Yamaha CS5 synthesiser.

Gareth John Covering a very wide range of styles, all this tape needs is some work on the rather 'flat' sound.

Solaris Good range of voices and effects from relatively limited instrumentation, now needs more variation of pacing and rhythm.

T.N.Z./Kenneth Brown: 'Boxes in the Attic'. Highly imaginative electro-music reminiscent of Holger Czukay's work through the use of short wave radio extracts.

Steve Jones A single Kraftwerk-style song, 'Robophobia', given a more human feel through the use of 'drum drops' backing tapes.

Steve Hoole 'Demo Tape 1'. Four very pleasant, simple songs along the lines of early Human League: nothing like as depressing as Steve seems to fear!

Steve Ainsworth 'Tapeworm' compilation. A wide ranging tape covering styles from ambient to mellow pop, with the highlight an incredible abstract soundscape based on TV's 'The Prisoner' called 'Who is No. 1?'

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1982

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 Studic
* 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 Czuyak * Depeche
Mode * keyboard Buyers Guide *
The Peak Programme Meter *
Reviews: Moog Source and Rogue
Synthesisers, Suzuki Omnichord,
Acorn Atom Synthesiser, Calrec
Soundfield Microphone * Projects:
Soft Distortion Pedal, Quadramix.

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

JULY Ronny with Warren Cann and
Hans Zimmer * Drum Machines
Buyers Guide * Jean-Michel Jarre

Music Supplement * Reviews:
Roland Juno 6 Synthesiser, Peavey
Heritage Amplifier, Steinberger
Bass Guitar, TI-99/4 Music Maker
Software * Projects: Universal
Trigger Interface, Electric Drummer
Part 5.

AUGUST Kitaro * Spectro Sound
Studio * Jon Lord Interview &
'Before I Forget' music to play *
Reviews: The Synergy, Korg Polysix,
Tascam M244 Portastudio,
Shergold Modulator 12-String
Guitar, Yamaha Professional
System Effectors * Warren Cann's
Electro-Drum Column * Projects:
8201 Line Mixer, Guitar Buddy
practice amplifier.

SEPTEMBER Richard Pinhas * Non-
Concordant Tone Generation *
Yamaha CS-01 Breath Controller *
The London Music Trade Show *
Digital Aids the Video Stars *
Reviews: Jen SX1000, Casio 1000P
Synthesisers, Fender Squier Guitar,
Carlsbro Stingray Electro-Acoustic
Amplifier, Pearl Effectors, Delta Lab
DL-5 Harmoniccomputer * Projects:
Comp-Lim, Twinpak.

OCTOBER Kate Bush interview and
'The Dreaming' music to play *
Digital Recording, A New Landmark
* Harrogate Festival of Audio & Video
* Ken Freeman * Spectrum
Micromusic * Reviews: Rhodes
Chroma, Fender Squier guitars, Kay
drum machine, Carlsbro Power
Amp * Projects: ElectroMix 842
Mixer, Amdek Distortion Kit.

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Music Techniques. 4. Sharp MZ-80K
music/sound effects. 5. Warren Cann
plays Syntom Drum Synthesiser pro-
ject. 6. Paia 8700 Computer music. 7.
Frankfurt Music Fair.

**Demo Cassette No. 2 (May/June
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 issues) contains:**

1. PPG Wave 2 Synthesiser. 2. Syn-

wave project. 3. Wersi Pianostar
played by Hady Wolff. 4. Alphadac 16
music. 5. Atari 400/800 music. 6.
Duncan Mackay. 7. Hexadrum pro-
ject. 8. MTU music. 9. Casio VL-Tone.
10. Irmin Schmidt's Toy Planet LP
extracts.

**Demo Cassette No. 4 (Sept./
Oct./Nov. 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.
issues) contains:**

1. Teisco SX-400 Synth. 2. Poly ZX81
music. 3. Study Music 1: Synth back-
ing 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. Se-
quential Circuits Pro-One Synth. 8.

Study Music 4: Kraftwerk's Ralph
Hutter at the E&MM interview. 9.
Home Electro-Musicians: Johnny
Demostos, Gerry Taylor. 10. Digital
Delay Line Effects Project. 11. Per-
cussion Sound Generator Project. 12.



E&MM Spectrum Synth sounds.

**Demo Cassette No. 7 (April to
September 1982 issues) con-
tains:**

1. Roland Juno 6. 2. Cardiff University
computer music. 3. The Omnichord.
4. E&MM Soft Distortion Pedal pro-
ject. 5. Warren Cann's Drum Column
examples in Parts 1 & 2. 6. Casiotone
1000P. 7. Emu Emulator. 8. Delta Lab
DL-5 Harmoniccomputer. 9. Yamaha
CS-01 Breath Control Synth. 10.
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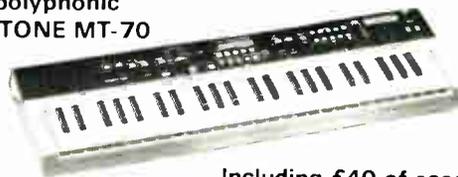


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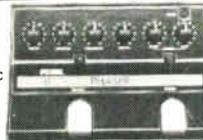
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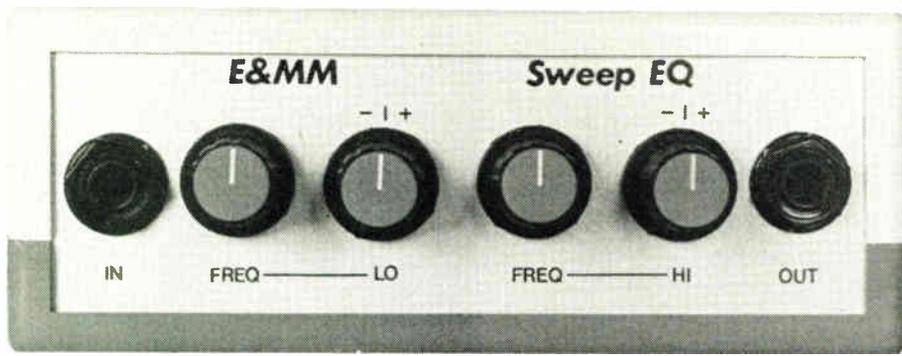
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- ★ Uses two low cost IC's
- ★ Easy construction

When recording vocals or instruments particularly acoustic instruments using a microphone, the results can often be very disappointing, lacking life and character. Invariably the problem is due to the microphone not picking up all the natural warm resonances of the instrument or singers voice. The microphone itself can exhibit peaks and dips in its frequency response which aggravate the problem. Another familiar problem is when the recorded instrument exhibits an unnatural resonance, or boominess at a particular frequency.

What's obviously needed is a means of controlling the contour of the frequency response; to lift the dips and drop the peaks. A graphic equaliser may provide the answer, if you can justify the cost of one, and if the ±10dB or so of control range is sufficient. A parametric equaliser can also be very useful, although considering its complexity would be an overkill in most situations. Since every parameter of the parametric filter's response can be varied, the operator is confronted with quite an array of controls to adjust, just for one centre frequency!

The E&MM Sweep Equaliser provides a

simple, low cost, but very effective solution. It provides two stages of equalisation whose centre frequency can be varied. Each stage has its own boost/cut control with an astounding range of ±30dB at the centre frequency. The busy musician/operator/engineer is presented with only the essential controls necessary to overcome equalisation problems quickly.

The use of the Sweep Equaliser is certainly not limited to frequency response correction. It should also be considered an invaluable creative tool in the studio, or on stage for use with any sound source, acoustic or electronic. Professional studio engineers use Equalisers (EQ) constantly in the production of the recordings we hear today, for both corrective and creative purposes. When you have a Sweep Equaliser at your fingertips, a whole new spectrum of sounds become available at the turn of a knob.

Filter theory

Active filter theory is too complex a subject to investigate in depth in these pages, but the following discussion gives some insight into the development of the bandpass filters which are the heart of this project. Some useful active bandpass filter design equations are also given.

The filters are based on the well known multiple feedback bandpass filter, sometimes known as an inductorless resonator for obvious reasons! Figure 1a shows the general circuit. Since we need to vary the centre frequency without changing the gain or Q factor, it can be seen from the equations that R1 and R2 must be varied simultaneously. In any practical circuit, R1 and R2 will have to be equal so that a standard dual gang potentiometer can be used.

Re-writing the equations for the equal value resistor circuit shown in Figure 1b, we

SPECIFICATIONS

EQ frequency range	: 50Hz to 700Hz and 700Hz to 9kHz
Boost and cut range	: ±30dB
Q factor	: 1.8
Bandwidth	: 0.75 octaves
Frequency response	: 6Hz to 33kHz -3dB (controls flat)
Output noise	: -87dBm (A) (controls flat)
	: -77dBm (A) (full boost at 700Hz and 9kHz)
Positive supply current	: 11mA
Negative supply current	: 11mA

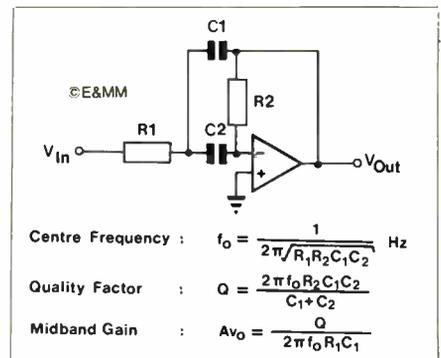
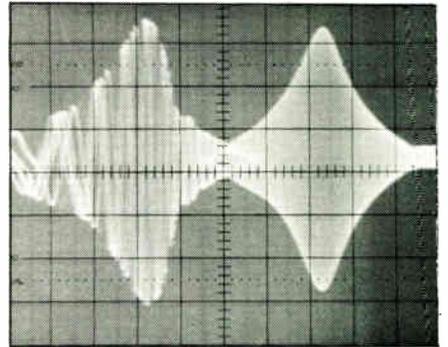
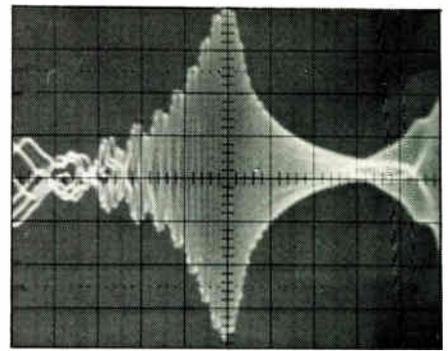


Figure 1a. Basic Bandpass Filter circuit.

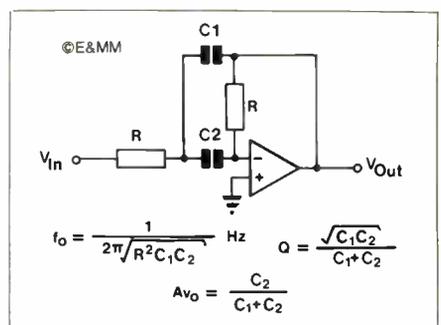


Figure 1b. Bandpass circuit with equal resistors.

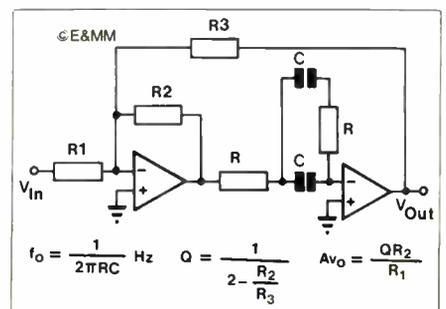


Figure 1c. Bandpass circuit with Positive Feedback.

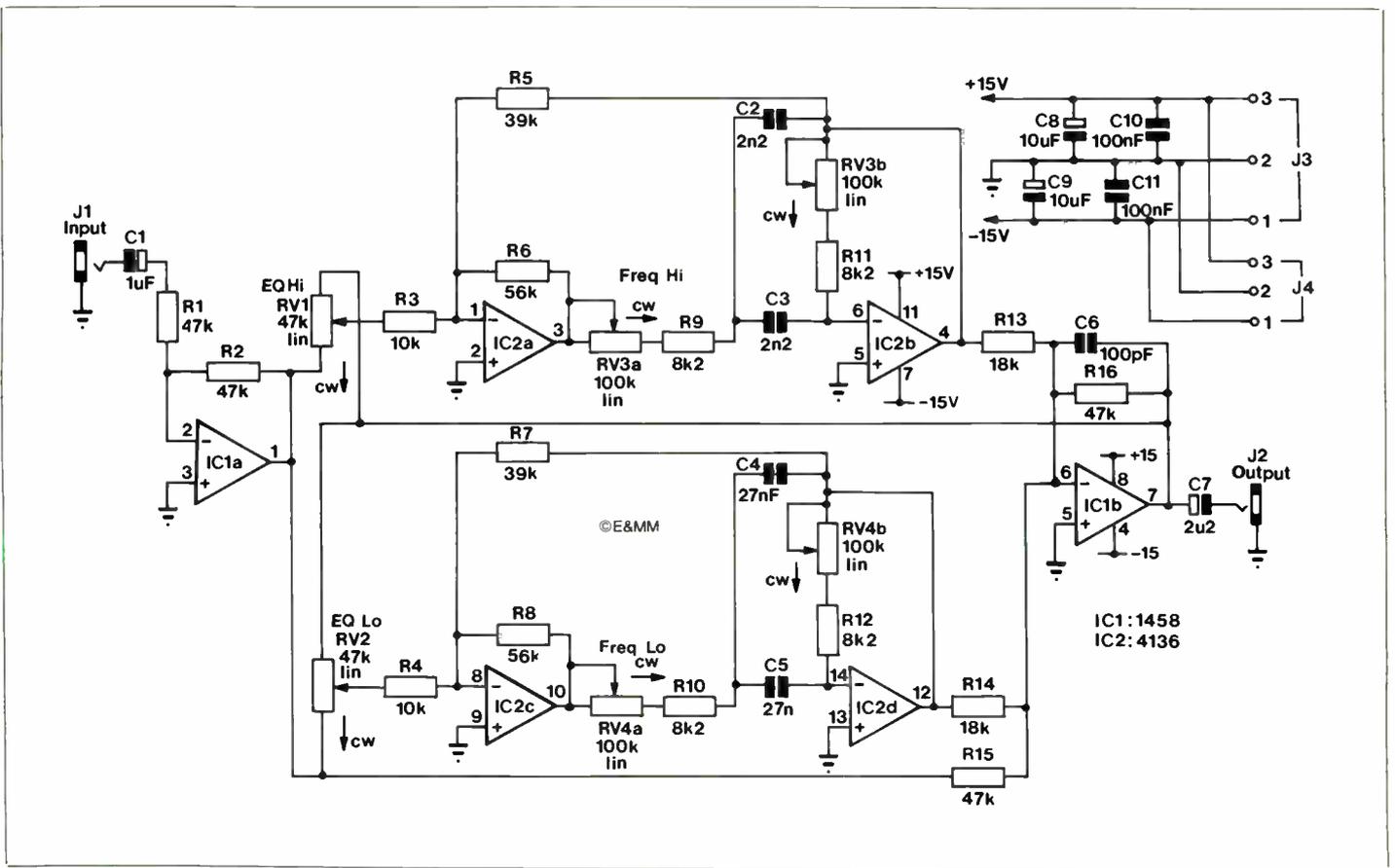


Figure 2. Circuit diagram of The Sweep EQ.

find that the maximum value of Q is 0.5 which occurs when $C1=C2$. A filter with such a small Q factor would be of very limited use since it would not be nearly selective enough.

