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Peter Zinovieff and Cultures of Electronic Music

Tom Hall¹

Electronic music has long been, and continues to be, a potent intersection or bridge, between music popular and less popular—what in simpler times has been described as "low" and "high" art.² The instrumentation of popular music from the middle of the 20th century can be distinguished from that of "classical music" (or more tellingly, as the Germans have it: *ernste Musik*) in very general terms: guitars drums and keyboards, as against various combinations of orchestral instruments. But when it comes to electronic music, also in very general terms, the instrumental *tools* are the same across these musical territories which in some ways, have become interpenetrated in the 21st century. So for the synthesiser music enthusiast and musicologist alike, with electronic music, there would appear to be a kind of "level playing field", in terms of tools and equipment, between musics whose apparent intended function, expressive intention and meaning could not be seemingly wider apart.

This technological commonality between such musics makes kissing cousins between compositions and composers (or "artists") that do not ordinarily "belong" in the same kind of psychological musical space, for want of a better expression. (As a point of reference: cue arguments between people that sort their albums/CDs/MP3s by category or exclusively alphabetically: does the music of Harrison Birtwistle *really* belong next to The Beatles, or on a different shelf/playlist altogether?) The use of identical or similar equipment for apparently different musical ends makes for fascinating comparisons between these musics which generally speaking, are ordinarily kept apart in both popular and academic culture.

When explaining to non-specialists who Peter Zinovieff is, as a shorthand, it's easiest to describe the place of the EMS VCS3 synthesiser in electronic music history, usually in the context of the BBC Radiophonic Workshop. This is the approach that some of the standard music technology textbooks take, for instance, with the British doing a better job than the Americans.³ Harshly described by Zinovieff as one of EMS' "rather pathetic little synthesisers" when interviewed for the *What the Future Sounded Like* documentary (audiences gasp at this description during screenings), the iconic VCS3 is emblematic of the popular perception of Zinovieff's place in electronic music history. At the same time, however, it is also a minor irritant, tending to shadow as it does the other musical work that Zinovieff was involved with for over a decade from the mid-sixties, and which he continues today at the age of 80.

Directed by Matthew Bate, *What the Future Sounded Like* (2006) gives a very good overview of some of the people involved in Electronic Music Studios (EMS), London, while omitting others entirely (such as Alan Sutcliffe

¹ Digital Performance Laboratory, Anglia Ruskin University. tom.hall@anglia.ac.uk

² Thanks to Alan Sutcliffe, Robin Wood and especially Peter Zinovieff for conversations that informed this piece of writing. Any errors are my own.

³ See example, Holmes, T., 2012. *Electronic and Experimental Music: Technology, Music, and Culture*. New York, NY: Routledge. Here the EMS company, but none of its founders, are named.

who was a part-time director of EMS and with Zinovieff co-wrote the prize-winning *ZASP*). The short film does well in outlining the place of EMS equipment in popular music, and demonstrates how the company marketed its synthesisers in accordance with the post-hippy Zeitgeist ("Every Nun Needs A SYNTHI" being one of Zinovieff's more memorable slogans, accompanied by a photograph of a woman in habit, donning headphones and playing a Synth AKS). The film also suggests, as Zinovieff has long stated, that as far as he was concerned, the function of the EMS company was to fund his own *personal* music studio, containing as it did digital musical and computer equipment initially never intended to be available for sale by EMS the company (an index of the somewhat confusing overlap is of course that this private studio was itself also called EMS).

Most readers of this text will also know that what distinguished Zinovieff's music studio from all others in the UK—and possibly the world—at this time, is that it was the first *computer* electronic music studio in a private house.¹ This studio preceded the synthesiser-producing EMS company by a few years in the mid 1960s, and significantly was never intended for the production of the kind popular music with which the EMS commercial equipment is most often associated. (Congruent with this, a playfully staged photograph from the 1970s of the EMS studio shows Zinovieff's children in flowing white clothes at the controls of the EMS machines, captioned "A performance of the Magic Flute / GLYNDEBOURNE 1983".²) So herein lies the rub, and perhaps explains why Zinovieff's place in music culture and history is richly complex and more nuanced than usually acknowledged. For Zinovieff himself would express little interest in the kind of popular electronic music that most of the people who are interested in *him* would have. (Again, we're talking in broad brushstrokes here: you, considered reader, are a likely exception...)

And these musical/cultural tensions go in multiple directions: some reporting from the popular music side describe Zinovieff as a boffin or "mad professor type" (being educated to the level of doctorate plays to this image). On the other hand, although Zinovieff is steeped in classical music culture, as the photograph of a mock futuristic performance of Mozart's opera suggests, it is also the case that he has no formal training as a composer. In fact, that description was one which for many years Zinovieff was overly-hesitant to use for himself, something that has rightly changed since his recent blossoming of compositional activity.

If Zinovieff's popular music associations are by now almost clichéd (the VCS3 is used by Pink Floyd on *The Dark Side of the Moon* record, then later by John Michel Jarre on *Oxygène*, and so on), they are still yet under-explored. It may well be that Delta Unit Plus, the trio formed with Delia D. and Brian Hodgson in the mid 1960s, was mainly intended to be another attempt at a money-spinner. However, it is still notable that, despite the apparent failure of this particular enterprise, the band is still entwined in one of the UK's "holy grails" of 60s popular music, The Beatles' *Carnival of Light*. It is one of the very last of the bands recordings to remain unreleased, its reputation easily attested by searching YouTube and seeing the many fakes of the track available. That this work has also been described by Zinovieff as a *collaboration* with Paul McCartney makes this moment all the more fascinating. (The billing on the poster advertising this 1967 "sound rave" at the Roundhouse describes "Music by Paul McCartney and Delta Unit Plus".) A postscript to this episode: in a recent interview for Q Magazine, picked up by *The Guardian*, McCartney, cultivating yet again his avant-garde electronic music credentials, describes meeting and visiting Delia Derbyshire, and going down to "a hut at the bottom of her garden ... full of tape machines and funny instruments".³ The irony: it's a visit to *Zinovieff's* garden studio in Putney that McCartney is describing, full of EMS equipment that Zinovieff himself co-designed, and which formed the backbone of Delta Unit Plus' instrumentation and tools.

