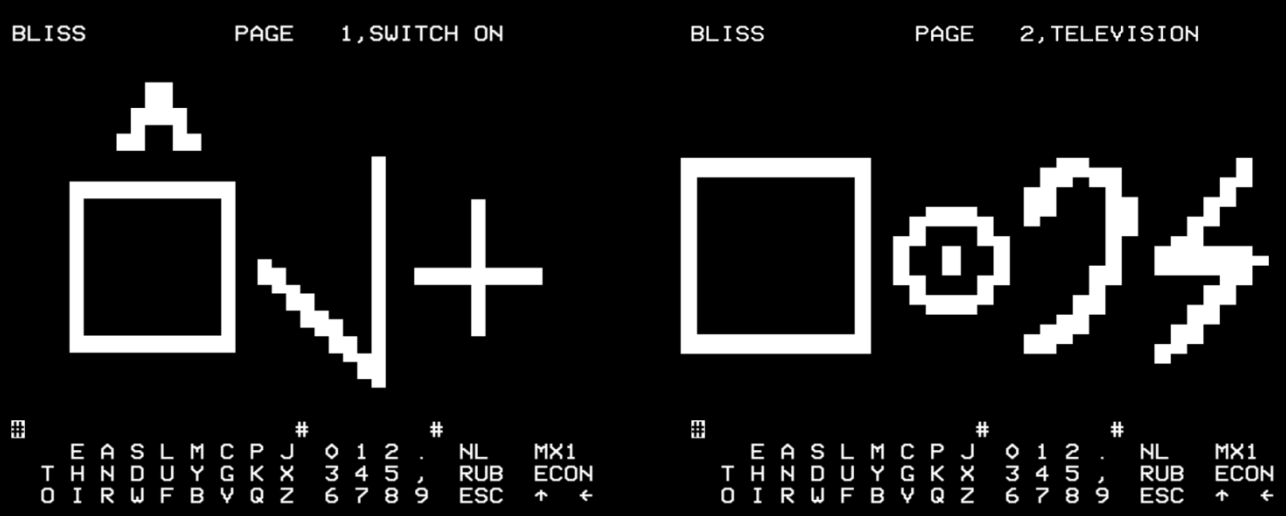
ONE SWITCH 100

Barrie Ellis - OneSwitch.org.uk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ONE SWITCH 100

Barrie Ellis

DRAFT – EARLY VERSION 2nd Jan 2021

OneSwitch.org.uk

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Game Accessibility Information symbol [left] and Content Unlikely To Offend symbol [right].

“The time you enjoy wasting is not wasted time.”

