16. MAVIS (Microprocessor Audio Visual Information System 1975-1981)

MAVIS deserves to be remembered. It was a ground-breaking project shaped by some of the UK's brightest minds and institutions. Disabled people, academics, a maverick "experimental psychologist", Reg Maling and computer scientists pooled their talents to create MAVIS: The first flexible multi-purpose computer for the severely disabled. And yet it has been largely forgotten.

The 1970s was a period of economic decline in the UK. Many were fearful of computers and how they might destroy jobs and communities. Some were far more sanguine. Hopes of cheap powerful computers bringing radical change, a leisure-based society, and an end to war were expressed. This was a time of fledgling "Man/Computer Interaction" studies: How could ordinary people better understand and make use of the exciting possibilities of computers?

Interest was growing in the benefits computers might bring to the Disabled. In a joint project between the Department of Industry's National Physical Laboratory (NPL) in Teddington and Loughborough University of Technology, the MAVIS team was formed. The goal, to bring the power of the microcomputer to **any** disabled person, to amplify the power of their minds and bodies.

Impetus came from the great need of severely disabled children to play, be creative, read and write (if possible), and to better control their environment. Thought was also given to the needs of disabled adults requiring far more assistance at work and home.

For both demographics, the hope was to take the baton from the likes of Possum and the Trace Centre and run with it. Computer aided environmental control, telephone communication, on-line news, word processing, art, music, games, and stories. Flexible input and output to match the user's abilities. All from one portable box, and affordable. Imagine that. That was the dream.

The MAVIS Team

Such an ambitious project was always going to be reliant upon a wide range of people and previous work. The National Physical Laboratory itself was known as a hotbed of pioneering firsts in computing. NPL luminaries included Alan Turing and Donald Davies who both changed the world.

Amongst a brilliant team of NPL and Loughborough University staff, children, their families, teachers, and occupational therapists, three members were key from the start: Julia Schofield, Reg Maling and Dr. Christopher Evans.

Julia Howlett (later Julia Schofield)

Julia Howlett was the first totally blind graduate in Computer Science, awarded in 1975 at Hatfield Polytechnic. Here she was supported to explore her passion for computing and access. It was a chance to better explore how new interfaces could enable herself and others to do more for themselves.

Some of this passion was ignited by Bill Tagg, director of the Advisory Unit for Computer Based Education in Hertfordshire. Bill oversaw a range of very early systems to give alternative access to educational courses for disabled students. One such instance linked two typewriters, one Braille and one ink, so Julia could write programmes that could be read by herself and sighted people alike

More fuel for this work came from a 1974 Hatfield Poly and RNIB seminar discussing the role of computing for the blind. Hatfield had a group of lecturers who were very interested in how a computer could be used to bridge the communication gap between Braille and print. Lecturer Mark Jenkin was said to have built a Braille translation system using a DEC System 10 computer. Investigating these ideas led Julia towards the work of the NPL and being chosen to work on MAVIS.

Reginald Maling (1 December 1927 – 3 January 2007)

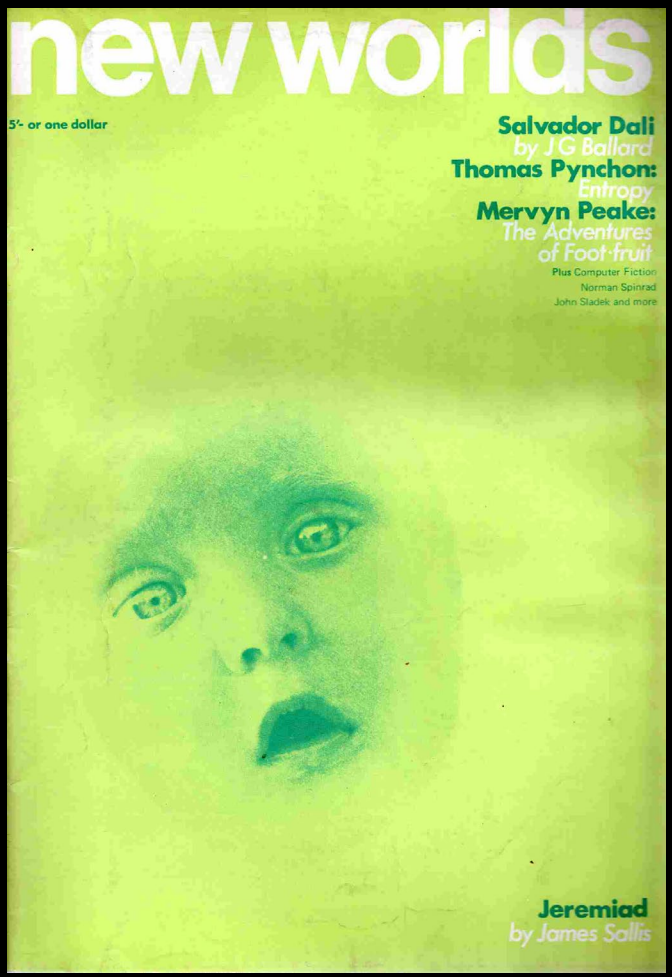
Reg carried with him the formidable reputation of having brought about Possum (see section 2) and the start of the modern-day electronic assistive technology movement. Reg was brought onboard as a consultant, giving advice on problems severely disabled children faced. MAVIS would never have existed without him.