The final solution shown in Figure 1c uses positive feedback to peak up the response at the centre frequency to give a design target Q factor of 1.8. Note that an additional stage is required to amplify and invert the signal fed back to the inverting input of the filter amplifier. This configuration is not suitable for high Q filters since it would be unstable in such applications.

Circuit

Figure 2 shows the complete circuit diagram for the Sweep Equaliser. IC2a&b form a bandpass filter for the high frequency range, while IC2c&d form the filter for the low range. RV3 and RV4 control the filter centre frequencies. With the controls flat, the input signal, buffered by IC1a is passed directly to the output amplifier, IC1b via R15. The signal will not be affected, and maintains its original polarity since it is inverted twice; once by IC1a and again by IC1b.

When RV1 is turned clockwise, the input signal is fed to the input of the high range filter, the output of which is amplified by IC1b to produce an output with a peak of 30dB at the centre frequency. When RV1 is turned anticlockwise, the high range filter is effectively placed in the feedback path of the output amplifier IC1b, causing its gain to decrease dramatically at the centre frequency, producing a dip, or notch 30dB deep. The low range filter is controlled by RV2 in exactly the same manner. RV1 and RV2 have been given a relatively high value compared with R3 and R4 so that the resultant loading on the potentiometers imparts a pseudo logarithmic response to the controls, providing finer resolution near their central positions.

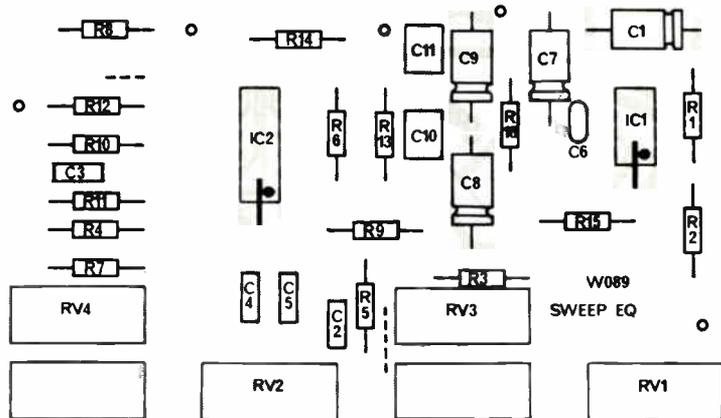


Figure 3. PCB component overlay (not to scale).

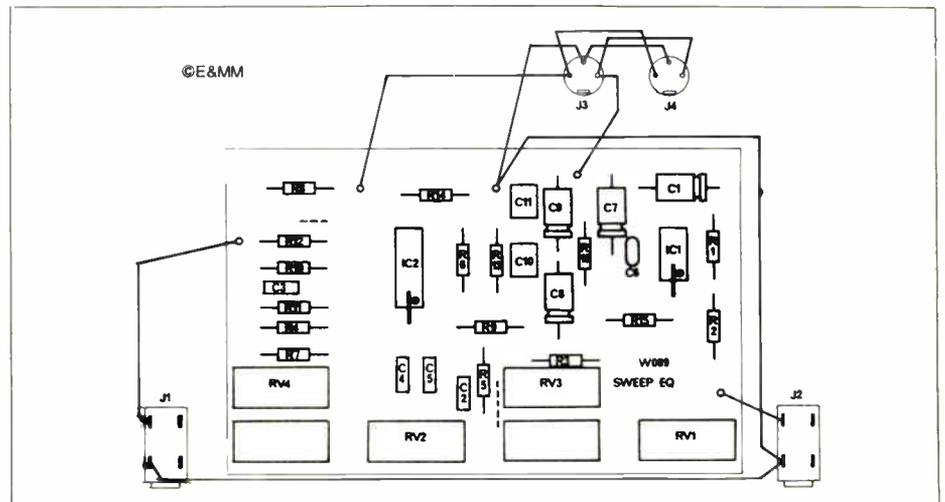


Figure 4. Inter-wiring diagram.

PARTS LIST FOR SWEEP EQ

Resistors - all 5% 1/3W carbon

R1,2,15,16	47k	4 off
R3,4	10k	2 off
R5,7	39k	2 off
R6,8	56k	2 off
R9,10,11,12	8k2	4 off
R13,14	18k	2 off
RV1,2	47k lin pot	2 off
RV3,4	100k dual lin pot	2 off

Capacitors

C1	1u 63v electrolytic	
C2,3	2n2 polycarbonate	2 off
C4,5	27n polycarbonate	2 off
C6	100p ceramic	
C7,8,9	10u 25v electrolytic	3 off
C10,11	100n polycarbonate	2 off

Semiconductors

IC1	CA1458 dual op-amp
IC2	RC4136 quad op-amp

Miscellaneous

J1,2	Jack socket	2 off
J3,4	3 way DIN socket	2 off
	Verobox 212	
	Knob	4 off
	Knob cap, blue	4 off
	8 way DIL socket	
	14 way DIL socket	
	3 way DIN plug	2 off
	Veropins	
	3 core cable	
	wire	
	PCB	

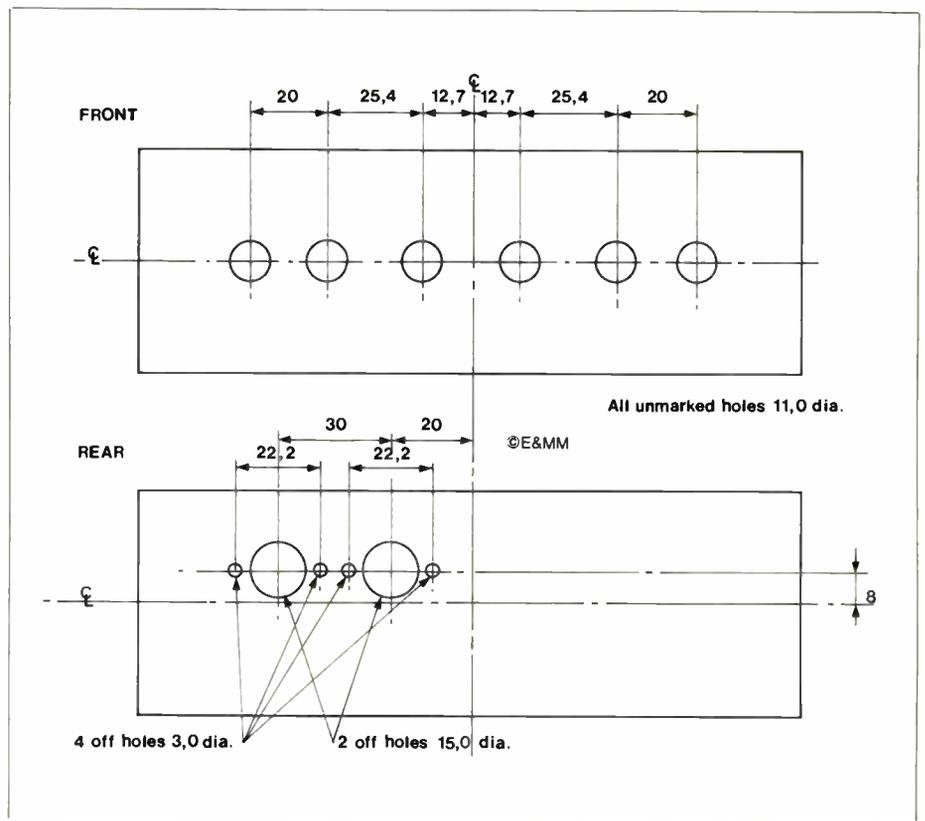


Figure 5. Panel drilling detail.

Capacitor C6 ensures that IC1b maintains high frequency stability at all control settings.

Construction

The ease of construction of this project relies on the use of a single PCB to mount all the components, including the potentiometers. Assembly of the PCB should commence by inserting and soldering the veropins, used to connect the flying leads to the PCB. Next insert the two wire links and all the resistors. Bend the leads at 45° to secure the components, then solder and crop. Fit the capacitors in a similar manner, taking care with the polarity of the electrolytic types. Solder in the IC sockets next, but don't fit the IC's at this stage.

After preparing the case panels as shown in Figure 5, fit the DIN sockets to the rear panel and the jack sockets to the front panel. Now locate the potentiometers in the PCB, but before soldering, secure them to the front panel so that strain is not put on the joints. At this stage check the assembly and all the soldering carefully, preferably with an eyeglass, looking for dry joints and bridged tracks. The IC's can now be fitted in their sockets, taking care with their orientation. Slide the completed panel assemblies into the case base and complete the project by wiring the PCB to the sockets as shown in Figure 4.

Using the sweep EQ

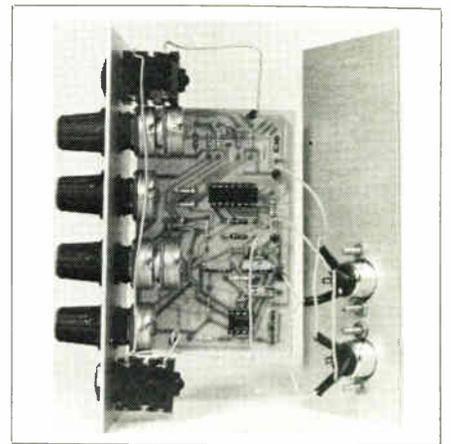
The Sweep Equaliser requires no setting up, and should be ready for use. It was designed to be used with the Twinpak DC power supply described in E&MM Sept. '82 P.59, although almost any twin regulated DC supply will suffice provided that it delivers regulated ± 9 to ± 15 v at a few tens of milliamps. Connect the DC supply to one of the DIN sockets, the other socket being intended to extend the supply to another unit.

Equalisation should ideally be performed during the recording process rather than on playback, as long as you can monitor the signal being recorded. Not only will this

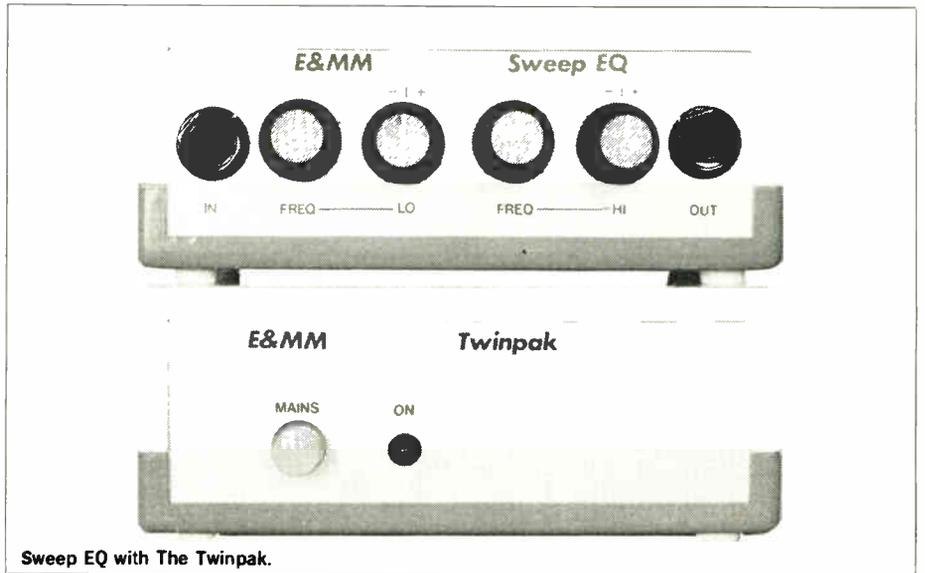
usually yield a higher signal-to-noise ratio, but also allows each track to be individually equalised using only one equaliser. To find the required frequency, set the relevant section to full boost and adjust the frequency control until the sounds requiring alteration become prominent. The boost/cut control can then be set as required to adjust the relative level of the selected sound.

Instruments such as guitars, synthesizers or organs can be connected directly to the unit, the output of which will then be routed to your amplifier, mixer, or tape recorder. To provide more equalisation stages, two or more Sweep Equalisers can be connected in series. Three or four units could be used together to form a powerful graphic equaliser!

E&MM



Internal view of the Sweep EQ.