Bertrand Russell

INDEX

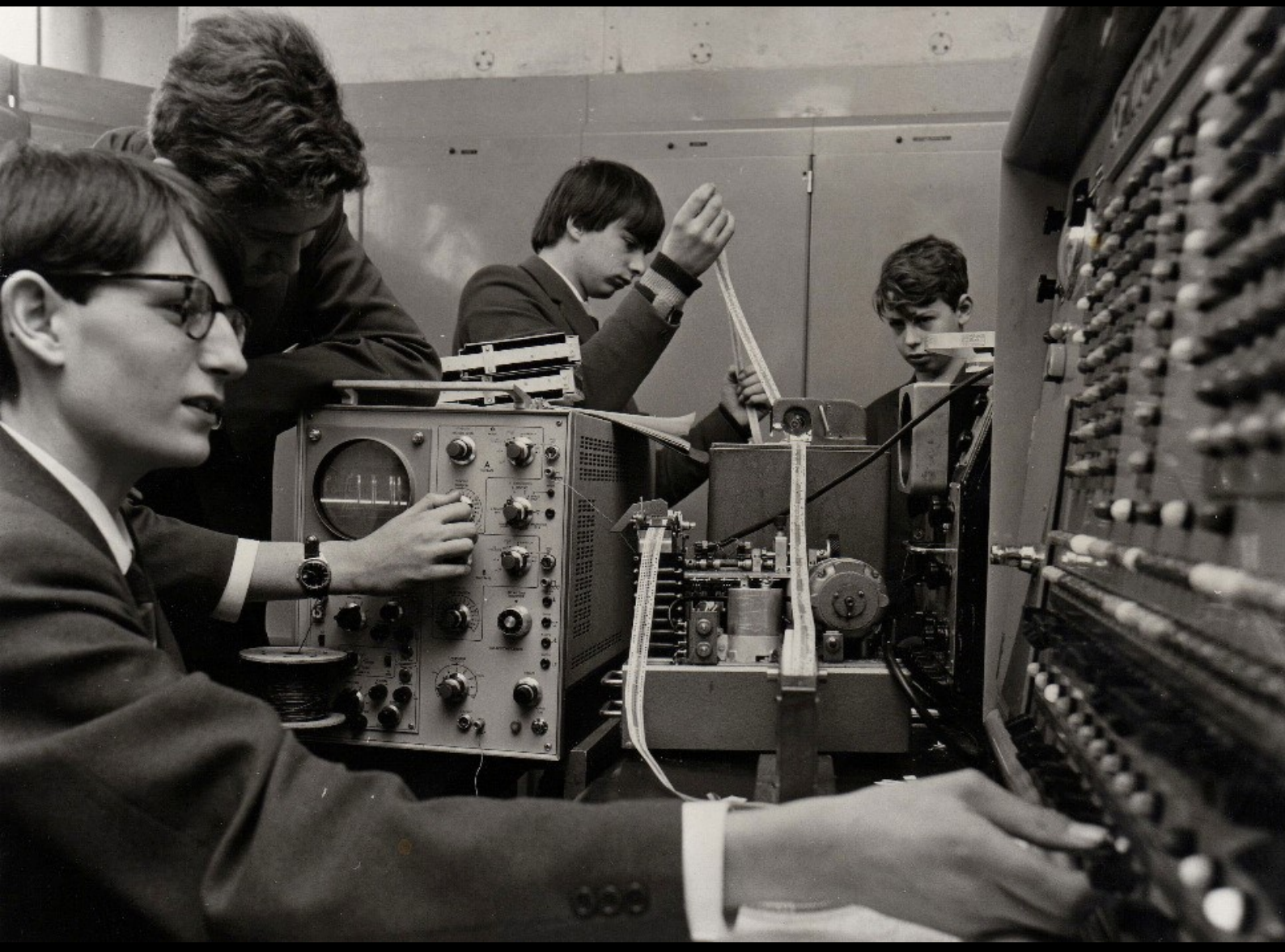
Part 1: One Switch Roots

1 The Birth of One Switch Games
2 POSM
3 Reaction Tester
4 Remote Controlled Wall Games
5 FRED
6 El Toro
7 Drop Zone 4
8 Steeplechase
9 Shooting Gallery and TV Powww!
10 Canyon Bomber
11 Handheld
12 Bowling
13 Air Attack
14 Team Play
15 Pre 1981 Electronic Assistive Technology – WORK IN PROGRESS
16 MAVIS