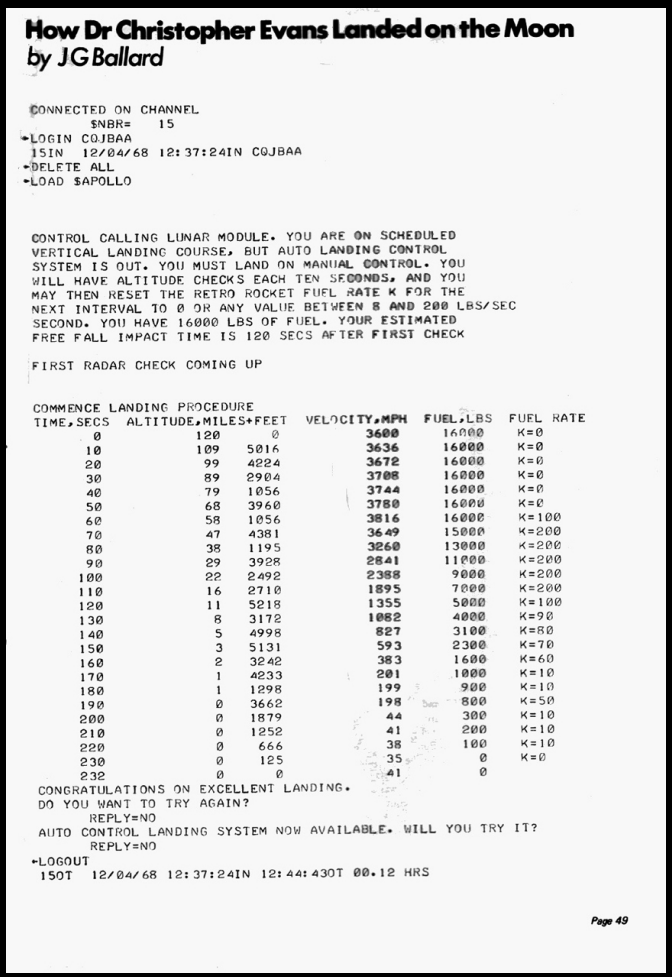
Christopher Evans (29 May 1931 – 10 October 1979)

An experimental psychologist. A maverick scientist. Christopher Evans was something the National Physical Laboratory had never seen before. Starting in 1963, his charisma, enthusiasm, and optimism would cast a spell over the NPL and many who came across him.

Dr. Evans had a fascination for the human mind, science-fiction, the paranormal, cults and computers. Where most of the scientists at the NPL wore stiff suits or white lab coats, Christopher Evans with craggy features ran around in American sneakers, jeans, long black hair, an open shirt, and iron cross necklace. His office featured a dentist's chair that people could chose to sit in, and it was said that you might see a tame rat (left over from biology work) peeping out from his shelves.

Of note, Chris became best friends with Science Fiction writer J G Ballard. They drank and worked on New Wave ideas together. Some of these led into Ballard's most notorious book, Crash. A dark tale of car-crash sexual fetishism.





How Dr Christopher Evans Landed on the Moon
by J G Ballard

```
CONNECTED ON CHANNEL
        $NBR=    15
→LOGIN COJBAA
 15IN   12/04/68  12:37:24IN COJBAA
→DELETE ALL
→LOAD $APOLLO


CONTROL CALLING LUNAR MODULE. YOU ARE ON SCHEDULED
VERTICAL LANDING COURSE, BUT AUTO LANDING CONTROL
SYSTEM IS OUT. YOU MUST LAND ON MANUAL CONTROL. YOU
WILL HAVE ALTITUDE CHECKS EACH TEN SECONDS, AND YOU
MAY THEN RESET THE RETRO ROCKET FUEL RATE K FOR THE
NEXT INTERVAL TO 0 OR ANY VALUE BETWEEN 8 AND 200 LBS/SEC
SECOND. YOU HAVE 16000 LBS OF FUEL. YOUR ESTIMATED
FREE FALL IMPACT TIME IS 120 SECS AFTER FIRST CHECK

FIRST RADAR CHECK COMING UP

COMMENCE LANDING PROCEDURE
TIME,SECS  ALTITUDE,MILES+FEET  VELOCITY,MPH  FUEL,LBS  FUEL RATE
        0          120      0        3600      16000     K=0
       10          109   5016        3636      16000     K=0
       20           99   4224        3672      16000     K=0
       30           89   2904        3708      16000     K=0
       40           79   1056        3744      16000     K=0
       50           68   3960        3780      16000     K=0
       60           58   1056        3816      16000     K=100
       70           47   4381        3649      15000     K=200
       80           38   1195        3260      13000     K=200
       90           29   3928        2841      11000     K=200
      100           22   2492        2388       9000     K=200
      110           16   2710        1895       7000     K=200
      120           11   5218        1355       5000     K=100
      130            8   3172        1082       4000     K=90
      140            5   4998         827       3100     K=80
      150            3   5131         593       2300     K=70
      160            2   3242         383       1600     K=60
      170            1   4233         201       1000     K=10
      180            1   1298         199        900     K=10
      190            0   3662         198        800     K=50
      200            0   1879          44        300     K=10
      210            0   1252          41        200     K=10
      220            0    666          38        100     K=10
      230            0    125          35          0     K=0
      232            0      0          41          0
CONGRATULATIONS ON EXCELLENT LANDING.
DO YOU WANT TO TRY AGAIN?
      REPLY=NO
AUTO CONTROL LANDING SYSTEM NOW AVAILABLE. WILL YOU TRY IT?
      REPLY=NO
→LOGOUT
 150T   12/04/68  12:37:24IN  12:44:43OT  00.12 HRS
```