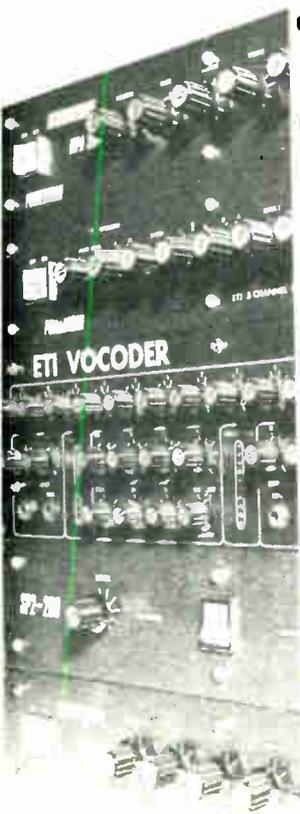


Sweep EQ with The Twinpak.

A complete set of parts for the Sweep EQ including components, PCB, case, screen-printed panel and hardware is available from E&MM, 282 London Road, Westcliff-on-Sea, Essex SS0 7JG, at a cost of £28.95, including postage, packing and VAT. Please order as: Sweep EQ kit.

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SCENE

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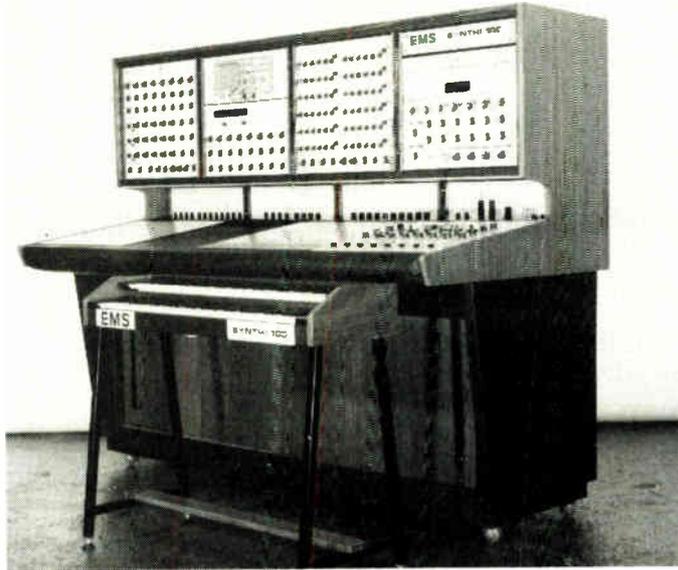
All 12 Oscillators are now identical having switch selection from Voice/Very Low Frequency operation. Each has individual outputs of Sine, Sawtooth, Pulse or Triangle Wave Forms with level control. The circuitry of the Oscillators has been completely re-designed, giving much greater stability, and more perfect tracking.

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In addition to the traditional reverb spring facility, an analogue delay line echo device is now included, with voltage-controlled delay, and echo mix. All Input and Output lines are balanced, giving full Studio working up to +16dBm levels. Noise and distortion have been reduced. The Patch Boards have been extended allowing more facilities to be programmed, and true virtual-earth mixing is employed to prevent interaction.

Further details from Datanomics Ltd./E.M.S., Westminster Road, Wareham, Dorset BH20 4SP, U.K. Tel. 09295 6311.



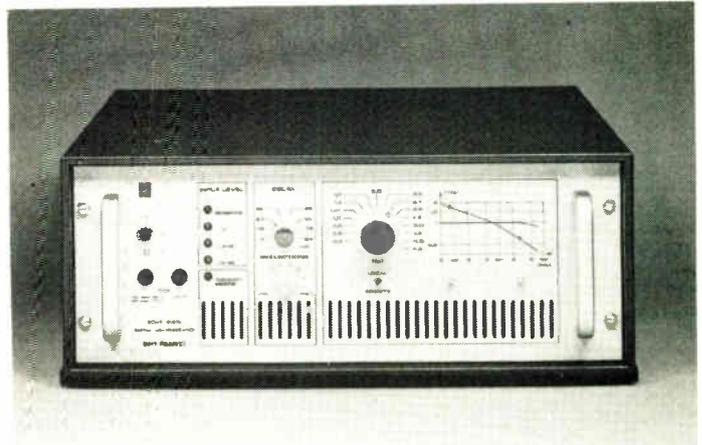
AKG Headphones

AKG have introduced two new lightweight headphones aimed at the portable hi-fi market.

The K1 has an approximate retail price of £17.25, which includes a carrying case doubling as a belt pack. The earpieces are connected by a collapsible stainless steel trellis designed for maximum adjustment and comfort. The K1 can be connected to any headphone output with an impedance of between 5 and 600 ohms.

The K4 headphone, developed from the widely respected AKG340, contains two separate units, one dynamic and one electrostatic. This system, claim AKG, is capable of producing very clear treble sounds together with a full bass-frequency range in fact being quoted as 20-25000 Hz. The approximate selling price is £62.10.

Further details from AKG Acoustics Ltd., 191 The Dale, Acton, London W3 7QS. Tel: 01-749 2042.



Accessit Effects

Bandive recently introduced new additions to the Accessit range of budget-priced studio effects. There's a sweep equaliser with two bands, each switchable to a high and low frequency setting and with individual gain; a noise gate with adjustable trip threshold; and a compressor with input and release controls and a moving coil

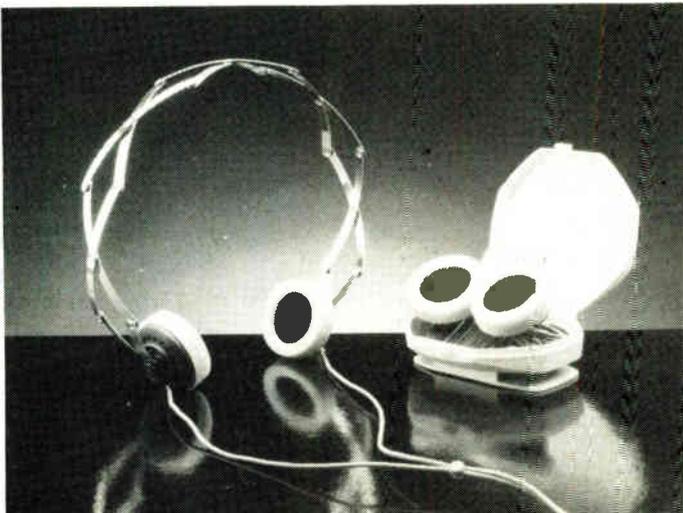
EMT 245 Digital Reverberator

EMT Franz GmbH recently introduced their EMT 245 Digital Reverberator, intended to exactly simulate the acoustics of a room of any desired size. Reverb time is selectable in sixteen steps between 0.4 and 4.5 seconds, and the high frequency absorption of air particles and bass emphasis of stone walls, for instance, can be duplicated if desired. The EMT 245's Remote Control unit can control and give a digital readout of all functions through connection by a single audio line: it contains an 8748 microprocessor which also allows it to store all the details of ten different reverb settings. Lithium battery power maintains this stored information for up to ten years. The reverb unit is compact enough for mobile use.

Further details from F.W.O. Bauch Ltd., 49 Theobald Street, Boreham Wood, Hertfordshire. Tel. 01-953 0091.

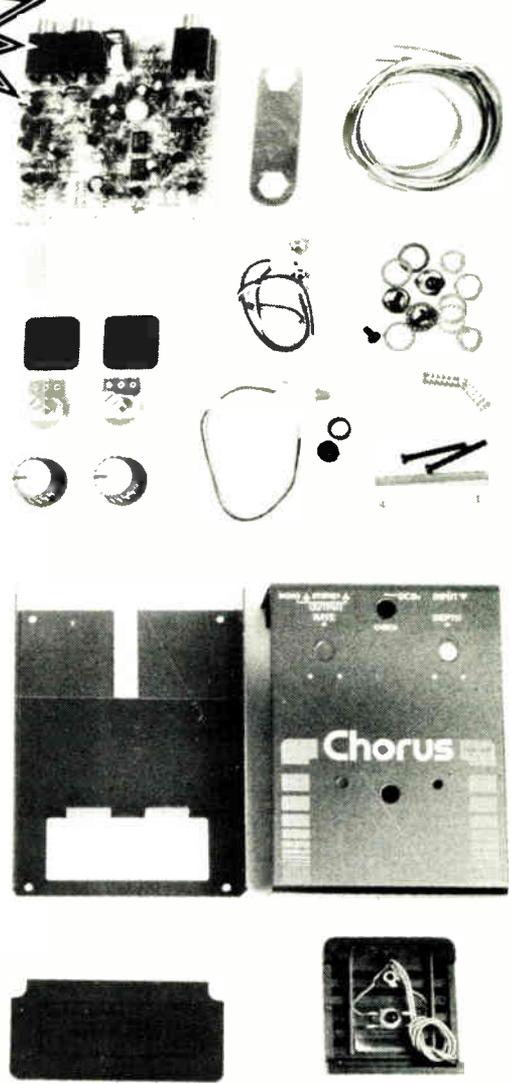
meter to indicate dynamic range reduction. There's also a reverb unit coupled to a remote stereo reverberation controller featuring an LED peak input indicator, connection being made via three leads which make a mix of 'wet' and 'dry' signal available.

Further details from Bandive, 12 East Barnet Road, New Barnet, Herts. EN4 8RW. Tel: 01-441 1133.





PARTS COST GUIDE £51



AMDEK

The complete set of parts laid out for checking prior to construction.

This month we look at the second of an exciting series of kit projects from the Roland/Boss Corporation in Japan that enable electro-musicians to build and customise effects units with the minimum of technical difficulty. E&MM's research team have also provided modifications that greatly extend the use of the Chorus.

- ★ Variable speed chorus
- ★ Stereo or mono output
- ★ Rate and depth controls
- ★ LED effect on and battery check indicator
- ★ Pre-assembled circuit board
- ★ Complete kit with detailed instructions

The Chorus must be one of the most widely used effects processors, particularly on recordings of modern music. Its main use is for 'thickening' the sound of a mono instrument signal or for spreading this signal between left and right channels in a stereo system to give a moving image that adds depth and richness.

It's ideal for treating most instruments including miked up acoustic types, electronic keyboards and synths (several of these already have chorus built-in), guitars and voices (and even for widening mono drum machine outputs!). One point to remember is that, in common with most analogue units, the Amdek Chorus

has filter circuits that reduce the top frequency range - hence very bright signals may lose their edge slightly. This is overcome by employing both outputs of the unit, one straight through (but electrically pre-amp'ed) and the other with the modulating chorus effect.

The Kit

The Chorus kit is available in bubble-pack form, complete with all parts, a spanner for tightening nuts and detailed instruction sheet. The extra tools required are a 15 to 30 watt soldering iron with a reasonably fine tip, wire cutters and strippers, small pliers (not essential), and a cross-head screwdriver. You'll also need a 9

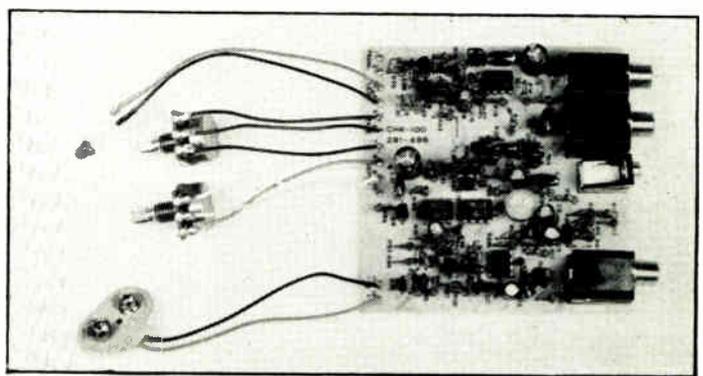
volt PP3 battery to power the unit unless you use an external power pack (DC 9V, such as the E&MM Synpac or Roland pack).

Parts identification is easily done from the component drawings in the instructions and, once you've laid them out on your work area, they can be checked off one by one.

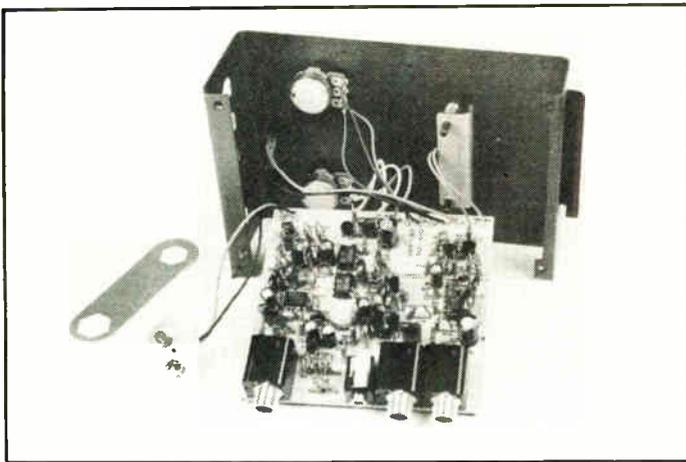
Step by step assembly commences with the preparation of 6 lengths of connecting wire for attaching to the two pots - made easy by the provision of a scale and specified lengths for each wire. Useful soldering tips are also given. In steps 3 to 5 the battery connector, LED and footswitch leads are cut to the specified length. Then all the necessary soldering to the factory-built PCB (which

includes 3 ready-mounted IN/OUT sockets) is done (steps 6-8) and the footswitch and LED holder are mounted in the diecast case (steps 8-10). This completes the soldering work.

Now the main components are inserted in the case, following steps 11-15. The small hexagonal spanner provides easy fastening of the pots and sockets. Care must be taken when inserting the PCB and a plastic insulation sheet provided sticks to the base plate to avoid shorting out the circuit board against the case. A rubber sponge insert holds the battery in place. The base plate screws neatly into place and the rubber battery cover gives simple and effective access without the use of screws (Steps 16-18). The unit is completed



Step 7. LED, pots and battery clip wired to the factory-built board.



Step 12. Last wiring work completed with pots and LED secured.