But the blurring of rightful attribution, of cultural and musical categories and memory don't always stem from such misrememberings of personal or cultural memory. For it is under the monicker of Delta Unit Plus that Zinovieff and Co. also perform (plays back) Zinovieff's first acknowledged electronic music compositions, including *Agnus Dei*, in a concert in Bagnor, 1966. Intended to be the part of an electronic music mass, *Agnus Dei* flies Zinovieff's musical modernist allegiances most clearly. Here is a composer who is interested in *serious*, complex and "difficult" music, that may well entertain, but which is often *about* more serious matters than the largely "consumable" pop of the period. (And yet, now another counter case to muddy the water, the mischievous *Lollipop for Papa* - Papa being Papa Hayden—from 1970. The piece begins in the at the time popular yet throwaway style of Wendy Carlos' *Switched-on Bach*, but then follows on with a set of experimental variations that embrace modernist atonal musical territory.)

⁴ The following textbook gives a good general overview: Manning, P., 2013. *Electronic and Computer Music*. Oxford: Oxford University Press. See Chapter 11.

⁵ http://www.softkazinovieff.com/?page_id=20

⁶ www.guardian.co.uk/music/2013/mar/22/paul-mccartney-dr-who-yesterday

By the late 60s, this seriousness of technological musical intention and ambition brings Zinovieff to the attention of a young modernist British composer, just returned from North America on an academic Harkness Fellowship. Harrison Birtwistle is a Northerner, from a small Lancastrian village on the outskirts of Accrington, where musical sophistication consisted of the local military band. Zinovieff's background, of course, couldn't be more different: cultured Russian émigrés parents, boarding school, an Oxford doctorate, and so on. And yet, they become very close friends, and their musical lives become entwined for the next decade. Over this time they collaborate on numerous modernist compositions, Birtwistle primarily writing the instrumental parts, Zinovieff the electronic. (These works in fact are the subject of my own musicological research). Then comes the all-consuming and ambitious opera *The Mask of Orpheus*, the now well-documented collaboration between Zinovieff and Birtwistle as librettist and composer.¹ The project includes an electronic music component, conceived as part of the opera from the start, but which is later unable to be realised by Zinovieff due to the collapse in the late 1970s of the EMS business and Zinovieff's EMS studio.

There are other collaborations and meetings with key modernist figures in the classical music world of the late 20th century, from the UK and beyond: collaborations with Hans Werner Henze, experiments with Karlheinz Stockhausen, performances involving Hugh Davies, and so on. These associations are important then, not only in themselves, but because they remind us that this, in fact, more than the output of the BBC Radiophonic Workshop and its current well-meaning evangelists, is the orientation of Zinovieff's musical world. That, and as the title of *Lollipop for Papa* suggests, the music of what is sometimes still called the Western classical music canon, especially Hayden and Beethoven---more on the latter below. (Zinovieff's daughter Sofka Zinovieff, a celebrated author, writes that when on holiday as a child, "There was always music playing, but it tended to be Mozart, Beethoven or Schubert rather than the kind of thing that was composed and recorded at the [EMS] studio in London").²

Peter Zinovieff's current *public* return to composition, beginning around 2010, has resulted so far in four compositions, all of which make perfect sense within the musical contexts outlined above. With *Bridges from Somewhere and Another to Somewhere Else* (2010) he explores the territory of transformation of audio of early recordings of Turkish folk music, in fact those made by Béla Bartók in 1936, recordings which helped shape Bartók's own approach to composition. Assisted by Tony Myatt and others from the University of York, *Bridges* was developed for a Thyssen-Bornemisza Art Contemporary-commissioned sculptural installation, using a multichannel system employing the highly specialised "Ambisonic" technique of sound diffusion. This method of creating multichannel works was employed again in 2012 for a second TBA21-commissioned work, *Good Morning Ludwig*, in which the audience is immersed in electronic sound coming from all around, including above (it is one of the compositions being performed as part of the career-spanning *Peter Zinovieff 80th Birthday Concert* in Cambridge, May 11, 2013). As suggested by its title, this composition also returns to notions of variation form springing from the models of existing music of the classical era, this time, the *Coriolan Overture* of Beethoven. The immersive nature of the result has echoes with Zinovieff's earlier "tape music" collaboration with Harrison Birtwistle, *Chronometer* (1971/72), which was among the earliest UK electronic *multichannel* works. *Chronometer* comprises two asynchronous pairs of two channel tape, allowing the introduction of subtle differences in timings between the pairs of channels each time the composition is "performed" in this format. (Its welcome rerelease on audio DVD in 2008 by Sound and Music,³ whilst making the a multichannel version of the piece publicly available for the first time, effectively destroys this subtle relationship between the parts of the composition.) This temporal approach rightly can be compared with notational/performance practices in Birtwistle's music of the time. However more importantly, from the standpoint of computer electronic music, it should be considered in relation to notions and the practice of controlled *randomness* that the use of the computer facilitated in Zinovieff's music from the mid 60s (an approach commonly now described as *algorithmic music*).

Since Zinovieff's public return to composition, there have been other works and collaborations, too, with the violinist Aisha Orazbayeva (*OUR*, 2010, a concerto for violin and electronics), and with the poet Katrina Porteous (*Horse*, 2011, broadcast on BBC Radio 3). Peter Zinovieff is also currently working on further compositions with Orazbayeva and Porteous respectively. Using current computer music technologies, Zinovieff embraces the new whilst employing notions of musical form and continuities that take us back to his earliest innovative musical work in electronics and computers. We look forward to hearing the results.