Page 49

Less controversial computer generated writings were published in New Worlds and Ambit magazines. One entitled "How Dr Christopher Evans Landed on the Moon" (Feb 1969), perhaps the first published playthrough of a computer game. This may have been plucked from the reams of computer literature, reports and print-outs Chris pulled from his bin to post to James Ballard every week. Another was 'The Dreams of the Computer' (May 1969) where a computer was forced to become increasingly disorientated until losing its 'mind'.

By 1969 Dr. Evans headed the Man-Machine Interaction Section at the NPL studying interaction by “naive” computer users and the development of programmes and equipment to better facilitate them. Naive meaning those unused to computers, which was almost everybody back then.

One early project was of a Medical history note taking machine that simulated the manner of a very polite and patient Doctor. A teletype machine was initially used with a keyboard mask reducing the keys to just ‘Yes’, ‘No, and ‘?’.

TELL ME DOES THE PAIN EVER WAKE YOU IN THE EARLY HOURS OF THE MORNING? PLEASE PUSH 'YES' OR 'NO'? 0

I SEE. WHEN IT WAKES YOU UP, DO YOU FIND THAT HAVING A LITTLE SNACK - MILK, BISCUITS OR PERHAPS SOME WARM WATER - GIVES YOU RELIEF? 0

NOW I'D LIKE YOU TO THINK RATHER CAREFULLY BEFORE YOU ANSWER THE NEXT QUESTION. JUST IMAGINE THAT I ASK YOU TO POINT OUT THE AREA WHERE YOU FEEL THE PAIN IN YOUR STOMACH - NOW CAN THIS AREA BEST BE INDICATED WITH ONE OR TWO FINGERS, OR WITH THE FLAT OF THE HAND.
IF WITH ONE OR TWO FINGERS, PRESS 'YES'
IF WITH THE FLAT OF THE HAND, PRESS 'NO'
IF YOU DON'T UNDERSTAND OR IF YOU FEEL THAT YOU COULD NOT EASILY INDICATE THE AREA WHERE THE PAIN IS THEN PRESS '?'? 1

In experiments carried out in Glasgow it was found that alcoholics seemed more likely to be honest about how much they drank when asked by a machine. Some ethnic minority women found discussing gynaecological issues with a male doctor impossible, but to a computer posing as a woman, far easier. The system evolved into a compact unit named MICKIE: The Medical Interviewing Computer.

During the 1970s Chris published books and presented television programmes on the mind, of cults, and the exciting new world the microprocessor was about to bring to us all. He was credited as the Scientific Advisor on ITV’s kids’ sci-fi series The Tomorrow People. He was probably the only scientist at the NPL known to the public in those days. Chris was the guiding spirit over the MAVIS team. Tragically he died of cancer in October 1979 just as the MAVIS Mk II trials were to begin. And just as his Television series The Mighty Micro was about to be broadcast, sharing his enthusiasm for an exciting future to come.

Research

Experimental research covered many areas that held potential benefits for disabled people. These included speech synthesis, large font and high-contrast options, Morse code, Blissymbolics, connectivity to Teletext and Prestel Viewdata services. A myriad of input and output devices were investigated as well as user programming. A Meccano robot called FRED (Flexible Reach Extending Device) able to move about a floor and manipulate objects was also looked into.

By September 1977, a MAVIS Mk I computer was ready to be demonstrated to a select audience of those interested in disability aids. If enough enthusiasm and support could be garnered the project would continue.

MAVIS Mk I

The 1977 MAVIS Mk I prototype was built by the NPL, pictured below running the Talking Arithmetic Program. Julia Howlett (in self-knitted cardigan with guide dog Baulah) operates the system by touch and hearing alone. Looking intently on is fellow computer scientist Tim Folkard, hoping it all holds together.

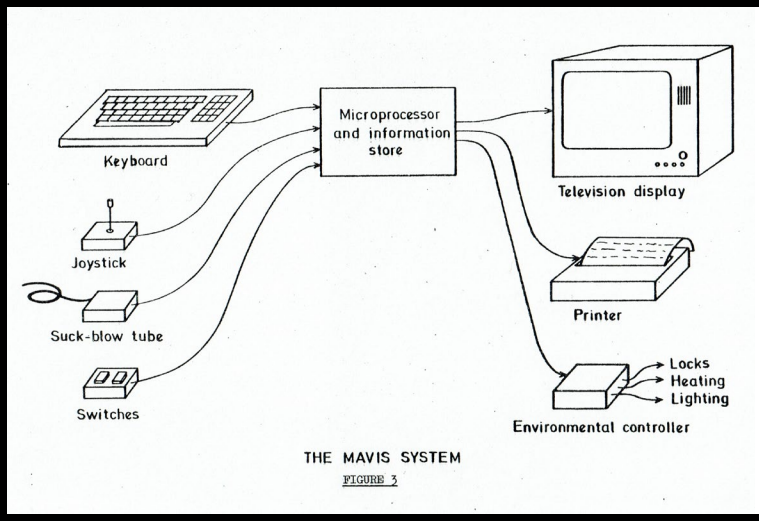
In this early form the system was able to demonstrate large Teletext style colour graphics and text in different sizes. It could speak numbers and play varied musical tones. It could be controlled by keyboard or ‘puff-suck’ input. A range of software including the talking calculator, text editor and a music playing activity were