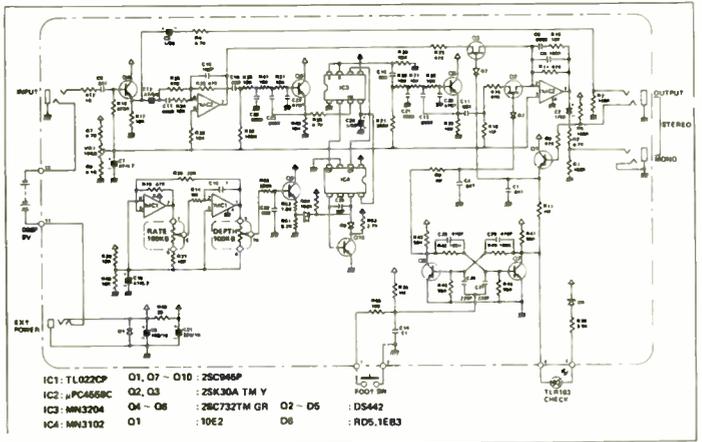


Figure 1. Chorus kit circuit diagram.

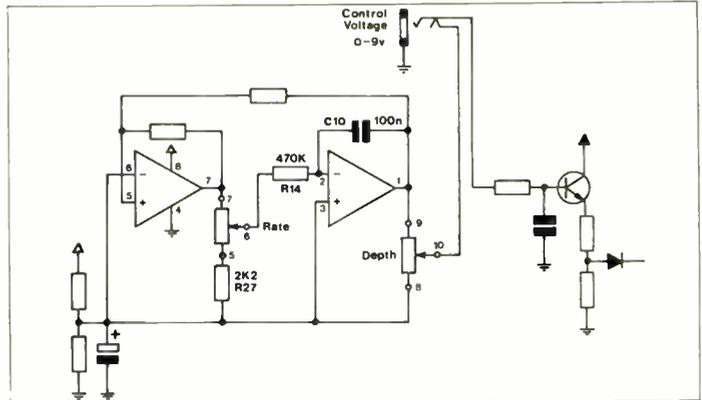
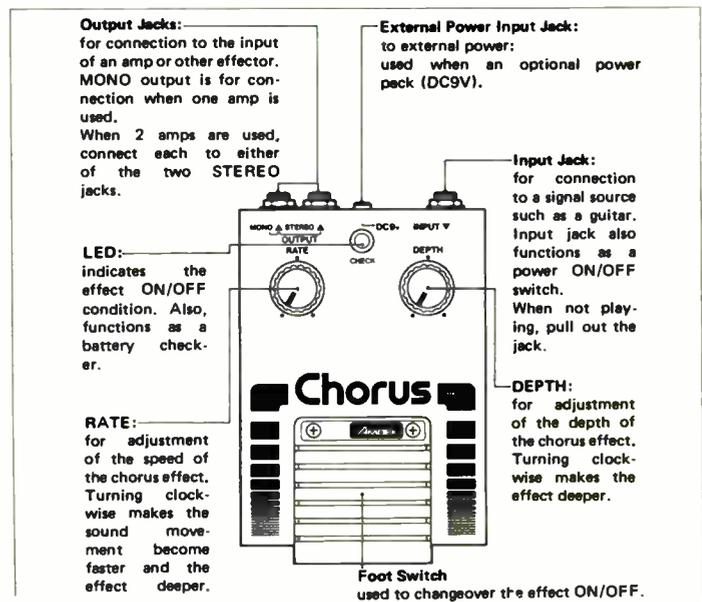


Figure 2. Modifications discussed in text.



Panel description.

is dictated by the time taken to charge capacitor C10 to a set threshold. By decreasing the value of R14 to 470k we can approximately double the top frequency which can be obtained. However, this charge doubles the whole range so to decrease the lower frequency the minimum charging current must be reduced. This can be done by altering R27 to 2k2. The oscillator will now run from 0.15Hz to 10Hz.

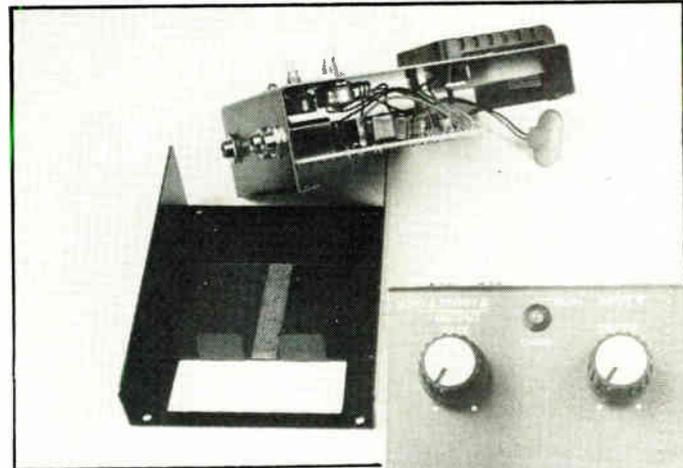
Mod 2 The versatility of the unit can be increased even more by using an external control voltage. By disconnecting the internal LFO and taking the CV input to an external socket we can now modulate the delay time

with a variety of control sources, e.g. VCOs, ADSRs, Random Sample and Hold, Sequencers, etc.

To do this you will have to drill a hole in the case and fit another jack socket. Take a connection from the wiper of the Depth control to the switched side of the socket, then connect the other side of the socket to Pin 10 on the board.

If no jack is inserted, the circuit operates as before. When a jack is inserted, the external source takes over. The control voltage must be in the range 0-9V.

E&MM



Step 14. PCB installed in case and insulation added to base plate.

Step 19. Final step fits on knobs to complete.



by the addition of two stick-on feet and control knobs.

The Circuit

The chorus effect is produced by mixing a pitch deviated signal with the direct signal. The pitch change is made using a Bucket Brigade device (MN3204) to delay the signal and a modulator LFO (TLO 22) to vary the rate of delay. A Depth control increases the amount of modulation.

Filter circuits are used in the Pre and Post processing signal path to remove the high frequency clocking signals which could be present on the audio output otherwise. Because the BBD is inherently a noisy device, pre-emphasis and de-emphasis circuitry is used to reduce process noise. Both straight and chorus signals are electronically amplified and FET switching gives virtually silent changeover from effect (LED on) to straight.

Operation

The Chorus kit supplied was assembled and worked first time with no difficulties encountered. However, should you have any trouble, a 'Hot Line' at the Roland UK factory will lend assistance on 01-847 1671. Examples of the Chorus unit in operation are given on E&MM Cassette No. 8.

The Chorus kit supplied was assembled and worked first time with E&MM NOVEMBER 1982

no difficulties encountered. However, should you have any trouble, a 'Hot Line' at the Roland UK factory will lend assistance on 01-847 1671. Examples of the Chorus unit in operation are given on E&MM Cassette No. 8.

The unit works well and provides an effective Chorus sound. The Rate control could be widened for best effect and our research team have tested and provided two useful modifications. [Please note that these modifications are made entirely at your own risk and neither E&MM nor Amdek can take any responsibility for any damage caused by your circuit changes].

Modifications

The rate of the delay produced by the BBD chain is set by the speed of the Low Frequency Oscillator built around IC1. With the components supplied, this oscillator operates from approx. 0.33Hz to 5Hz. If you feel that this range is too limited you can vary this by making the following changes, as shown in Figure 2.

Mod 1 The frequency of the LFO

E&MM's special offer price for the Amdek Chorus Kit is £51.00 inc. VAT and p&p. Please order as: Amdex CHK-100 kit.

electromix 842

Part 2

by Paul Bird

This month we continue our superb mixer project with construction and setting up details.

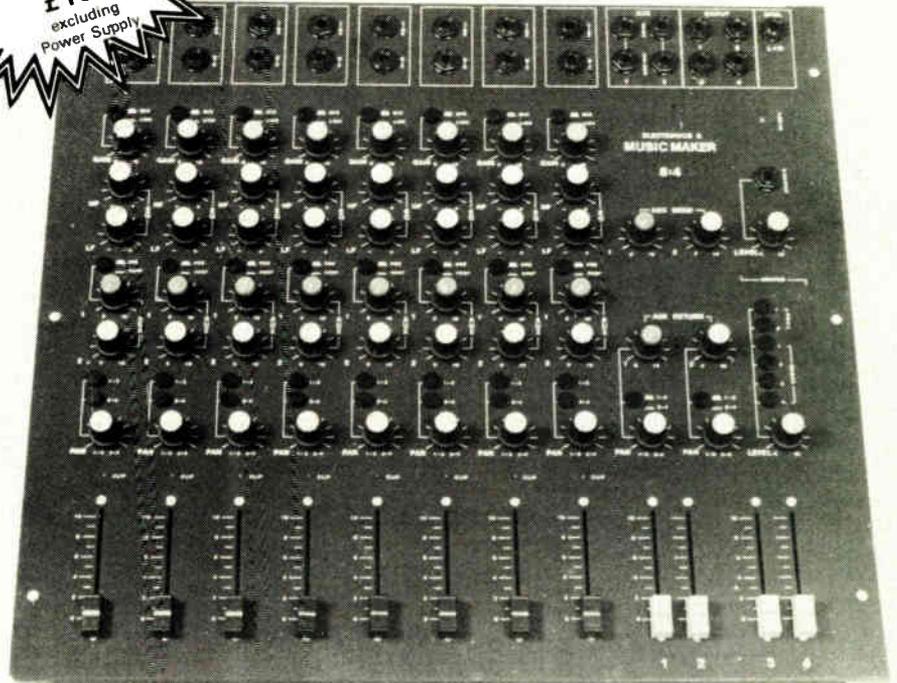
Construction

Although construction should be fairly straightforward, there are a few points worth noting. Before assembling any of the boards, slots for the buss wires have to cut in the edge using a hacksaw and/or small file. The buss wire should be 16swg, stretched to form straight lengths. IC sockets should be used although none were used in our prototype. A socket for IC1 of the Channel Module can be made by carefully cutting a 16 pin socket in half.

Insert and solder the required links on each board as shown in Figures 1, 2, and 3, with reference to the photographs of the completed boards. Next insert the veropins; on the component overlays these are shown with crosses when they protrude from the track side and with dots when they protrude from the component side. The resistors and capacitors can now be inserted and soldered, taking care with electrolytic capacitor polarities. If you are using IC sockets these can now be positioned and soldered. The switches and pots come next, not forgetting the pre-set on the monitor board. After this stage the IC's can be pushed into their sockets or soldered into place.

As PCB mounting jack sockets seem almost unobtainable except to equipment manufacturers, normal types with solder tags are used which are fixed to the boards with short lengths of tinned copper wire, (soldered first and then inserted into the PCB's). The sockets and the switches must be seated squarely on the board to avoid problems when mating the PCB's to the front panel. There is a link to be added on the routing switches of each channel board and one on the monitor board which are soldered directly to the switch tags (see overlay diagrams). There is also an earthing link from each PCB to the back of one of its potentiometers. The LED's are bent and soldered to Vero-pins after the PCB's have been mounted to the face plate. The bulk of the wiring is to the Aux, Group and Monitor sockets which is made with screened wire. The returns of the Group faders should be screened although this is not necessary for the Channel faders (see wiring details). As the power supply is remote, miniature 3-core mains cable was used to feed the Channel supply busses. These should be linked to the Group and Monitor busses (see Figure 4).

Parts
Cost Guide
£150
excluding
Power Supply



ElectroMix 842.

Checking and setting up

After checking wiring, IC, diode and LED orientation, power up and test supply voltages. If all is well, connect a suitable amplifier and speaker set-up to the Monitor outputs. Turn the Monitor level to maximum, little or no background noise should be heard. Plug a signal source (tape deck, radio etc.) into Channel 1 line input and select line input. Bring the Channel and Group faders to 0VU and the Panpot to central position. Press Group 1 and 2 switches on the Monitor module and adjust Monitor level. Run through all the functions on the Channel i.e. Input select (check Mic input is more sensitive), EQ, Routing, Pan, Aux sends, etc. This is repeated for the other Channels selecting the appropriate outputs on the Monitor select switches each time. If all inputs and outputs appear to operate correctly, disconnect the signal source and turn Monitor level to maximum. Run through all controls and switches which should operate quietly. Any thumps or clicks produced by switches indicates a DC level, which should be checked out with an oscilloscope or voltmeter. If any controls produce a small amount of noise this should be compared to normal listening levels to see if any further investigation is necessary.

The only preset which has to be set on the mixer is the Reference for the clip LED's. Set all faders to 0VU and insert a signal. If using as a level indicator for recording adjust the LED's to come on at a 0VU reading on your Tape recorder. In a P.A. situation the LED's could indicate a signal level for full output power of the amplifiers used. Alternatively as a clipping indicator, reduce the level of signal with the fader and increase the gain until definite distortion is heard. Reduce the gain so the distortion is no longer audible and adjust the LED's to just light. If you have access to an oscilloscope Table 1 gives peak to peak values for various signal levels.

- 8 Input channels
- Mic or Line inputs
- Frequency Equalisation
- Versatile Panning options
- 2 Aux Send and Returns
- Built in Headphone Amp
- Stereo Monitor output
- Studio quality
- Optional Meter Bridge

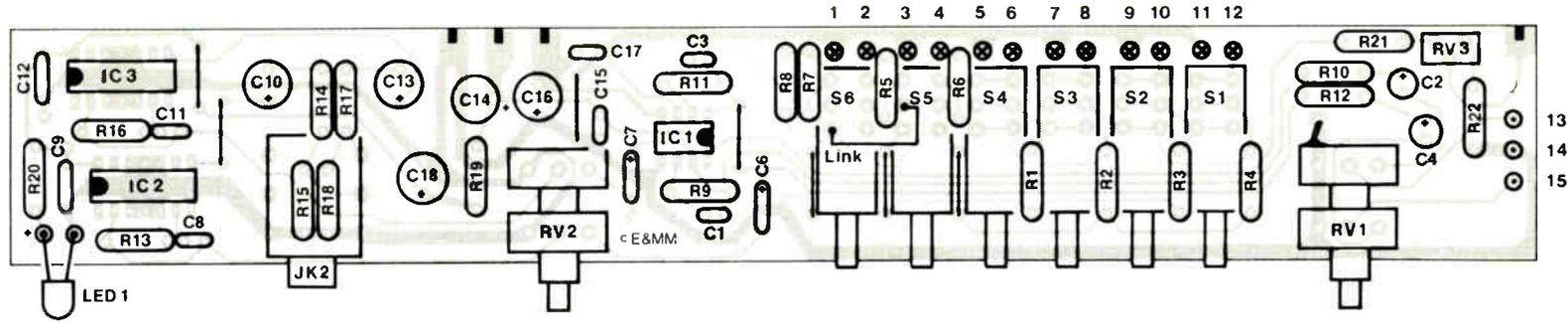


Figure 3. Monitor Board component overlay (not to scale).