⁷ See for instance Cross, J., 2009. *Harrison Birtwistle: The Mask of Orpheus*. Farnham, Surrey: Ashgate

⁸ http://www.sofkazinovieff.com/?page_id=20

⁹ Various: Recovery/Discovery—40 Years of Surround Electronic Music in the UK. SAM 0801



PZ Dissolved and Resolved

Frames from an animation by Alan Sutcliffe

Photo by Jenny Zinovieff

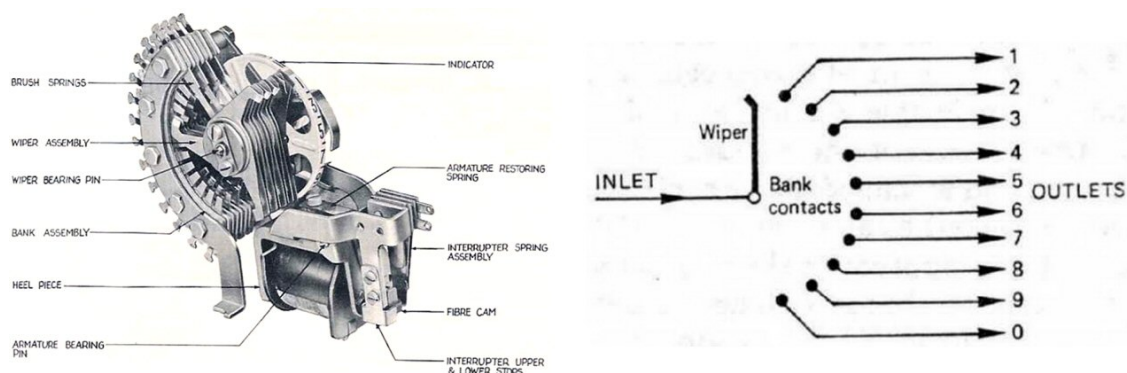
EMS MILESTONES

Peter Zinovieff

- 1 Sequencers
 - 2 PDP-8/S computer
 - 3 Oscillator and filter bank
 - 4 First sampler
 - 5 Cybernetic Serendipity
 - 6 ZASP
 - 7 VCS3 and other synthesisers
 - 8 MUSYS
 - 9 QEH Partita for Unaccompanied Computer
 - 10 VOCOM voice synthesiser
- The Analytical Engine lead to the Mask of Orpheus
and the development of recent software 2009-2011

1A Uniselector sequencer

The search for a good sequencer started with my great distaste for tape splicing after lessons from Daphne Oram. First by uniselectors switched fixed manually controlled oscillators.



1B First transistor sequencer



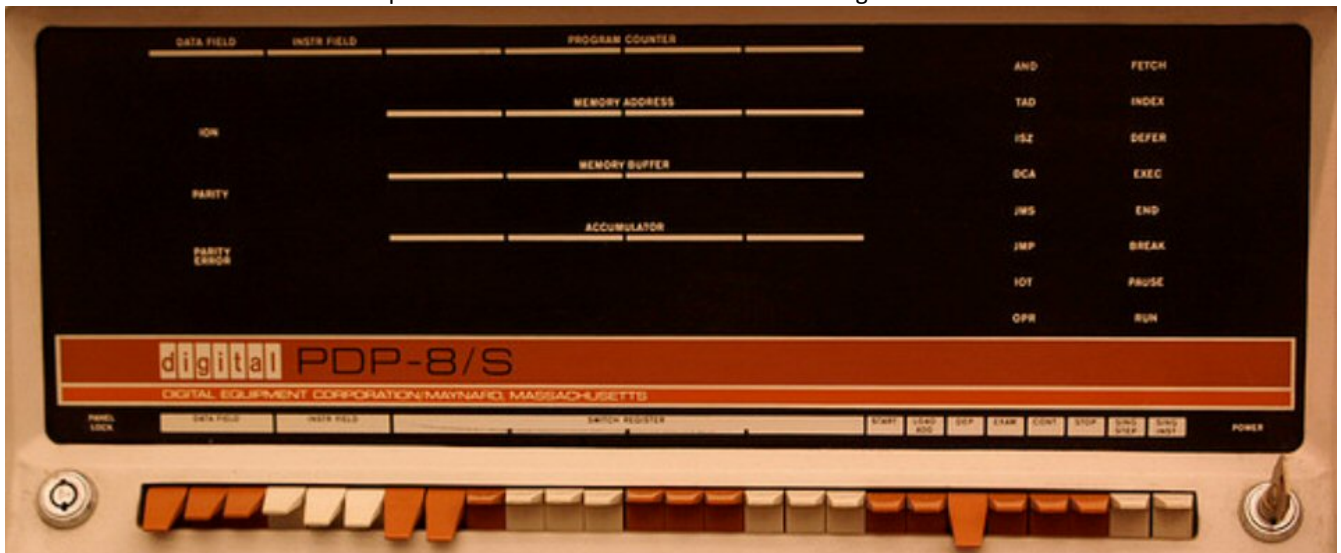
1C EMS transistor and digital sequencers





2 PDP-8/S computer

The next stage in my sequencer development was the acquisition of a 4k PDP-8/S Digital Equipment Corporation (DEC) computer. This completely revolutionised the capabilities and potential of the studio. Anything could be designed to be controllable by the computer. The computer could get data from any source: video camera, keyboard, touchpad, lightpen, typewriter, relays, tape recorders, punched tape, digital tape, hard drive and so on. And of course all the other electronic music sound producing equipment designed by David Cockerell. Countless oscillators, filters, amplifiers, envelope generators and so on. Many of these devices and interfaces were completely innovative and had never been used elsewhere. Above all an endless sequence of events - a whole score - could be generated.



This 4k PDP-8/S cost £4,000 in 1966, as did the addition of 4k of memory and later a 32k hard drive. [At that time, a new graduate would earn less than £2,000 in a year.]

Later, more computers were added: a PDP-8/L and a PDP-8/E, and also two DecTape digital data units.

Today I have 16gb memory and 20TB hard drive. Many million times more than in those days.