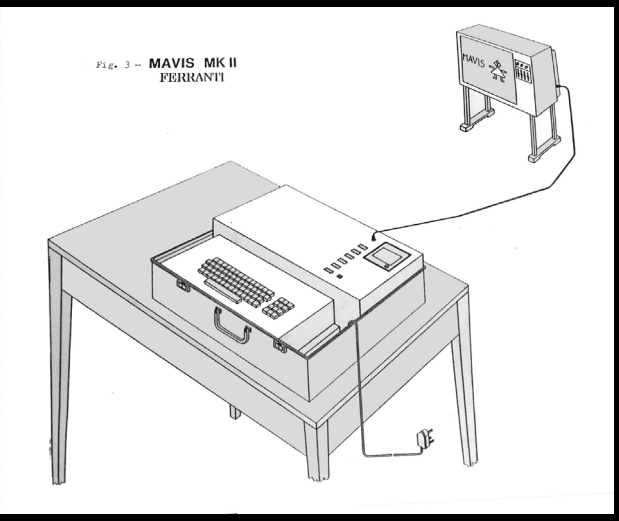
available. Work could be saved to cassette. Nothing this versatile had existed before in the world of assistive technology.

The demonstrations were a success. Work resumed immediately with Ferranti Instrumentation Ltd brought in to collaborate on building MAVIS Mk II and investigate market possibilities. Manchester based Ferranti built the first commercially available computers. They also made the first dedicated digital gaming computer, Nimrod, for the 1951 Festival of Britain. Hopes were high.

MAVIS Mk II: I Live in a Suitcase

By the summer of 1979, the MAVIS Mk II was ready. Some features did not make it, such as Bliss symbols which were impractical due to the relatively low resolution graphics. Full speech did not make it. Hopes to make use of a large Magnetic Bubble Memory store were dashed too due to lack of supply (a large RAM card was used to simulate this). However, the fundamentals were soon there, ready for the trials. Flexible input, including keyboard, various switches, and sip-puff. Flexible output including to standard colour TVs, printers, telephones, and other devices. Most importantly, there was fun, and productive software ready and waiting.





MAVIS II came in a large 17” (43cm) wide briefcase. Luggable at 20lbs (9kg) with the aim that it could be easily transported between school and home. The case contained the computer, memory, input and output board, power supply and cassette unit. Some of the specifications included:

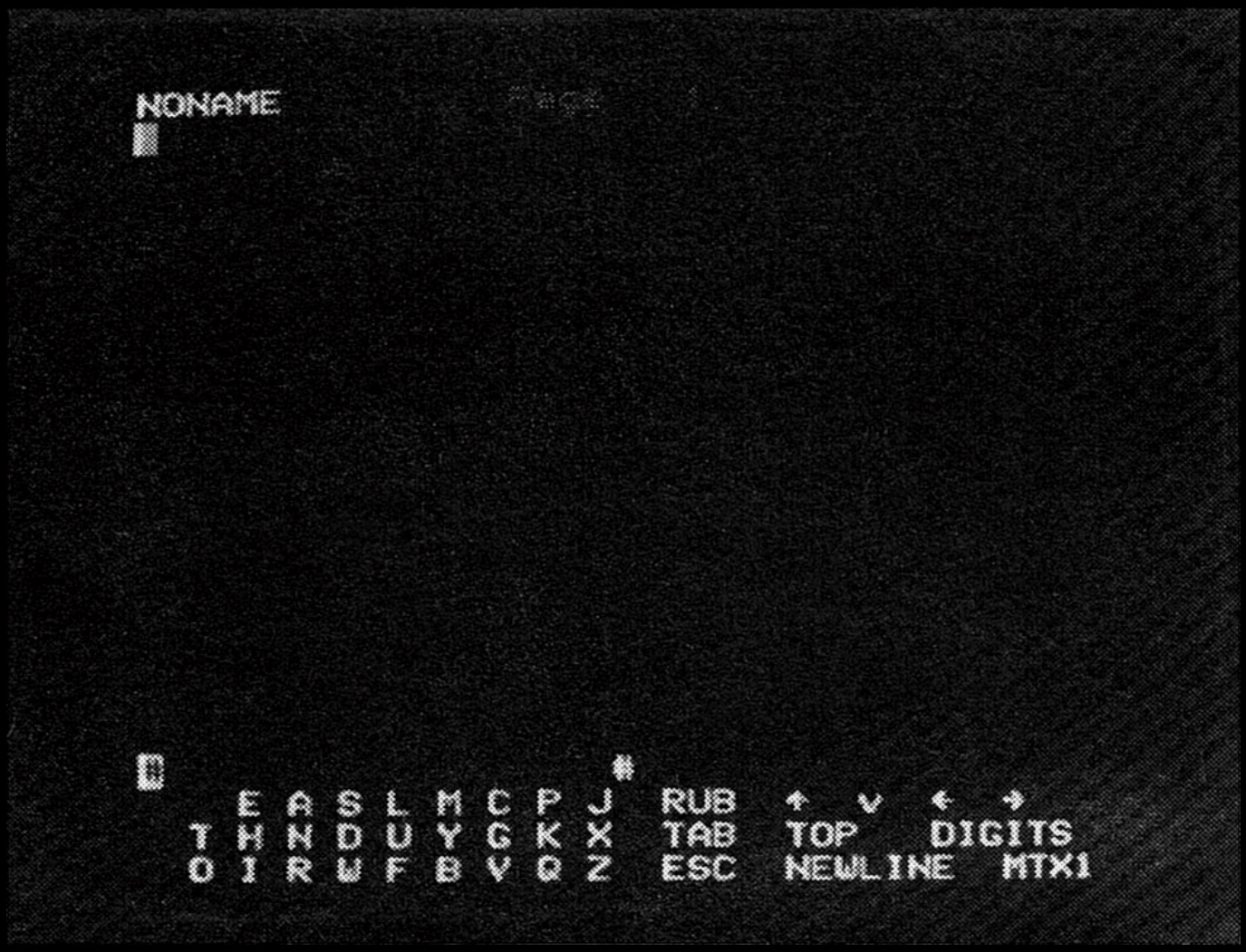
A Z80 CPU @ 2.308 MHz.
14Kb EPROM, 16Kb RAM and 128Kb “bulk store” RAM simulation (expandable).
2x parallel and 2 serial (RS232) interfaces.
69 key lighter touch keyboard with some colour coding.
Built in speaker and mini cassette unit.
Built in power supply.
16 Opto-isolated inputs and outputs (for user input and environmental control).
Telephone autodialler.
PLUM high-level language.