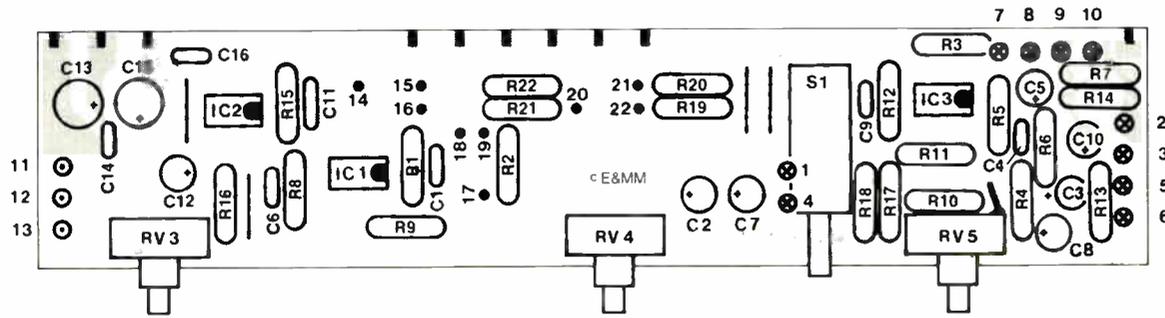


Figure 2. Group Board component overlay (not to scale).

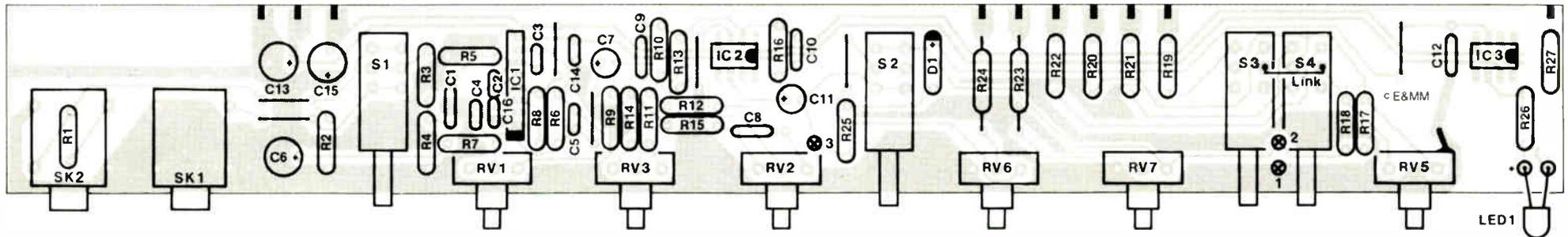


Figure 1. Channel Board component overlay (not to scale).

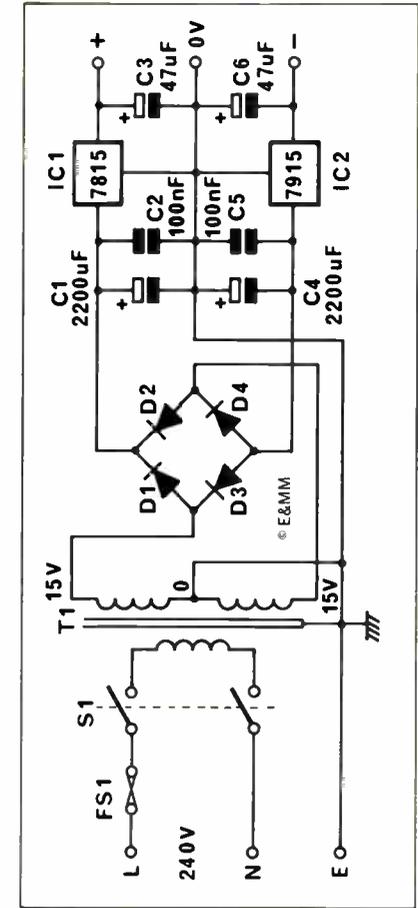


Figure 5. Power Supply circuit diagram.

PARTS LIST FOR ELECTROMIX 842

Channel Module — Quantities For One Board — 8 Required

Resistors — 0.25W, 5%, Carbon except where marked.

R1, 6, 27	47k	3 off
R2	2k7	
R4, 5	100k Metal Film	2 off
R3	220R Metal Film	
R7	82R	
R8	22k	
R9, 10, 16, 19, 20-24	100k	9 off
R11, 14	1k5	2 off
R12, 15	1k0	2 off
R13, 17, 18	10k	3 off
R25, 26	4k7	2 off

Capacitors

C1, 12	220nF Siemens multilayer	2 off
C2, 5	47pF Ceramic	2 off
C3	100pF Ceramic	
C4	22pF Ceramic	
C6	220uF 16V PCB Electrolytic	
C7, 11	100uF 10v PCB Electrolytic	2 off
C8	47nF Siemens multilayer	
C9	4n7 Siemens multilayer	
C10	10pF Ceramic	
C13, 15	47uF 25v PCB Electrolytic	2 off
C14, 16	10nF Ceramic	2 off

Potentiometers

RV1	10k Reverse Log	
RV2, 3	22k Lin	2 off
RV4	4k7 Log Slider	
RV5	10k Lin	
RV6, 7	100k Log	2 off

Semiconductors

IC1	HA12017	
IC2	TL071	
IC3	741	
D1	0A90	

Miscellaneous

JK1, 2	Mono switched jack socket	2 off
S1-4	2 Pole latchswitch	4 off
	3mm Red Led	1 off
	Grub screw knob	5 off
	Knob cap	5 off
	Slider knob	1 off
	Switch cap	4 off

Group Module — Quantities For One Board — 2 Required

Resistors — 0.25W, 5%, Carbon.

R1, 8	220k	2 off
R2, 6, 9, 13, 16	47R	5 off
R3, 7, 10, 14, 17-22	100k	10 off
R4, 11	4k7	2 off
R5, 12	10k	2 off
R15	330k	

Capacitors

C1, 6	10pF Ceramic	2 off
C2, 5, 7, 10, 12	100uF 10V PCB Electrolytic	5 off
C3, 8	2u2 16v PCB Electrolytic	2 off
C4, 9	150pF Ceramic	2 off
C11	4p7 Ceramic	
C13, 15	47uF 25v PCB Electrolytic	2 off
C14, 16	10nF Ceramic	2 off

Potentiometers

RV1, 2	4k7 Log Slider	2 off
RV3	10k Log	
RV4	100k Log	
RV5	100k Lin	

Semiconductors

IC1, 3	TL072	2 off
IC2	TL071	

Miscellaneous

	Mono unswitched jack socket	4 off
	Grub screw knob	3 off
	Knob cap	3 off
S1	2 Pole latchswitch	
	Switch cap	1 off
	Slider knob	1 off

Monitor Module — Quantities For One Board — 1 Required

Resistors — 0.25W, 5%, Carbon

R1-8	100k	8 off
R9, 11	220k	2 off
R10, 12, 14, 17	47R	4 off
R13, 16, 21	10k	3 off
R15, 18, 20, 22	1k0	4 off
R19	100R	

Capacitors

C1, 3	10pF Ceramic	2 off
C2, 4	100uF 10v PCB Electrolytic	2 off
C5	Not used.	
C6, 7	2u2 16v PCB Electrolytic	2 off
C8, 11	150pF Ceramic	2 off
C9, 12	100nF Siemens multilayer	2 off
C10, 13	220uF 16v PCB Electrolytic	2 off
C14, 16	47uF 25v PCB Electrolytic	2 off
C15, 17	10nF Ceramic	2 off
C18	470uF 16v PCB Electrolytic	

Semiconductors

IC1	TL072	
IC2, 3	LM380	2 off

Potentiometers

RV1	10k + 10k Log Dual	
RV2	100k + 100k Log Dual	
RV3	22k Min. Vertical Preset	

Miscellaneous

S1, 6	2 Pole latchswitch	6 off
JK1	Stereo switched jack socket	1 off
JK2, 3	Mono unswitched jack socket	2 off
	3mm Red Led	1 off
	Grub screw knob	1 off
	Knob cap	1 off
	Switch cap	6 off

Power Supply

Capacitors

C1, 4	2200uF 25v Electrolytic	2 off
C2, 5	100nF Siemens multilayer	2 off
C3, 6	47uF 25V PCB Electrolytic	2 off

Semiconductors

D1, 4	1N4001	4 off
IC1	7815	
IC2	7915	

Miscellaneous

T1	15-0-15v, 30VA Transformer	
S1	Mains rated switch	
FS1	500mA 20mm Fuse	
	20mm Fuse holder	
	Case, to suit transformer used.	

WIRING DETAILS (*Screened Wire)

FROM PIN	TO	REMARKS			
1	RV4/2	—	5	RV2/1-	Screen
2	RV4/2	—	6	RV2/2-	*Conductor
3	RV4/3	—	7	JK3/2	Screen
			8	JK3/1	*Conductor
			9	JK4/2	Screen
			10	JK4/1	*Conductor
			11	JK8/1	*Conductor
			12	JK8/2, JK6/2	Screen
			13	JK6/1	*Conductor
Links: — 14 to 16, 17 to 18, 20 to 21.					
Monitor Board					
			1		Screen
			2	Group Bd. 1/13	*Conductor
			3		Screen
			4	Group Bd. 2/13	*Conductor
			5		Screen
			6	Group Bd. 1/8	*Conductor
			7		Screen
			8	Group Bd. 1/10	*Conductor
			9		Screen
			10	Group Bd. 2/8	*Conductor
			11		Screen
			12	Group Bd. 2/10	*Conductor
			13	JK2/1	*Conductor
			14	JK2/2, JK3/2	Screen
			15	JK3/1	*Conductor
Links: — 14 to 15, 17 to 19, 20 to 22					
Group Board 2					
1	RV1/3	—			
2	RV1/1-	Screen			
3	RV1/2	*Conductor			
4	RV2/3	—			

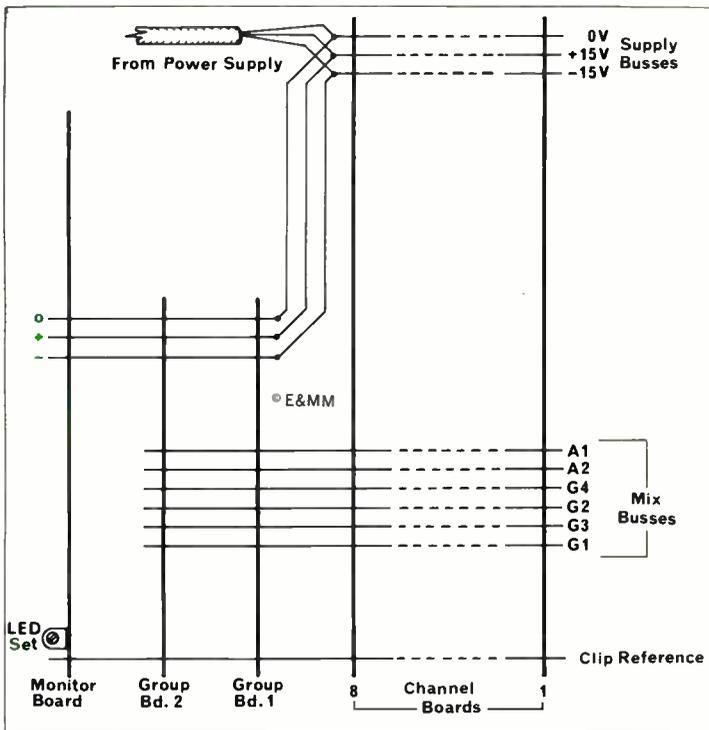
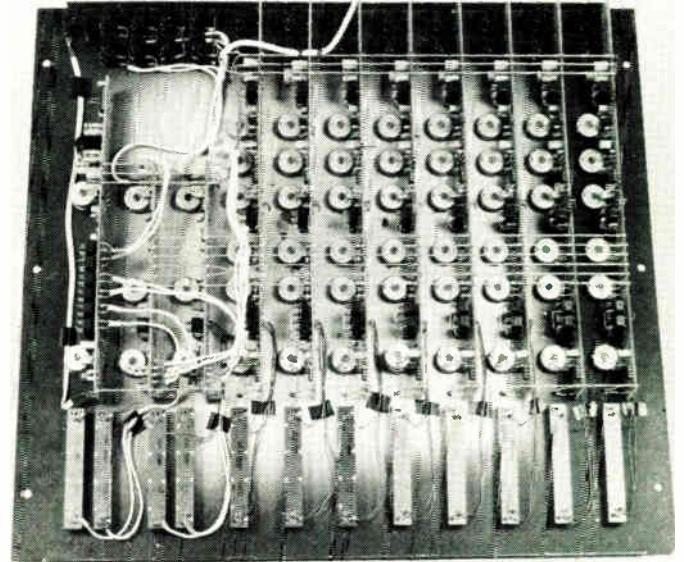


Figure 4. Bus connection diagram.



Rear view of ElectroMix panel.