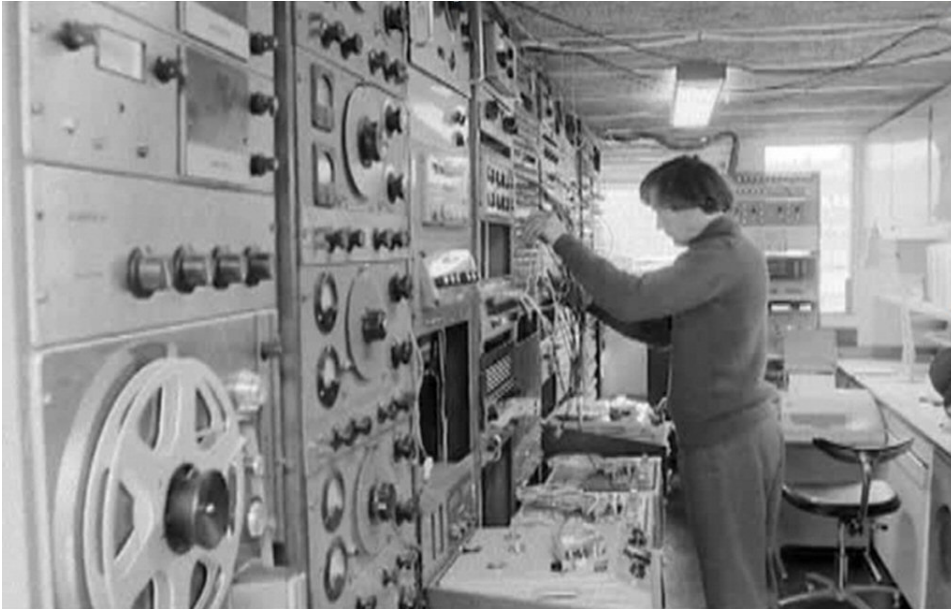
3A Oscillators plus filter bank

Three banks of 184 digital oscillators (DOB) could be individually switched on at any amplitude and with a choice of waveforms. This allowed sounds to be made by additive synthesis. A limitation was that the centre frequencies were of fixed frequency, unlike the 12 voltage controlled oscillators.

The analogue 64 filter bank enabled an analysis of sounds through 64 variable q filters.

This data could be replayed by turning the filters into oscillators. This was the method used to generate speech and some pretty good recreations of real sounds.

The studio in 1968 – in the garden shed



Various methods were able to control the oscillators.

- teletype keyboard
- light pen
- touch pad (the Feely) really the first mouse
- programmable piano like keyboard with touch sensitive resistive foam and 64 programmable keys
- colour video camera interface
- Geiger counter and a luminous watch dial to obtain random numbers
- remote control unit which could program any aspect of the studio from a kilometre away and the results could be heard over headphones and loudspeakers

Data could also be entered manually using custom made programs in assembler or other languages. (See the Musys Manual)

3B Oscillator and filter bank

When EMS moved to Oxfordshire in the 1970s it acquired several manufactured Fast Fourier Transform Units. Potentially these would give better analytical data than the analogue filter bank. Alan Sutcliffe wrote Fortran DSP programs for these devices but the main drawback was that they provided only 512 logarithmically arranged samples.

Peter Easty was commissioned to build EMS' most expensive project - *The Analytical Engine* - which had 256 digital, variable, filter and q filters. At the end of the day it worked for a very few seconds thereupon Easty left for Ircam in Paris and that was the end of this £40,000 project.

The Studio in 1970 – in the house



Clockwise from bottom left, with equipment racks listed from top to bottom:

- Telephone
- Analysing keyboard (outputs to computers)
- Synthesizer AKS; Tannoy loudspeaker (behind)
- KSR-33 Teletype
- Rack 1: filter controls; audio-frequency oscilloscope; DEC tape drives; DEC PDP-8/L "Leo"
- Rack 2: high-frequency oscilloscope; filter controls; potentiometer bank; frequency counter; Wavetek oscillator; 32k hard disk drive
- Rack 3: amplifier controls; DEC PDP-8/S "Sofka"; various audio devices; main patch panel
- Rack 4: digital analogue controllers, including the "button panel" for interaction with MUSYS programs; reverberation units
- Monitor and keyboard for programming computers; Tannoy loudspeaker (behind)
- Synthesizer 100
- Ampex 4-track tape deck with Dolby noise-reduction units on top
- Ampex 4-track tape deck without Dolby
- The main mixer, built by Robin Wood, who acquired control of the rights to EMS equipment in 1995
- Custom unit for 4-track spatial effects
- (Centre) Valuable Persian carpet

The method of working was that I would think of hardware that was needed. David Cockerel would realise his fantasy and deliver a module or circuit board that could be digitally controlled. Then came an elaborate process of me writing the machine code and assembly language drivers that could be incorporated into the system before any music work could be done.

One of the real problems with the EMS studio was that it was always in flux and tomorrow was always going to be better than today. Each new endeavour took weeks to incorporate successfully.

4 First Sampler

The now 8k memory, 32k hard drive and the DecTape units were used to sample and replay sounds. This was the first ever sampler. Sampling became a leitmotif of EMS and is the basis of my current work. It epitomises the difference between pure Electronic Music and Musique Concrete

<http://www.historyofinformation.com/index.php?id=2717>

<http://answers.yahoo.com/question/index?qid=20090104084651AANyjQq>

5 Cybernetic Serendipity

This was the first public showing of my studio. The exhibit was extraordinarily difficult to prepare and maintain. An onlooker whistled a tune and the computer detected the frequency by counting the time interval and number of zero crossing in the waveform. It then replayed the tune with variations using voltage controlled oscillators and other devices all controlled by the PDP-8 computer.

http://en.wikipedia.org/wiki/Cybernetic_Serendipity

This CD cover of sounds from the exhibition was part of one of my scores.



6 ZASP

In 1967 ZASP (anagram PZ and AS) - a computer composition - was made in collaboration with Alan Sutcliffe. This was the first piece composed on one computer (ICT 1900) and realized on another (PDP-8). It explored acoustics generated by algorithmic patterns and textures uniquely inherent to the electronic music equipment. In 1968 ZASP won second prize at the IFIP (International Federation for Information Processing) Congress in Edinburgh.

Data was transferred from one computer to the other in the form of paper-tape carried across Putney footbridge from ICT to EMS. The piece now sounds very primitive [disputed] but the technology involved and the programming at both ends of the process were very complex.

Winning this prize gave Alan Sutcliffe the impetus to found the Computer Arts Society and bring out its first issue of PAGE ZASP also led to the formation of EMS as a company consisting of Peter Zinovieff, Alan Sutcliffe and Tristram Cary.