Powering ON

As soon as MAVIS was switched on it was ready to be used. The top line indicated the current file being worked upon (e.g. CAKES) and the currently displayed ‘frame’ of information (e.g. SPONGE). Files could hold many individual frames of information that could be paged through one at a time.

The next 18 lines of the screen were the main user area. From the off you could start typing or creating art. “ESC” took you to the command/error message line (20th down). Here, with the aid of a crib sheet, you could change the current activity and access more advanced commands.

Finally, the last four lines were ‘the matrix’. This is where switch and sip-puff users controlled MAVIS, using a POSM-like scan and select method. The big difference here from was that an unlimited number of custom matrices for different purposes could be created.



Built into MAVIS were four fixed matrices that could be pulled up at any time. These gave access to extra controls including telephone use, scanning options, and an alarm to call for help if needed. In the matrix above, selecting DIGITS gave access to numbers and selecting MTX1 pulled up another matrix.

At this stage, a brand-new world of possibilities was opened.

TRIALS (October 1979 - April 1980)

To a radio backdrop (I like to imagine) of Blondie's Dreaming, The Police's Message in a Bottle and Gary Numan's Cars, the trials began. Two locations would receive a MAVIS Mk II computer and support.

Identified with the co-operation of the Department of Health and Social Security (DHSS) were The Banstead Place Assessment Centre in Surrey and The Richard Cloudesley School in London.

> **Banstead Place** was a residential assessment centre for up to 32 young people of school leaving age. This included teenagers with Spina Bifida, Cerebral Palsy, heart disease, epilepsy, deaf children, blind children, and children with various brain injuries and learning disabilities. The aim was to support them all in getting ready for a more independent life.

Pictured above at Banstead Place was a typical MAVIS set-up. A domestic colour TV (left), a MAVIS unit with keyboard (middle bottom), an environmental controller (top middle) and a printer (right). A range of input devices (not pictured) were sourced to match the needs of the different children.

The Richard Cloudesley School supported 100 disabled children aged 3-16 years. Of those, one five-year-old called Joanne was singled out as a perfect candidate for the project. She was an intelligent child with Cerebral Palsy, very frustrated by her inability to communicate and participate independently.

Joanne's small nursery class had a wide range of toys with play actively encouraged by the teachers. Joanne communicated by looking at Blissymbols and had been practicing regularly with a switch-controlled Possum device. Joanne would start by taking MAVIS home with her to replicate her Possum work.

GAMES: Hangman, Target, Patience and Simon.

Most students at Banstead watched television as their main recreation. Games on MAVIS provided a second possibility which could be used independently. Many students who could not manage other elements of the system used the games purely for recreation and fun.

The games package played a very important part in the evaluation trials. Three games were initially provided, **Hangman** (pictured above played via foot switches), **Target,** an arcade type game, and **Patience** a number matching game. The games were used as a recreational facility, as an introduction to using MAVIS and as educational toys for helping with spelling and numeracy.

These games proved so successful that a fourth called Simon (likely based on the popular MB Electronics memory game ‘Simon’) was soon added. More were requested. In London, Joanne played the games too, against her brother Stuart at home. Both as equals.

TEXT EDITOR

The text editor was a revelation for those able to use it. It gave an instant area to communicate from. It allowed users to edit their thoughts tidily to be displayed on screen, printed out or saved to cassette. Custom matrices allowed users to select whole words and concepts without having to type them in one letter at a time. Below is Andrew at Banstead composing a letter using a chin switch.

Banstead users and staff typed up content to share for schoolwork or purely for leisure. An early MAVIS User Guide was available. Short stories and pages from the Radio Times and TV Times too.