Peak to peak voltages	Signal level
880mV	-10dBV
2.8V	0dBV
2.2V	0dBm
3.5V	+4dBm
13.8V	+16dBm*
22V	+20dBm

*Recommended level for Clipping indicator.

Table 1.

Power Supply

The mixer requires a $\pm 15V$ regulated supply at approx. 200mA. A supply designed specifically for the ElectroMix is shown in Figure 5. This circuit uses standard voltage regulators IC1 and 2 fitted with on board heatsinks. This supply will also power the meter bridge.

Construction is straightforward with components inserted in the usual order; veropins, diodes, capacitors and IC's. (— correct polarities are very important!). See Figure 6.

Double check all connections before connecting to the mains supply.

Please note; LF351 and LF353 IC's were specified on the circuit diagrams last month. Certain samples of LF353 seemed to burst into high frequency oscillation, so alternative types TL071 and TL072 were tested and proved to be more suitable, with the added bonus of being a lot cheaper.

The Retro-fit input channel with an electronically balanced Mic input and the Meter Bridge will be described in a forthcoming issue.

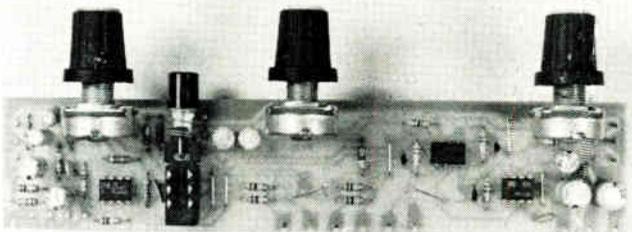
E&MM

All parts except panel and PCB's are available at most electronic component retailers. Details of complete kit suppliers will be published next month.

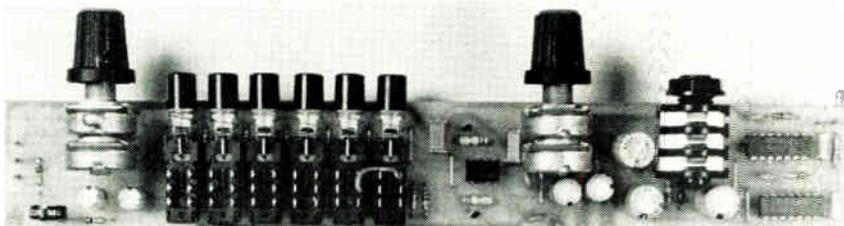
The fully finished panel and a set of PCB's are available from Electronics and Music Maker, 282 London Road, West-cliff-on-Sea, Essex. The prices are £24.95 for the drilled, sprayed and screen printed panel and £24.95 for a full set of PCB's inc. p&p and VAT. Order as ElectroMix 842 Panel and ElectroMix 842 PCB set. Please allow 28 days for delivery.



Channel board.



Group board.



Monitor board.

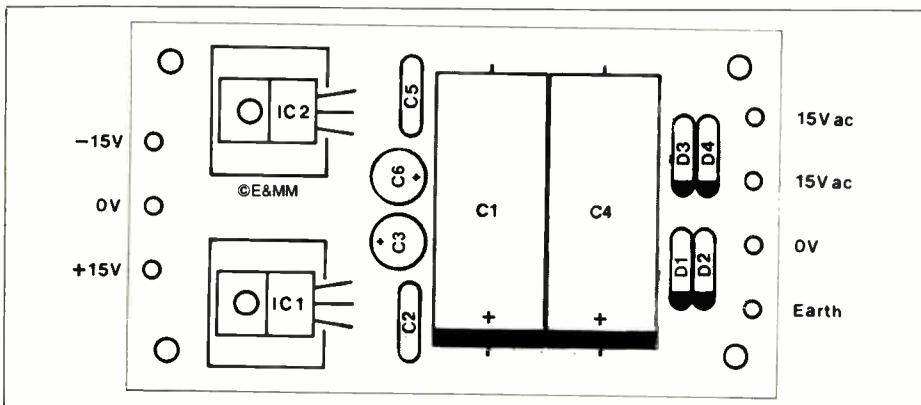


Figure 6. Power Supply component overlay.

turnkey BY MAIL

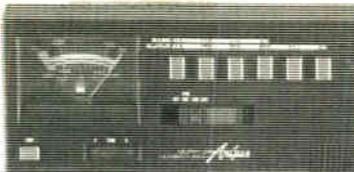
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There's a 10W amplifier built into these compact recording monitors. Plug in directly from any line level source for a powerful and accurate sound Sold normally in pairs but we will sell singly. These are in stock NOW. £151.36 per pair, incl.VAT & PP.



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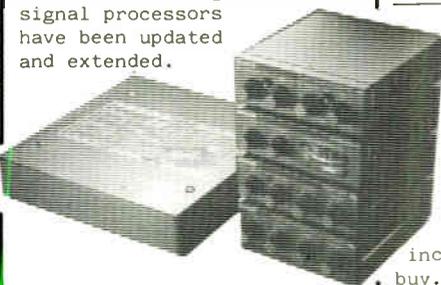
FREE 60 page booklet of hints from FOSTEX, but there's one catch. First let's whet your appetite. It's filled cover to cover with useful facts like mike placement, miking your amp, how to use EQ, tape time tricks, the nine track bounce and many more. But to get a copy you'll have to call in or call at the FOSTEX booth at the forthcoming Hands on Show. Sorry, but that's the rules.

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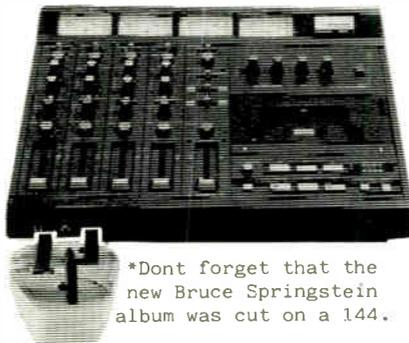
The Accessit range of signal processors have been updated and extended.



Prices start at £33.35 incl. and there's a new colour brochure that explains their use and application in detail

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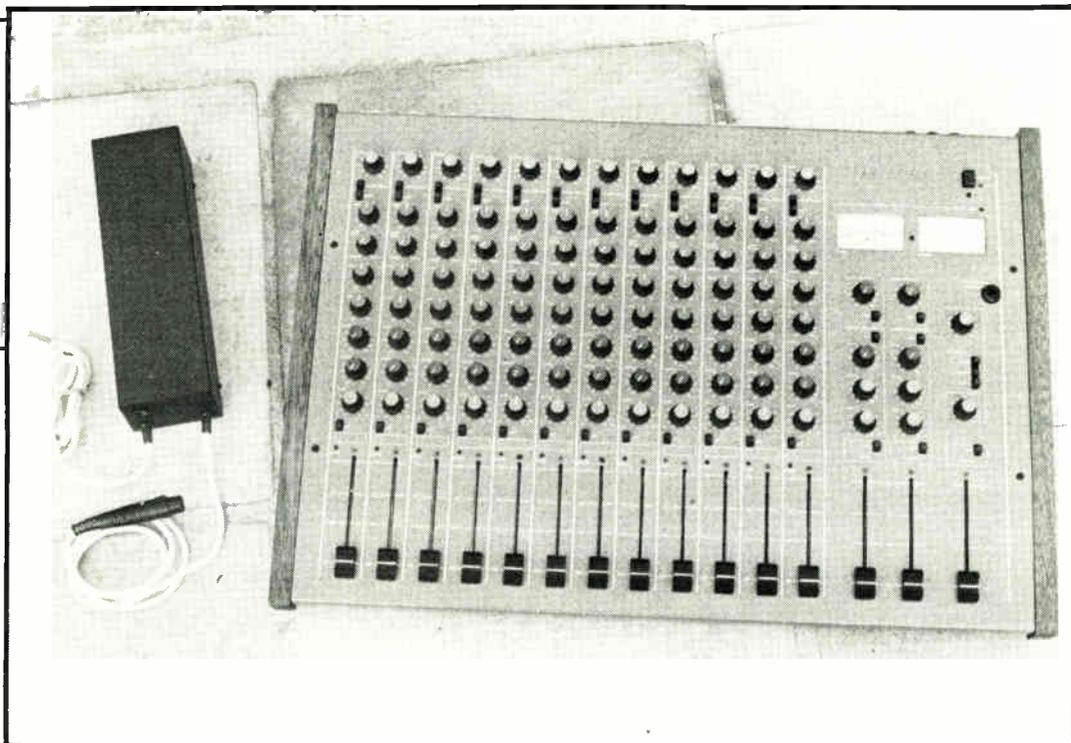
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Allen & Heath's latest range of 21 series mixers offers a new format for 'on the road' PA systems, club installations, stereo recording and community broadcasting. The three models in the range are called the 621, 1221 and 1821, each having six, twelve and eighteen inputs respectively, but the important feature for these mixers is the inclusion of a mono output derived from the main stereo mix. Sockets are also provided to link two or more 21 series mixer together.

Construction & Circuitry

The mixers are rigidly constructed, with four heavy metal panels at top, bottom and sides and polished wood end pieces. Dimensions (mm) of the mixers are 6:2:1 458 x 475 x 100, 12:2:1 674 x 475 x 100, 18:2:1 891 x 475 x 100. Weights are 11.30, 15.90 and 22.70 kilos respectively.

The main panel is finished in light brown with yellow and red legending. Red is used for channel numbers and is a little difficult to read. Push-fit pots are colour coded red, green and brown, with good sized black fader tops. Incidentally, production models are to have plastic inserts in faders to catch dust etc.. Construction is based on boards that have PCB mounted pots for direct fitting to the main front panel.

The 1221 instrument supplied for review has 4 stick-on rubber feet and uses an external power supply to keep hum at a minimum. The supplied unit has 2 metre mains and connecting cables for +15 and -15 volts DC output to the mixer that is derived from straightforward dual regulator circuitry. The PCB is mounted on four snap-fit plastic pillars with a strap securing it in place. The PSU is adequately rated for the mixer range and a phantom supply is also available in an alternative PSU.

Access for servicing is easily done by removing ten screws at the rear and removing the heavy back cover. The individual circuit boards are all hard-wired without the use of connectors. All wiring is via 9 bus wires, LED and fader wires, or connecting wire neatly grouped together.

A&H have obviously taken a lot of trouble to find parts that reduce cost but maintain good quality. The advanced low noise circuitry with high slew rate of 13V/microsecond is in fact based on one type of low noise dual op-amp throughout the mixer, the TL072. Each input stage contains two TL072's and six BC214 transistors. The monitor board and 2 send/mix PCBs use ten TL072's, plus BC214 and BC109C transistors. A 12V relay operates the PFL system.

Input stages

Each of the 12 input channels receive signals via individual Neutrix 3-way XLR connectors. Mic or line signals are set with a mic/line switch to give electronically balanced transformerless mic or high impedance balanced line inputs. A Pad switch further reduces the signal by 20dB and a Gain control next adjusts levels from +25 to +60 dB. Maximum Gain boost is always best avoided here as background noise increases considerably and the microphone gain at full sensitivity is 60dB. This should be satisfactory for most mic inputs, e.g. a 1.23mV input (with the mixer set to OVU = 4dBm) gives 1.23V at the output.

At this point, a stereo jack socket allows interruption of the signal for send/return of effects and other processors (or simply to insert a standard unbalanced jack line input, bypassing the initial mic/line stages).

The first of the two sends available is 'Cue' and is normally next in the signal chain, although an internal link change will put it after the EQ stage if desired. Either way it is a pre-fade send and a Cue control sets output send level.

A 3-band quasi parametric equaliser gives plenty of tonal adjustment, with high frequency control, mid-frequency sweep from 400Hz to 6kHz, and low frequency for adjustable boost or cut over +12 to -12dB.

One LED peak indicator for each input stage is inserted next and will turn on at 3dB prior to clipping. Its position in the chain ensures that your equalisation adjustments do not overload the mixer.

Just prior to the input fader is also a pre-fade listen (PFL) switch for mono checking of the signal.

Next the input fader sets the level of the signal on the stereo bus lines, via a Pan control for left and right placement, and a post-fade Echo send with its own level control completes the input stage.

PFL

The mixer offers comprehensive PFL monitoring at 19 key points - in each of the twelve input stages as mentioned, at Cue and Echo outputs, at main left and right pre-fader outputs and main mono pre-fader output, and also at echo return inputs 1 & 2. Each PFL switch activates a relay that turns on a red LED close to the meters.

Since the PFL system overrides any other monitoring that is taking place, the LED is an important reference to ensure that only the PFL points you require are in operation.

Final mix stages

Two identical boards inside the mixer conveniently accommodate send/return signals and main stereo outputs, whilst a third board incorporates monitoring and the main mono signal.

The controls for these are located at the right hand part of the mixer and include monitor controls, VU meters, power on/off switch and its LED indicator. Controls for Cue Master and Echo Master sum the individual sends from input channels. There are two Echo returns which have Level controls and Pan controls for positioning on the stereo bus as well as Cue pots for an additional mix onto the Cue bus. The latter is a useful way of ensuring that treated echo, reverb and other processed sounds can be added to the Cue send output. Separate main faders for left and right output feed the XLR connectors at the rear, as well as a stereo bus output (via stereo jack socket) for connecting to another mixer or additional recorder.

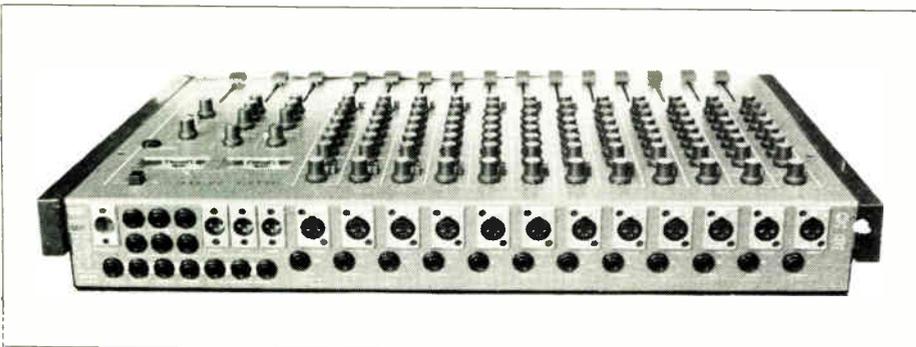
Both stereo and mono outputs on the 21 series mixers are set for OVU (4dBm), but internal links are provided to match outputs and tape monitor inputs to lower operating levels giving 12dB cut or boost respectively.