<http://www.ems-synthi.demon.co.uk/emsstory.html#begin>

<http://www.ems-synthi.demon.co.uk/emsstory.html>

<http://www.ems-synthi.demon.co.uk/emsstory.html#team>

<http://www.ems-synthi.demon.co.uk/emsstory.html#putney>

<http://www.ems-synthi.demon.co.uk/emsstory.html#users>

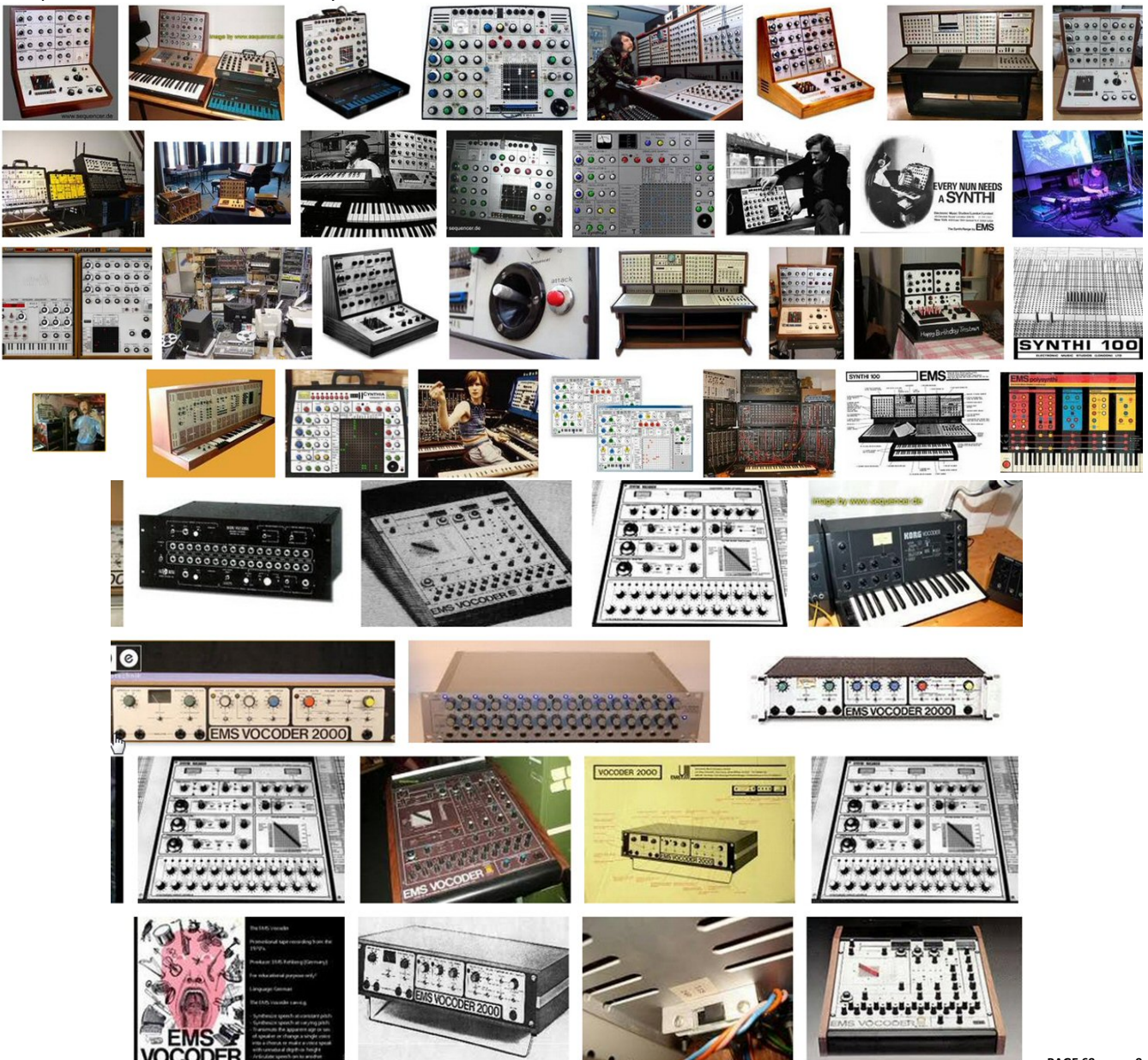
<http://www.ems-synthi.demon.co.uk/emsstory.html#oxford>

<http://www.ems-synthi.demon.co.uk/emsstory.html#nonproducts>

7 VCS3 and other synthesisers

In order to finance the studio EMS produced a large array of synthesisers and modules ranging from the portable Synthi A to the gigantic Synthi 100 and the computer Synthi as well as many Vocoders.