The text editor also held the potential for creating new software via PLUM: The Programming Language for Users of MAVIS.

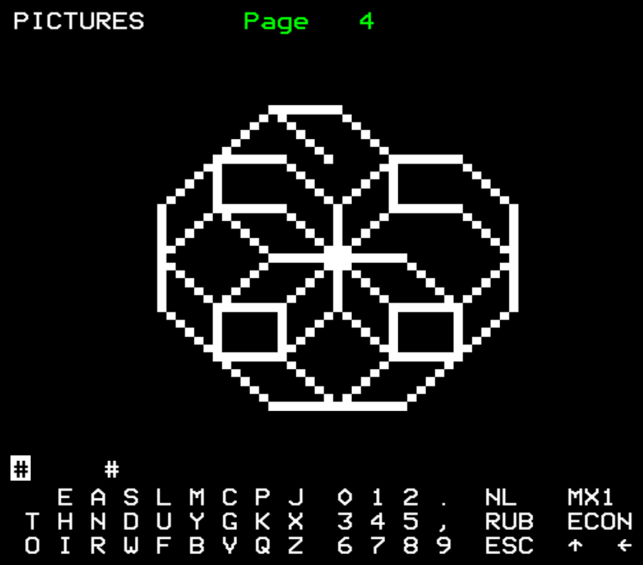
USER RESPONSE SYSTEM

A branching text system was made available to make it easy for a MAVIS operator to create quizzes, questionnaires, and other tests. At Banstead, many tests were created. These covered riding, swimming, and the highway code. Also tests on personal care, post office allowances and benefits.

Content rapidly built up. All had the benefit that users could pause and complete them at their leisure. The computer never lost its patience.

ART

Being able to create something uniquely your own can bring pride and self-esteem. It's one of the great joys in life. MAVIS was instantly ready for users to doodle with. Bringing up the DRAW or similar custom matrix enabled users to paint in light and colour on a television screen.



A cursor could be moved in 8 compass directions, with the ability to draw, erase and fill areas with any of the available colours. The art works above have all been recreated (by Dan Farrimond) from original black and white MAVIS photos.

Finished art works could be saved to cassette or printed. It was said that many non-disabled adults found the system difficult to use, but that the children had no such difficulty. The facility to create artwork could be used throughout any MAVIS activity.

The 'BOAT' example (top left) was painted at Banstead, reflecting one of the big news stories of 1979: NASA's Skylab space station falling from the sky out of control back to Earth had caused global panic.

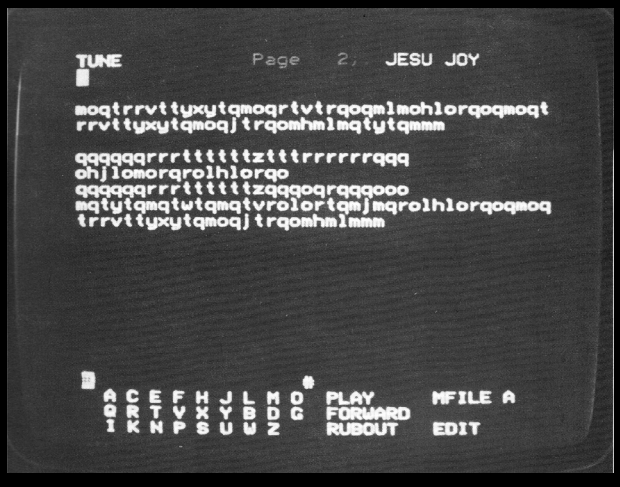
Pictured above is Rachel, who was very weak and unable to speak, creating art using a single finger. She later moved to switch accessible input when her strength reduced further. Rachel very quickly became a competent user of MAVIS using it for communication and all class work, including preparing material for other users.

MUSIC

Carried across from MAVIS Mk I was the facility to play and edit tunes. The root of this came from early experiments with blind computer output and a box called Sparky. Alongside Morse code and speech, Sparky could translate the contents of a screen into a musical score. Each character having its own unique tone.

This text to musical tones conversion was slow, and overwhelming to make full sense of for most users. However, a highly accessible method of playing and editing simple musical tunes made perfect sense.

A more elaborate version displayed notes on a Stave as they were played. Here different musical keys and time signatures were possible to select. The simpler version allowed users to enter musical notes and lengths as letters.



One tune was Bach's Jesu, Joy of Man's Desiring. A song of joy. Probably inspired by the Wendy Carlos 1968 Switched-On Bach version of the same song.

Another ditty was 'HORNPIPE' (pictured on previous page), inspired by Mike Oldfield's 1979 synthesiser rendition of the Blue Peter theme.

ENVIRONMENTAL CONTROL

A wide range of external devices could be controlled via MAVIS using the ‘E CON’ command. Built into MAVIS was the potential for telephone dialling from a contacts list. A system provided by Reg Maling, “as advanced as the Possum PSU3” expanded potential control to lights, heaters, door-locks, intercoms, radio, television control and so on.

Pictured above is Joanne in 1982 controlling an electric LGB train, which she got to keep. This is the last photographic evidence of the MAVIS project. The controls she has switch control over are likely START STOP and FINISH (playing).