The big feature of this range is its main mono fader output in addition to the stereo faders (via XLR male socket). This will be ideal for use as a fold-back mix on stage or as a feed to a mono PA system, without losing the facility of stereo recording during performance. It also offers a mono output for simultaneous video recording or for mono broadcast transmissions.

The use of stereo jack sockets for several of the rear connections, while being cost effective, does make linking up a little awkward.

Monitoring

Before actually mentioning these facilities, it is worth noting another aspect of monitoring - the control legends. Gain level, Cue and Echo controls are all numbered 0 to 12, EQ controls are divided into 8 parts, whilst input faders are smooth long



Rear connections showing neat layout.

Allen & Heath 1221

throw types labelled +10 max, 0 nominal to -10 and off. I missed the graduated scales here and on the master faders (these have 0, -10, -20, and off line markings) although probably most pro users would simply chinagraph points straight on the mixer panel.

Monitoring is via two independently controlled stereo outputs to headphones and monitor amplifier. Thus each has a ganged stereo level control in its output stage to feed stereo jack sockets, at the rear for your stereo monitor amplifier/speaker system, and next to the VU meters/right hand end panel for your headphones (8-600 ohms). Output on headphones is entirely satisfactory with plenty of gain without extra noise.

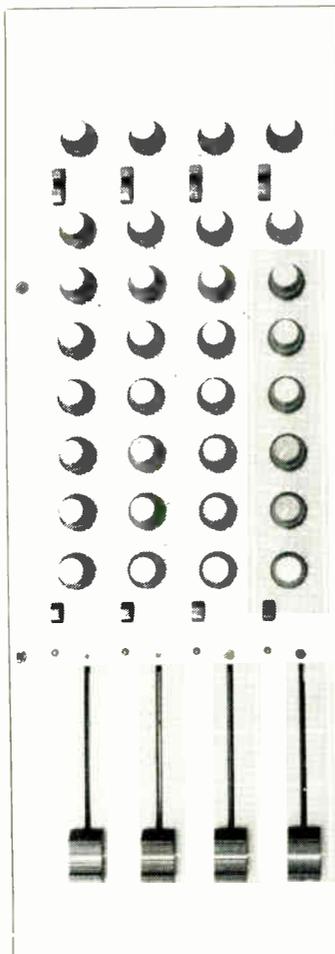
It is worth noting again the basic order of the monitoring chain to understand the system's advantages. Main monitoring is first selected by 3 switches for Stereo, Mono and Tape In from a stereo recorder. This permits A/B monitoring during recording - a useful facility, although I would have liked gain control matching for the Tape-In to make instant switch comparisons without fiddling with levels. Nevertheless, if you are using the same 'master' recorder with the mixer, the internal links will enable suitable level matching.

The PFL switches then override any of the 3 main functions and the two VU meters monitor all chosen settings accordingly. The meters are illuminated and scaled -20 to +5 and 0 to 100%.

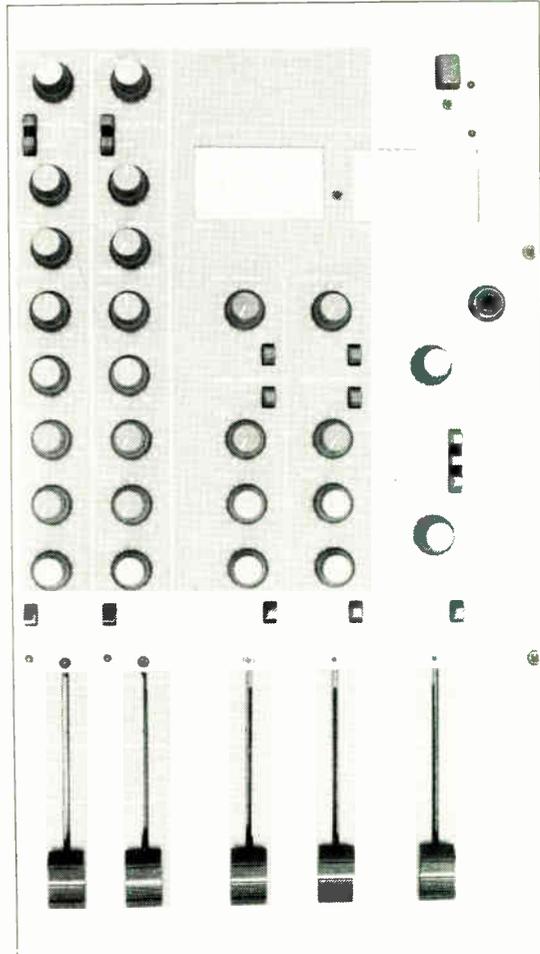
Rear Connections

The mixer basically consists of 12 input stages and input connections at the rear that feed 6 main bus lines for stereo left and right, mono, Echo mix, Cue mix and PFL. The latter also has a further bus line for DC control of the PFL relay and LED indication. There is also a 48 volt phantom power option, when using the MPS7P power supply unit instead of the normal MPS7 sold with the mixer. This operates in A-B mode on the two balanced line wires at pins 2 and 3 (1 is screen).

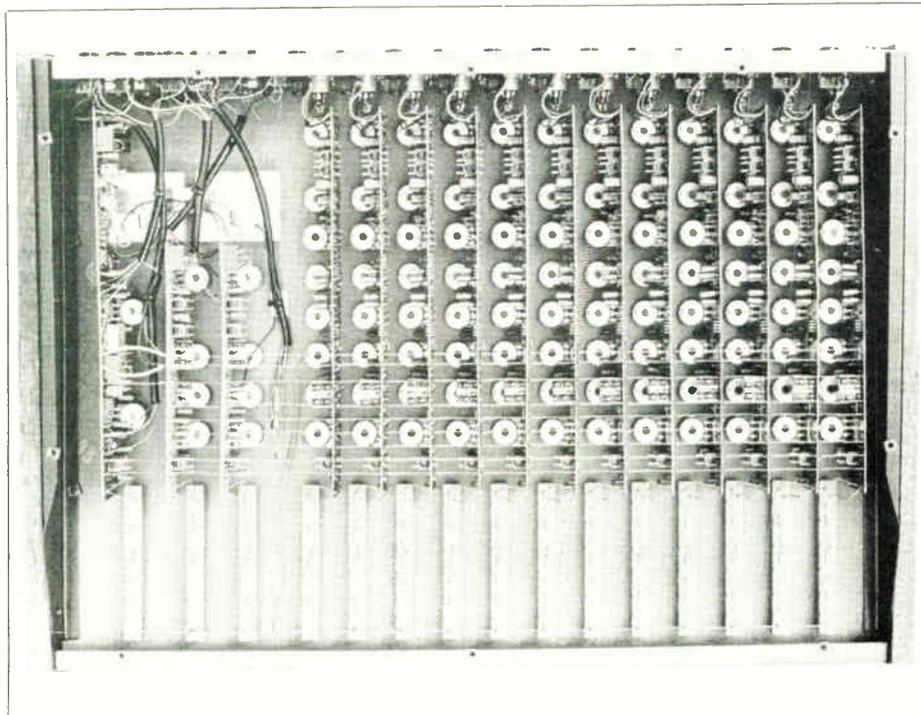
Apart from the input stages, the mixer offers standard jack inputs at the rear for Mono input, Aux input (stereo signal to Cue and Echo mix busses), Stereo input (on to L and R main busses), PFL input



Input channels.



Output and monitor sections.



Mixer rear panel removed.

(with DC control signal) and Tape input (stereo signal to monitor system only). Echo Return 1 and 2 are via standard jack sockets and DC power from the supplied external PSU is via a Cannon XLR 5 pin connector.

Outputs available are as already mentioned: XLR L & R stereo, Mono outputs; standard jack Cue, Echo mono, (Cue/Echo) Aux and L/R stereo outputs, as well as Monitor and Headphone outputs.

Line inputs and outputs are set at a nominal level of 0VU (+4dBm), with a maximum level of +21dB (reference 0.775 V into 2K or more). With internal links for output pads and tape boost inserted, main output and tape input levels become 0VU=-8dBm (0.3V).

Conclusions

The 1221 mixer reviewed was well constructed and designed specifically to provide a low cost system for semi and professional use. Prices for the mixers (inc. VAT) are £443 for the 621, £569 for the 1221 and £742 for the 1821. Quality wise, it's likely to satisfy most users and although the circuitry is quite straightforward, the results are good with low background noise. Its robust frame as well as distinctive appearance will attract many electro-musicians who will benefit from this special system format and comprehensive in/out and PFL monitoring. **E&MM**

The Allen & Heath 21 Series Mixers are distributed in the UK by Allen & Heath Brenell Ltd., Pembroke House, Campsbourne Road, London N8. Tel. 01-340 3291.

A Young Person's Guide To Electronic Music

by Dr. Robert A. Moog

During September this year, one of the best known figures in electronic music equipment design, Dr. Robert A. Moog, visited this country to give a series of lectures entitled 'A Young Person's Guide to Electronic Music'. These lectures, held at the Science Museum, London, were sponsored by Syco Systems, importers of the Fairlight CMI and other exotic music-making equipment.

Dr. Moog has been involved in electronic music since his university days, setting up R. A. Moog Co. as a part-time business in 1954. He in actual fact obtained two degrees, one in Physics and one in Electrical Engineering before his PhD in Engineering Physics.

In 1973 his company, now Moog Music Inc., became a division of Norlin Industries, but later in 1977 Dr. Moog left Moog Music to form a new company, Big Briar Inc. who specialise in designing custom electronic and computer music controllers.

Three lectures in all were given covering The History of Electronic Music, its Technical Aspects and the Musical Applications.

Lecture 1

"Within the past fifteen years, electronic music has come from being an experimental laboratory curiosity to an important component of our musical experience. This first lecture deals with the history of electronic musical instruments, especially with regard to how inventors over the past eighty years have chosen to meet what they perceived to be the needs of musicians.

The Telharmonium was a very large electric musical instrument that was built in the United States around the turn of the century. It used one generator for each pitch, each generator producing up to 15 kilowatts of power! The installation resembled a power plant more than a music studio. Subscribers received 'Telharmonic Music' over phone lines - the first known precursor of Muzak.

The invention of the vacuum tube (valve) around 1914 ushered in the age of electronics. One of the first electronic musical instruments, invented in 1920, was the Theremin, an expressive instrument that is played by the motion of the performer's hands in the space surrounding the instrument, the right hand controlled the pitch, while the left controlled amplitude with no tactile reference at all! Another was the Ondes Martenot, which used the same general technology as the Theremin, but employed a keyboard and a sliding band. Ondes Martenots are still heard in concert.

Yet another important instrument of the 30's was the Trautonium, which introduced the concept of 'Formant Control', that is the simulation of acoustic resonances, that enabled the performer to shape tone colours as well as pitch or loudness.

The first instrument to be called a synthesiser was developed by Coup-leaux and Givélet and shown at the Paris Exposition in 1929. It used pneumatic player piano mechanisms to actuate pitch and tone colour changes. Another important early synthesiser was the Hanert Synthesiser, built around 1940 in the United States by John Hanert, chief engineer of the Hammond Organ Company. The Hanert Synthesiser consisted of an array of photocells that 'read' a graphic score, plus a large bank of electronic sound producing circuitry that responded to the 'output' of the photocells. The 'score' for the Hanert was a long piece of paper, perhaps twenty metres long, a bit like shelf paper. The photocells rode on an automated carriage along the paper to read the score. After the Second World War, the Radio Corporation of America developed a similar large synthesiser. The RCA synthesiser used a paper roll that was punched like a piano roll, to programme the sound producing circuitry. The RCA Synthesiser is still in use at the Columbia-Princeton Electronic Music Center in New York City.

The Moog synthesiser was developed in 1964 in response to the needs of musicians who were learning to compose with tape recorders, and needed to generate and modify sounds electronically in a wide variety of ways. The Moog synthesiser came to the public attention when electronic music composer Walter Carlos transcribed several pieces by J. S. Bach for Moog synthesiser, and assembled the transcriptions on a multitrack tape recorder. Carlos' Switched-on Bach was enormously successful, at least in the United States, and precipitated a deluge of 'Moog Records', which, in turn, opened up the ears of keyboard Rock musicians who were also in the process of delving into musical electronics. British keyboardist Keith Emerson was responsible for much innovative 'Moog Playing' during the early '70's.

Today, synthesisers are widely sold and accepted by professional keyboardists, especially rock and jazz musicians. However, a new horizon is coming into view: computer musical instruments. Computers have much to offer musicians. They are the most versatile tools that musicians have ever had to work with. Computer technology and computer

musical instruments such as the Fairlight, will provide musicians with new, musically potent resources for years and decades to come."

Lecture 2

"Electronic music is not a type of music. It is a musical medium that is defined by its technical nature. Contrary to what many people think, there is nothing new about musicians using technical developments to make music. In their days, a drum of supple animal skin, a carved reed flute, a lute, a trombone, and a grand piano, were the very height of technology. The point is that musicians have always employed the most sophisticated, technologically advanced instruments. Except for singing, music would not exist at all without technology. It is the same today. Electronic music and computer music is new only in that it uses today's technology instead of the technology of some other era.

Each new musical-technological medium enlarges the resources that are available to musicians. No medium 'outmodes' or 'replaces' any other. Most electronic musicians see themselves as part of the total musical scene, not the practitioners of some isolated, inaccessible art.