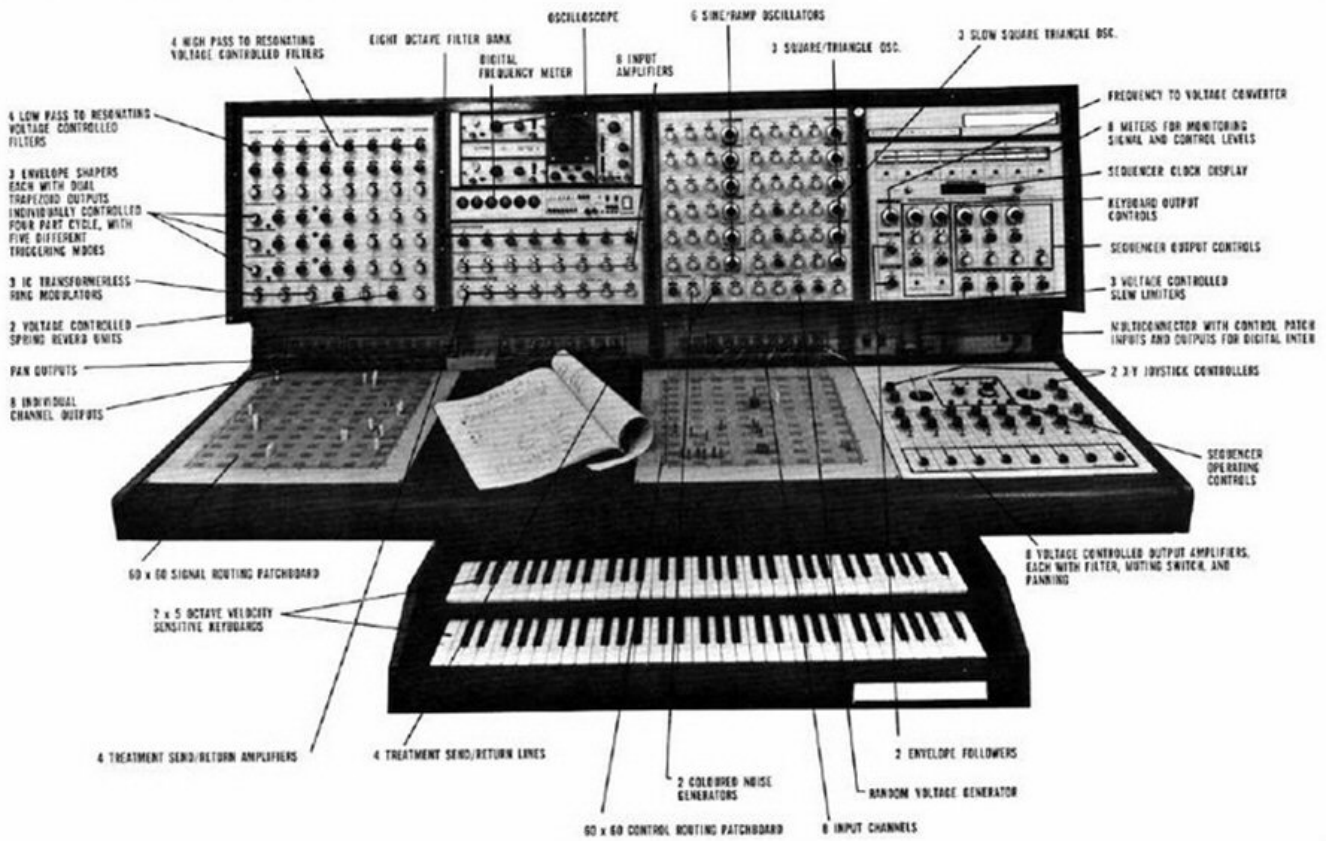
Development of these continues both by the manufacture of the original VCS3 by Robin Wood and by the design of computer emulators, for instance by Xavier Oudin.



SYNTHI 100

EMS

Electronic Music Studios London Limited,
 49 Deodar Road London SW15 2NU
 Telephone 01-874 0042/874 2363 Telex 928327
 New York: 408 East 78th Street NY 10021 Tel: 212 734
 Telex 42 40 33





XILS 3 developed by Xavier Oudin is a very complete VCS3 with a sequencer.
<http://www.xils-lab.com/products/XILS%203-%3A-iLok-or-eLicenser-protected.html>



Above XILS 3 (software module)

8 MUSYS

MUSYS won first prize at the ISCM 1970 (International Society for Contemporary Music) for a computer music program. A very complete manual describes in detail all aspects of the studio hardware and software at this time. A similar approach was being developed at Bell Labs by Max Mathews in his system 'GROOVE'.

MUSIC SYSTEM was used to describe the whole studio as well as the specific program developed by Peter Grogono at EMS. This was a rather high level assembly language allowing macros, lists and control of the computer output to the voltage and digitally controlled devices (see an example in the VOCOM section). All the later serious work at EMS used this ever-developing system, for example works by Henze and Birtwistle. Peter Grogono wrote much of MUSYS.



<http://120years.net/machines/ems/index.html>

At this time a number of important pieces were made in the studio, including 'TRISTAN' with Hans Werner Henze. Here live recordings of prepared piano were mixed with oscillator bank ensembles controlled by a Sony colour video camera. This premiered on 20 October 1975 under Colin Davis at the Royal Festival Hall in London.

<http://www.discogs.com/Hans-Werner-Henze-Tristan/release/2092602>

Also 'CHRONOMETER' with Harrison Birtwistle.

<http://www.myspace.com/peterzinovieff>

<http://www.universaledition.com/Chronometer-for-2-asynchronous-4-track-tapes-Sir-Harrison-Birtwistle/composers-and-works/composer/64/work/8049>

9 QEH Partita for Unaccompanied Computer



At a concert in the Queen Elizabeth Hall in London a computer played my "Partita for Unaccompanied Computer". Hardly a laptop but the first real-time performance on stage of any Electronic Music not using tape.

During this period EMS put on a yearly concert at the QEH and Royal Festival Hall. These were the first purely electronic music public concerts.

<http://www.musicweb-international.com/routh/Contemporary.htm>

10 VOCOM Voice Synthesis

An important project at EMS was the development of VOCOM. This was to revolutionise telephone transmission by analysing speech and retransmitting it at a very low bit rates and then reconstitute it at its destination using DEC PDP8Ls and a derivative of the 64 filter bank at each end.



SCV1 SINGLE CHANNEL VOCOM UNIT

A GENERAL PURPOSE UNIT FOR DIGITAL SPEECH TRANSMISSION AT LOW BIT RATES

GENERAL DESCRIPTION

The SCV1 is the complement of a Modem which allows digital signals to be sent over an analog line.

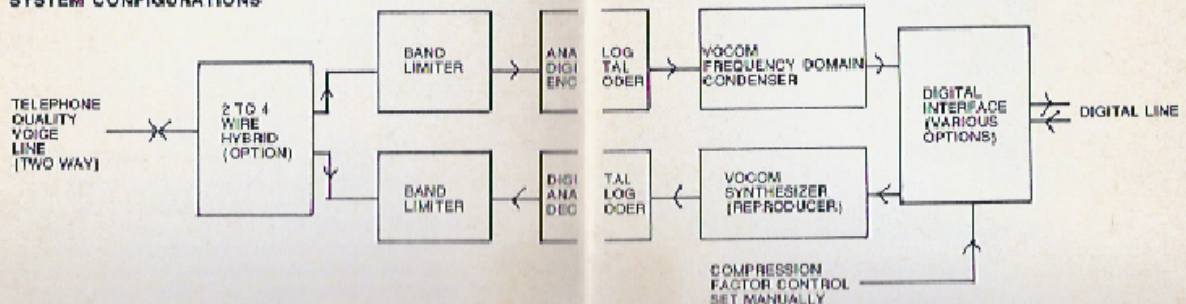
The SCV1 accepts telephone quality speech and produces a digital output at very low bit rates. This output can be transmitted on low capacity digital lines or stored very compactly in any digital memory. In receiving mode, the unit accepts the same digital input and reproduces the original signal without loss.