EVALUATION

By the end of the trials, much was learnt. MAVIS had proved it could be used for many tasks by different age groups and disabilities. It proved that a ‘black box’ all-in-one solution greatly reduced the clutter created by needing dozens of incompatible single-purpose aids.

The children found the ability to produce tidy edited text rewarding. The games were very successful as was the tune playing routine. Many students at Banstead found, for the first time, that they were able to paint, play music, read, and study at their own speed. Some used the system as their main way of communicating personal thoughts with the outside world.

It was found at Banstead that some children were far more capable than was initially thought. One such child was Clifford, who was totally deaf, partially sighted and a ‘non-communicant’ wheelchair user. His use of MAVIS showed a boy far more capable than most people had realised. He seemed to be much happier too since using the system.

The London trials brought lasting benefits for young Joanne. Controlled movement was incredibly difficult, but an input device she could use was made. Using her right hand in a sideways motion, she would operate one of two padded wiper switches to navigate the MAVIS matrices. The switches were further personalised with a Peter Rabbit design and brightly coloured soft padding. By the end of the trials and beyond, Joanne was using the system with her family for games, communication, and control of a large electric train set. At school she was working on word construction using the system to display and save her work. As a child unable to make a sound, it gave her an independent voice. She was the last user of MAVIS.

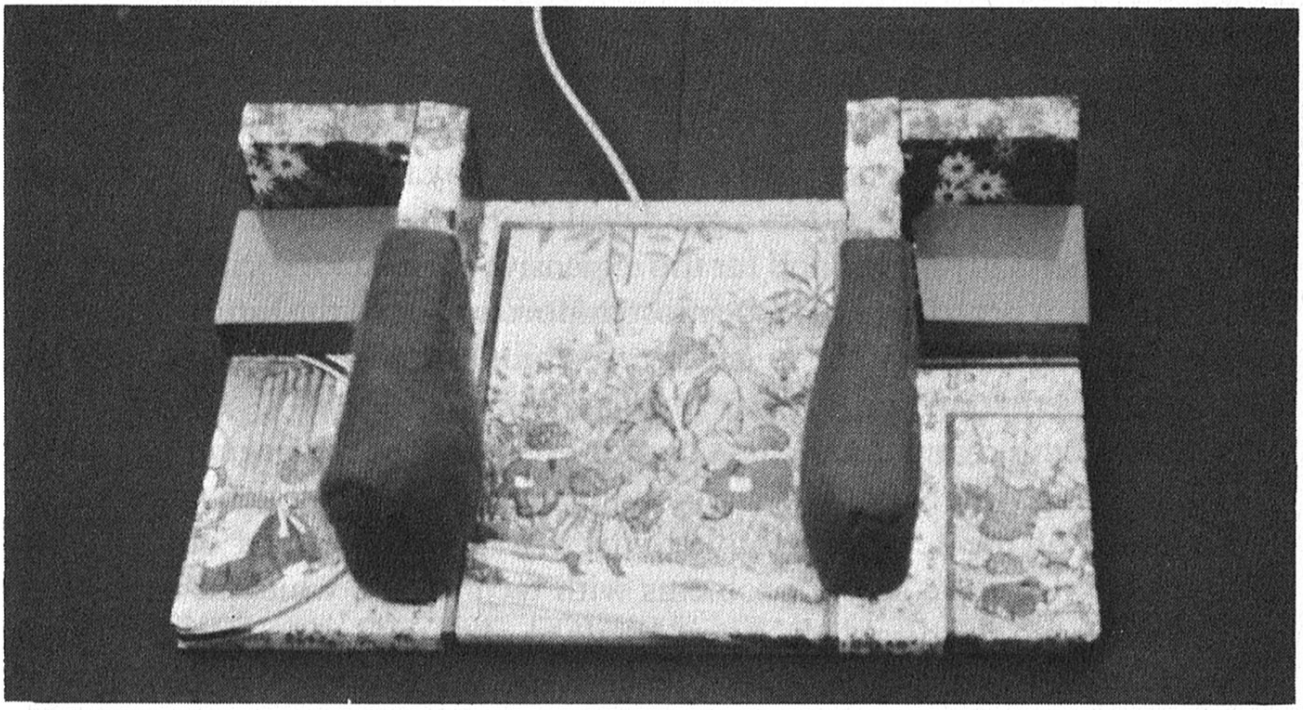


Figure 7.1: Joanne’s latest input. Blue and yellow soft pads at the end of wooden ‘wipers’, and between them a picture of Peter Rabbit. Joanne puts her hand between the pads and is just able to control enough sideways movement to move them, activating microswitches and enabling her to use the matrix selection.

In 2015 her mother Sylvia recalled: “Jo was a very independent young lady, who travelled to many places with friends and family. She had a group of carers and she was able to live an independent life whilst at the same time remaining at home with her family…. She had a lovely smile, great sense of humour, she affected everyone that came in contact with her. She was a lovely baby, and a beautiful young lady, but then I’m biased!”

“Jo is probably looking down on me typing this and 'laughing' because I have forgotten so much!!! Her father John who passed away about 2 years before Jo would also be a font of all knowledge. He was always very proud of what Jo achieved and he always encouraged her to 'communicate' and get her message across. He would help her to set up systems to be able to email friends, text friends - using her communication systems.”

Another bright spot was that Julia Howlett met her future husband, David Schofield at the National Physical Laboratory. They worked closely when he took over as project manager.