What, then, are the potent new resources of the electronic music medium? As I see it, it is the ability to build up sounds, sound patterns, and complete pieces of music from component parts. An electronic musician usually starts by constructing a sound out of basic elements. The elements are:

The Oscillator that makes regularly-repeating waveforms that are heard as pitched tones;

The Filter that emphasises some part of the sound spectrum and cuts others out, thereby altering the tone colour;

The Amplifier or the Articulator that shape the overall sound;

The Modulator that imparts regularly repeating variations in otherwise static sounds;

The Envelope Generator that varies a property of a sound once per sound event, and;

The Noise Source, that produces random, unpitched sound.

These are the basic sound generating and modifying processes that electronic musicians use. Rich, interesting, complex sound can be built by combining many of these processes.

Synthesisers are instruments that offer many of these resources to musicians in a convenient, logical format, like a kit of tools. The term Synthesise means, after all, to assemble a complete entity out of its component parts.

Once the sound itself is produced, musicians then use a variety of programming and controlling devices to assemble many sounds into a melody, a sequence, or a texture. The device that is most familiar is the keyboard controller, that enables a musician to play successions of sound of any texture. Another device is called a Sequencer, which may be thought of as an automated keyboard that can automatically produce repeating and other machine-generated patterns.

To produce the complete piece of music, a multitrack tape recorder is often used. One line of sound at a time is recorded. In a complex piece of music that is realised on a multitrack recorder, there is usually too much to control for one musician at one time, so the musician records just one line at a time. Then when the lines are all recorded, the musician mixes them together, using a mixing console. All of the music of Car-



Dr. Robert A. Moog.

los, Tomita, Patrick Gleeson, as well as hundreds of other musical works, are made in this manner.

Thus, in producing a piece of electronic music, a musician may first perform the role of Composer, deciding how his music will be organised, then the role of Instrument Builder, setting his equipment up to make the desired material, then the role of Performer, playing the tones on a keyboard or similar device, and finally the role of Conductor, combining all the lines of sound to make the final music.

Computer music is the newest development. Computers can be used in all phases of music production. They can be programmed to assist in composition, to produce tones directly, to generate melodies and sequences, and to programme entire pieces of music. Computers are the most potent tools that have ever been available to musicians. However, we can expect that it will take many years before we learn how to programme computers too so that musicians can have easy access to all the potential resource of computers."

Lecture 3

In this lecture Dr. Moog played various taped samples of music showing the vast variety of work which has been performed in the electronic music medium.

The first tape was of a piece by Ravel, played by Clara Rockmore who was a violin virtuoso until she lost the use of her shoulder. In this recording she, accompanied by her sister, had transferred her musicianship to the Theremin, which had been specially built for her by Leon Theremin himself. It was a very moving recording proving that it is the skill of the musician which makes electronic music emotional



Dr. Moog mimes to a piece played on the Theremin.

Continued on page 80.



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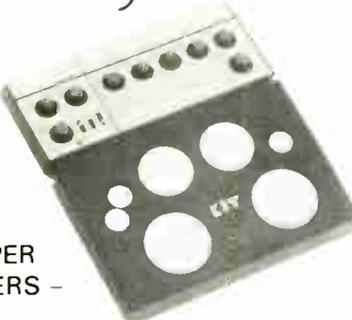
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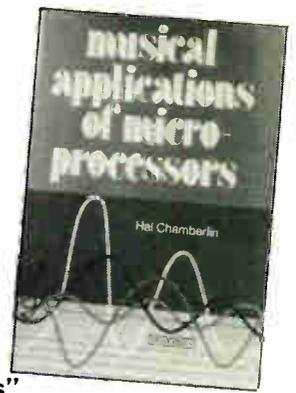
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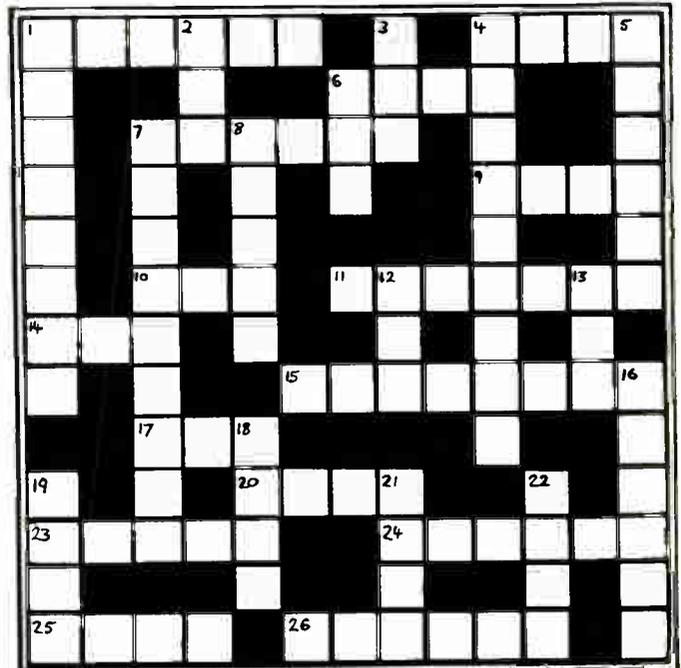
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No. 5

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Across

1. Building block for complex synths (6)
4. The artist can't work without her help (4)
6. Emerson's pleasant band? (4)
7. New name in budget tape recorders (6)
9. Beware of breaking one in your compositions (4)
10. Jarre's computer keyboard on 'Oxygene' (1,1,1)
11. A well-known and respected organ (7)
14. Christian name of 10cc's creamy musician (3)
15. Popular monosynth, now discontinued at its source (8)
17. What bands play, live (3)
20. Electronic synthesiser sound productions: A pressure group (1,1,1,1)
23. Beyond — perhaps as in 8 down? (5)
24. Not an input (6)
25. To keep time, abbreviated (4)
26. Instrumental sounds end up in these after multitracking (6)

Down

1. Could Korg control the market completely with this new synth? (4-4)
2. Unidentified heavy metal band? (1,1,1)
3. Final process in producing a recording (3)
4. Old timer: or a gnome on the Paris underground? (9)
5. Use of one of these should alter your music (6)
6. The latest (3)
7. Ultimate computer instrument, this bright Australian (9)
8. Of sound (5)
12. Pseudonym of the Human League for 'I Don't Depend On You' (3)
13. A prefix, new 'one'? (anag.) (3)
16. The most popular instrument of all (6)
18. It used to mean 'great!' now it's just equipment (4)
19. Public transport, part of mixer? (4)
21. Not mono (4)
22. International exhibition of recording equipment (4)

September's answers:

Across: 1, Blues; 7, Harmonic; 8, In The; 10, Orchestral; 12, Explorer; 14, Odes; 16, Dark; 17, Star Turn; 20, Manoeuvres; 23, Rests; 24, Encoders; 25, Idols.

Down: 2, Echo; 3, Bach; 4, Smash; 5, Snare Drum; 6, Scales; 9, Error; 11, Spare Neck; 13, EHT; 15, Order; 18, Noises; 19, Leads; 21, Vero; 27, Send.

September's winner: Miss Amanda Horwood from Watford, Herts.

We acknowledge with thanks the cooperation of John Wiley & Sons Ltd., who distribute 'Musical Applications of Microprocessors' in the UK.

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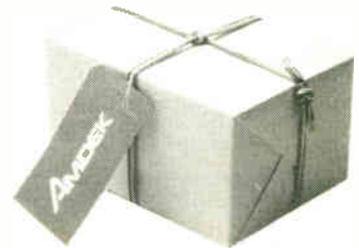
CLIFF RICHARD

From the skiffle of '58, through rock and roll, to music with today's instruments and his own range of styles, Cliff talks frankly about his role as performer and reveals his recording techniques. There'll also be a complete track from his latest LP to play.

ARS ELECTRONICA
In the beautiful setting of the Austrian mountains and the River Donau, the industrial town of Linz recently became the scene of this festival for the arts. With electronic music a focal point amongst sky art and other concerts indoors and out, E&MM meets the personalities, including Tomita, and gives you an insight into this important bi-annual event.

PROJECTS?

Next month's projects are too exciting to give away, for not only do we have a very special Amdek kit, but we'll be giving you an electro-music 'first'.



AND MORE...

Patrick Moraz tells how he improvises, and there'll be plenty of features and in-depth reviews, including Elka's new Synthex polyphonic.

Plus your free ticket for the 'Hands On Show' on December 4th & 5th.



The Moog Lectures *Continued from page 76.*

The next piece was by Walter Carlos. He was interested in synthesisers in their earliest days, composing pieces for commercials to make some money to pay for equipment. The piece was from 'Switched on Bach' which was nothing short of sensational when it was released in 1968. This opened the ears of a lot of musicians.

Five years later another classical work was released this time by the Japanese commercial musician Isao Tomita; 'Snowflakes are Dancing' was a fully electronic transcription of the work of Debussy. "This was much more clouded, more richly sonic than the orchestral performance."

At this time some members of the music industry saw the synthesiser as the gimmick of the year and imagined that anybody could make music with it. Dr. Moog illustrated this with three very mechanical versions of popular records which were assembled mainly to make money. "A skill and talent was needed to create expressive music beyond reading a score with mechanical perfection. Differences on the threshold of our hearing make music sound interesting to our ears - with feeling."

Rock musicians were becoming interested in the new medium, but you couldn't take all this studio equipment on stage - or could you? "Keith Emerson's use of the synthesiser on stage, difficult as it was, opened up the ears of a lot of performing rock musicians, introducing the synthesiser to the rock community." 'Hoe-down' (from ELP's Trilogy) was played to demonstrate his inventive use of the synthesiser.

"Another rock musician, Jan Hammer, was the one who was most responsible for developing what musicians call 'the wheel technique'

for bending pitch in a guitar like fashion." This was illustrated by an all Minimoog piece, 'No Fear', from the album 'Like Children'.

"Since then people have taken the trouble to develop a technique to play synthesisers." Another piece called 'Train' which "creates an experience or a feeling" was by 'Mother Mairdards Portable Masterpiece Company'.

Computer generated music was demonstrated by Jean Claude Roussay's, 'Mutations 1' and a piece by the Austrian composer Hubert Bognermayr called 'Erdenklang' played on the Fairlight CMI and sent to his friends as a Christmas greeting.

Excerpts from the film music of 'Apocalypse Now', composed by 4 studio synthesists and 'Tron' by Wendy Carlos illustrates how "Electronic music has now come full circle. Wendy Carlos looks on the synthesiser merely as a musical resource to be completely assimilated into an orchestra."

Dr. Moog finished the lecture by playing two 'Moog' records of popular arrangements which were "interesting for what the musician was able to impart to his music in the way of personality."

Current ventures

Although no longer with Moog Music, Dr. Moog is still heavily involved in instrument design and manufacture. He is now following his main interest which is making controllers which allow the musician a more intuitive control over the sound making process and are limited only by the musician's ability to play.

In a future issue we will be publishing an in-depth interview with Dr. Moog.

Kenneth McAlpine E&MM



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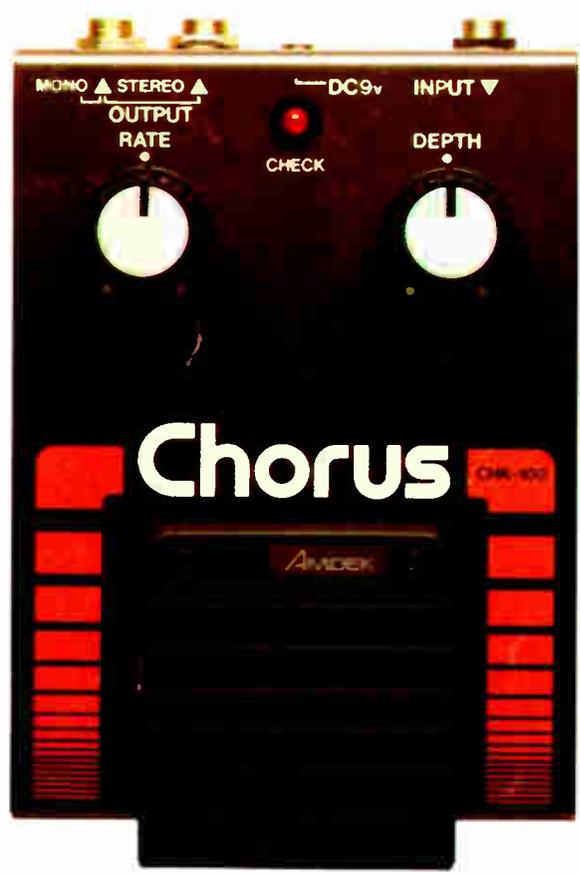
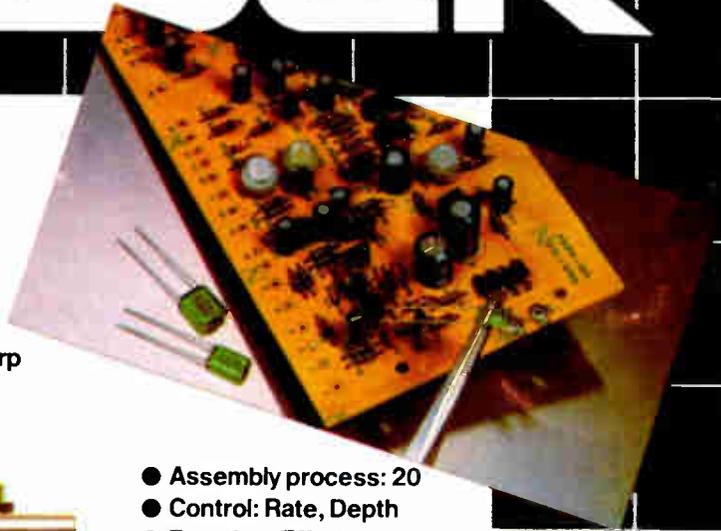
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