The maximum theoretical compression of digital speech is by a factor of about 1000, for the meaning of each word to be conveyed. Where the subjective sound quality must not be impaired, the SCV1 offers a saving of about 10 times. Where intelligibility is the only criterion, savings of up to 100 times can be achieved with the SCV1. Thus digital lines previously incapable of carrying speech can now do so, and higher capacity channels can now carry better quality speech. Factors above 100 can be achieved in special situations, for example where good sentence intelligibility, as distinct from good word intelligibility, is adequate.

APPLICATIONS

The first main application of the SCV1 is in enhancing the quality of speech already being transmitted over a digital line. The unit is then placed between the voice input and the existing digital line.

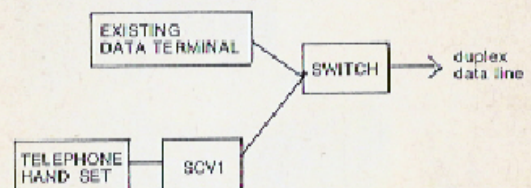
SYSTEM CONFIGURATIONS



The second main application is for transmitting speech over a digital data line that is not otherwise capable of carrying speech, for example a 2,400 bits per second data link. In this case the SCV1 is connected to the line through a switch, which will cut out the existing data terminal while speech is being transmitted.

Because of the way that the SCV1 codes speech digitally, it offers a secure method of transmission, which can only be interpreted using another SCV1 unit. For high security operation an option is available that incorporates special dynamically changing coding which can then only be interpreted on a matching SCV1.

SPEAKING ON A DATA LINE



SPECIFICATION

The unit is housed in an enclosure measuring 19" x 10" x 16" for normal static applications. A miniaturised version measuring about 3" x 4" x 5" is being developed for mobile applications, though some state-of-the-art components have not yet shown sufficient reliability.

The compression rate on a particular unit can be altered in a few minutes, so the system can adapt to changing line conditions or speech quality requirements.

An example of a computer generated poem using Vocab

This programme is written in "VOCAB", a computer language specially developed for VECOM.

```

VE
/L
0001 1"TODAY WAS A WONDERFUL DAY"
0002
0003 1"SPOKEN POEM NOVEMBER 1972"
0004 1"START AT DISC ADDRESS 544 WITH DATA TAPE BLUE 5 ON UNIT 5"
0005
0006
0007 0.0:
0008 "DJ70 3700 !"
0009 .
0010 "VA" #C01 ; "VA" #C02 ; "VA" #C03 ;
0011 " ! " = " ! "
0012 "VP" #C01 ; "VP" #C02 ; "VP" #C03 ;
0013 "V$"
0014 " " = " " #CR ;
0015 "VN" #C01 ; "VN" #C02 ; "VN" #C03 ;
0016 " " = " " #CR ;
0017 "VV" #C01 ; "VV" #C02 ; "VV" #C03 ;
0018 " ! " = " ! "
0019 "DJ10 3700 VATEST VPTEST DJ70 3700 V$ ! " = " ! "
0020 " ! ! ! ! "
0021 10<
0022 #PL ; #L1 3^ ; #L2 3^ ; #SP ; #HT 20 ; #CR ;
0023 #PL ; #L3 3^ ; #L5 3^ ; #L4 3^ ; #SP ; #HT 10 ; #CR ;
0024 #PL ; #L6 3^ ; #L5 3^ ; #L4 3^ ; #SP ; #CR ;
0025 #PL ; #L7 ; #L8 2^ ; #SP ; #HT 10 ; #CR ;
0026 #PL ; #L7 ; #L8 2^ ; #SP ; #CR ;
0027 #HT 30 ; #CR ;
0028 #L10 ; #CR ;
0029 #CR ;
0030 #CR ; #CR ; #CR ; #HT 200 ;
0031 " ! ! "
0032
0033 "V$"
0034 #
0035 C01 #L1 1 ; #L1 2 ; #L1 3 ; #L2 1 ; #L2 2 ; #L2 3 ; #L3 1 ; #L3 2 ; #L3 3 ; #SP ; #CR ; 0
0036 C02 #L4 1 ; #L4 2 ; #L4 3 ; #L5 1 ; #L5 2 ; #L5 3 ; #L6 1 ; #L6 2 ; #L6 3 ; #SP ; #CR ; 0
0037 C03 #L7 ; #L8 1 ; #L8 2 ; #L9 2 ; #SP ; #CR ; 0
0038
0039 L1 ZR "LOVE " , "PATTERN " , "EARTH " , @
0040 L2 ZR "CHANGES " , "HOUSES " , "WORDS " , @
0041 L3 ZR "DESTROY " , "ALLOW " , "PERSUADE " , @
0042 L4 ZR "ERRORS " , "EYES " , "SEAS " , @
0043 L5 ZR "SACRED " , "HAUNTED " , "FORGOTTEN " , @
0044 L6 ZR "RUSH " , "FRAME " , "CIRCLE " , @
0045 L7 "SUCH " @
0046 L8 ZR "KNOWING " , "WEEPING " , @
0047 L9 "ORPHEUS " @
0048 SP " " @
0049 CR " ! " @
0050 WT "VV" ZR\ @
0051 PL "VV" @
0052 L10 "VORPHEUS " @

```

Tell the clock to speak it quite fast.

Get the words and file them on disc.