END OF MAVIS

Although the trials of the MAVIS Mk II were successful in many ways, and the need for such a machine proven, there would be no MAVIS Mk III. There were three main reasons why.

Firstly, the death of Christopher Evans in the same month that the trials began, was a huge blow. The team soldiered on without him, but it would never be the same.

Secondly and thirdly were a mix of technological and financial pressures. For MAVIS Mk II, the Ferranti cassette loading and saving was unreliable and the large store Bubble Memory not readily available. This could be overcome with investment.

The British economy was in the doldrums with the new Conservative government fast gaining a reputation for hacking and slashing publicly funded projects. A sponsor was found in BP to fund a full evaluation of the project. This was hoped to convince government departments and potential investors of the value of backing the project into larger scale production.

An issue of ‘who will pay for this?’ was highlighted by Dr. J.A. Hicklin, the medical consultant nominated by the DHSS.

“MAVIS presents a particular difficulty for the administrator in that it bridges and blurs the distinctions between health provision, education provision and employment provision in a way that no piece of environmental equipment has done so far. It would be tragic if the enormous opportunities for the severely disabled which this device presents were to be lost because MAVIS is too good and too potent, particularly in circumstances where it is no more and possibly less expensive than the cumbersome and out-dated equipment which we are at present using.”

Price was a factor in all of this. Production run MAVIS was estimated to need to retail at around £2000 each. There was suggestion that the system could be rented to users if other funding sources could not be found. At one stage the Department of Industry were reported as being close to ordering 50 MAVIS devices. But Ferranti

pulled out, saying they could not see a way to make the system financially viable. Thorn-EMI stated an interest, but wanted others involved to share the financial risk.

All of this came at a time when the Mighty Microcomputer revolution was gaining apace, as long championed by Dr. Christopher Evans. The likes of the Apple II, Commodore Pet and RM 380Z computers were starting to show a future alternative. It was Sinclair though that smashed one of the biggest barriers to access. Price and visibility. Midway through the trials (29th Jan 1980) Sinclair released the ZX80 home micro for £99.95 selling in high-street shops. It showed just how fast the price of home computers were plummeting.

In 1980 the Council for Educational Technology started looking into issues around access of software for schools and special education.

The order for 50 MAVIS Mk IIs never happened. By the end of 1981 civil servants turned the tap off for future funding. Government officials were told in debates that MAVIS was already out of date. A better approach might be to look at cheaper less specialist home computers. Going to the highest levels of government up to the Prime Minister, Margaret Thatcher, it was decided that the better approach was to aid the development of special interface switches for ordinary cheap computers. It was felt that this might be the more versatile approach. There was consideration for the Department of Industry giving switch interfaces for standard computers to schools for disabled children.

There was some frustration in this approach. Something that was so close to being ready to go, was about to be removed as an option. Julia felt that some of the issues were in UK culture. A place that could be frequently brilliant at creative innovation, was frequently poor at turning these ideas into money making products.

“With technology that is changing very fast it is difficult to predict the future except to say that it is probably brighter than it has ever been, provided that the correct beginnings are made now. This really means a vast and factual information and education programme being carried out to ensure that decision makers are in full possession of the facts, and that disabled people and their parents know, and are realistic about, the techniques and skills that are needed; in fact that people generally become less in awe of computers.

We are going to see a time in the not-too-distant future where leisure plays a far greater part in life than it has ever done, with people working far fewer hours, possibly from home. For the disabled person, working from home would be a great advantage, but it is now that leisure and the improvement of life need to be looked at carefully. It is no good having disabled people working if they are then totally cut off from the world outside and have nothing else to do.” – Julia Schofield 1981.

Joanne and Mum Sylvia smiling together using MAVIS to communicate.

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16. MAVIS

Text and photos from interviews with Julia and David Schofield and various other sources including: Some Microprocessor-based Aids For The Severely Disabled: Julia M. Howlett, BSc, Thesis, submitted February 1981 (written in 1980) and The MAVIS Evaluation Trial by Julia Howlett, St. Margarets Software Ltd and the National Physical Laboratory NPL Report DNACS 6/78 – September 1978, by Julia Howlett, Dr. C R Evans, N Bevan, T J Folkard and R F Penn – Mickie information via Turing's Legacy: A History of Computing at the National Physical Laboratory 1945-1995 by David M Yates 1997. Also, from correspondence and conversation with Sylvia (Joanne's Mum).

MAVIS picture with accessories (on its own) PHOTO CREDIT: CS/23069/7 – Central Photographic Section – National Physical Laboratory, Teddington, Middlesex. Colour picture of Joanne and Mum from Sylvia. Picture of Joanne and LGB train-set by Hugh Busby (1982). Colour MAVIS artwork recreations by Dan Farrimond

1977 Computer Weekly Supplement:
https://archive.org/stream/ComputerWeeklySupplement1977UKEnglish/Sep%2015%201977%2C%20Computer%20Weekly%20Supplement%2C%20%23567%2C%20UK%20%28en%29#page/n3/mode/2up .

1981 8th October 1981: "Plan for computer to help disabled are stymied":
https://books.google.co.uk/books?id=8WvC62WxCXAC&pg=PA88&lpg=PA88#v=onepage&q&f=false

SEE: OneSwitch.org.uk/page/100 for the full story