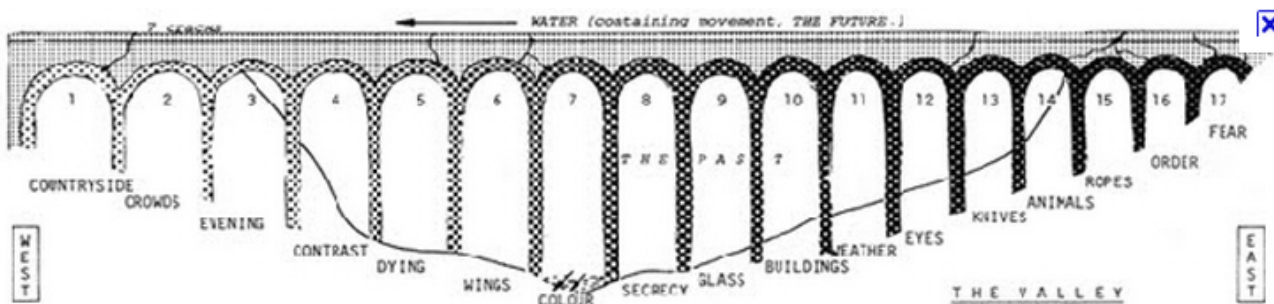
Perform same test routines

Get a pattern of words from the disc.

These macros store the words.

Vocabulary used in this experiment.

The development of the extremely complex digital voice transmission system VECOM and its user language Vocab as well as the complex scores that I had been writing directly and, of course, the many collaborations with Harrison Birtwistle directly led to the commission by Covent Garden Opera to write the libretto of The Mask of Orpheus. This was a mammoth, almost 10-year, project culminating in its production by the English National Opera in 1986.
http://en.wikipedia.org/wiki/The_Mask_of_Orpheus



From the libretto



Design by Sofka Zinovieff

Orpheus and EMS

Alan Sutcliffe

Peter Zinovieff's libretto for *The Mask of Orpheus* is the finest work he has done, more significant than building those twin towers of EMS, the studio and the synthesiser business, more significant than his musical compositions. I believe that it drew new developments out of Birtwistle, and is recognised as pivotal in his work. It was Peter's main preoccupation for many years. In a year he sometimes spent five months working on it at his cottage on Raasay, an island off Skye. He had built the cottage from a ruin, years earlier. Around the time of *Orpheus*, Birtwistle bought a property on the island.

EMS suffered as a result, without Peter's guidance and impetus. But this was not the only cause of its downfall. In the earlier years the synthesiser business had unique products, in facilities and price, and they sold themselves. But the competition began to catch up and EMS was too small to compete. The move to Great Milton in about 1975 was necessary but not sufficient. EMS had 30 products, all excellent but far too many for such a small organisation.

During this time my role in the organisation changed from technical to management. I went with Peter to meetings, first to keep things going, then to rescue as

much as could be of the studio and the business. Visits to the factory, to the solicitors, to potential backers and buyers, and to business advisors. A trip on my own to New York to see if anything could be retrieved from a man who had issued a guarantee that proved to be worthless failed: I was bamboozled. Robin Wood kept the EMS name alive repairing and trading in EMS equipment.

Among efforts to find a home for the studio Peter and I had discussions with Robert Sherlaw-Johnson of Oxford University music department. He showed us the large empty top-floor room where the studio would go and we discussed the equipment layout. But nothing came of it. At the National Theatre agreement was reached with a senior manager, no doubt helped by Birtwistle being musical director there. The studio was eventually put into storage there but was never put back together as a working studio. A national disgrace that grieves and angers me still.

These are a few of my recollections, but others may see and remember things differently. I do not agree with all that Tom and Peter write. Such is history.



The Computer Arts Society

A British Computer Society Specialist Group

Bringing together artists and technologists
Exchanging techniques and ideas
Formulating needs for support
Helping to get works known
Exploring new forms

ABOUT THE COMPUTER ARTS SOCIETY

Aims

The Computer Arts Society (CAS) promotes the creative uses of computers in the arts and culture
It is a community of interest for all involved in creating, developing, interpreting and understanding the cultural potential of information technology

Membership & fees

Membership is open to all who are interested in the aims and activities of the group

There is an optional annual contribution of £10 (€15 or \$20 overseas) for which members receive a printed copy of each issue of PAGE

The British Computer Society (BCS)

The CAS is a Specialist Group of the BCS and receives their support and funding

CAS Website

www.computer-arts-society.org

Publication

PAGE the Bulletin of the Computer Arts Society appears quarterly and can be downloaded from the CAS website

Archiving computer arts

The first period of CAS activity lasted from 1968 until the mid 1980s, and there are significant archives of material from this era, mainly stored in homes and offices of people then active in the group

The CAS worked closely with CACHE, a project in the Art History Department of Birkbeck, University of London, documenting UK computer arts in the years to 1980

This project led to the creation of the National Archive of Computer Art at the Victoria & Albert Museum, under the aegis of Douglas Dodds, Senior Curator of Computer Art

Present & future computer arts

With so many novel and exciting developments in the creative uses of computers in the arts the society will continue its original aims of bringing together those active in this area

EVA – Electronic Visualisation and the Arts

The EVA Conference is an annual event that focuses on the creative use of computers in the arts, industry and academia

Collaboration

The society holds joint events with other BCS Specialist Groups and collaborates with other organisations

Education

CAS continues to make students and practitioners aware of the history of computer art, and supports current student practitioners through its lecture series and conferences

CAS COMMITTEE

Chairman

Dr Nick Lambert n.lambert@bbk.ac.uk

Treasurer

Sean Clark seanc@cuttlefish.com

BCS and EVA Liaison

Dr George Mallen george@ssl.co.uk

Membership Secretary

Iris Asaf i.asaf@ucl.ac.uk

Webmaster

Dr Stephen Boyd Davis s.boyd-davis@mdx.ac.uk

Communications

Paul Brown paul@paul-brown.com

Editor of PAGE

Alan Sutcliffe alansut@alanist.com

4 Binfield Road Wokingham RG40 1SL
+44 (0) 118 901 9044

Committee Members

Dr Stuart Cunningham s.cunningham@glyndwr.ac.uk

Sue Gollifer S.C.Gollifer@bton.ac.uk

Tony Mann A.Mann@gre.ac.uk

Catherine Mason catherine.mason@dsl.pipex.com

Dr Mark Palmer Mark.Palmer@uwe.ac.uk

Tony Pritchett tony@agmp.net

John Sharp sliceforms@yahoo.co.uk

Dr Alex Zivanovic alex@zivanovic.co.uk

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