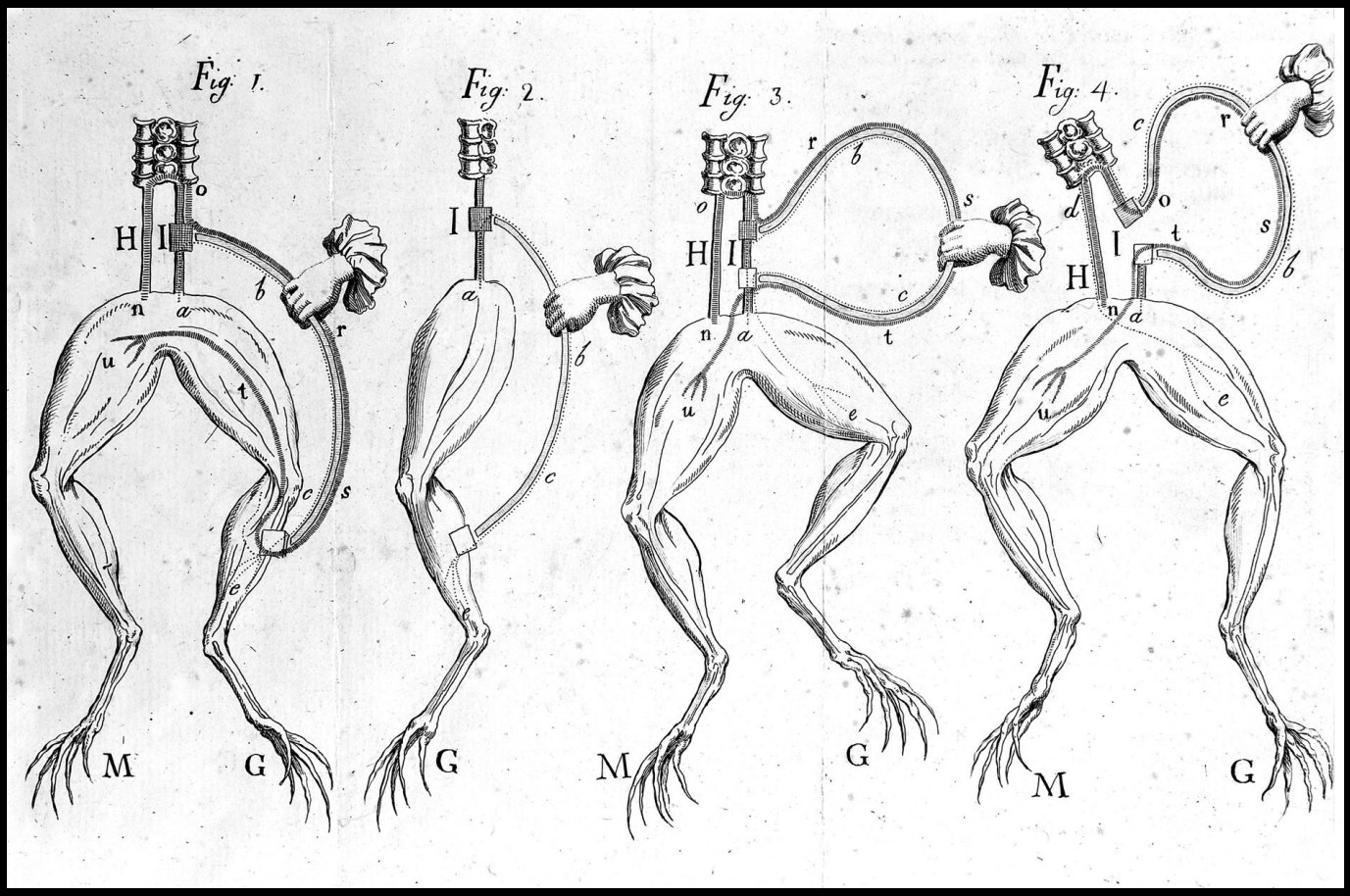
Part 2: The Day of the Micros

Glossary
Bibliography and Picture Credits
Index

ONE SWITCH ROOTS



PART ONE



1. The Birth of One Switch Games

Electrical games have been played by humans for thousands of years. Rubbing fur to build up a static charge then using it to shock someone or make hair stand on end was playing with magic. My fascination though, is in one button “one switch” video games and how, at their best, they can open gaming for all.

The first step towards the joy of video gaming was in finding a way to store electrical power. The solution came from a macabre one-switch experiment by Italian scientist Luigi Galvani in 1780. Galvani found that it was possible to make the leg of a dead frog twitch into action using an electric shock. He deduced that a store of animal electricity was kept within the Frog’s pelvis. All manner of bizarre experiments followed that would form the basis of Mary Shelly’s Frankenstein. Intellectual adversary Alessandro Volta questioned Galvani’s conclusions, and in seeking to disprove him, created the first electrical battery using copper, zinc, and brine-soaked cloth in 1799. It was a success and the reason why today people do not power their electronic gadgets with plug in frogs.

Human one-twitch games played long before Galvani prodded a frog include stare out competitions, sleeping lions and try not to laugh or grin games. First to blink flinch, smile or laugh is the loser. Last to do so, the magnificent winner.

The earliest battery or mains powered one-switch games arrived in the 1800s and were initially suffered by the rich in their own homes. Essentially, it was electricity enhanced “knock down ginger”. Flick a light switch on and off or press a doorbell button repeatedly until the occupant loses their rag and chases after you.

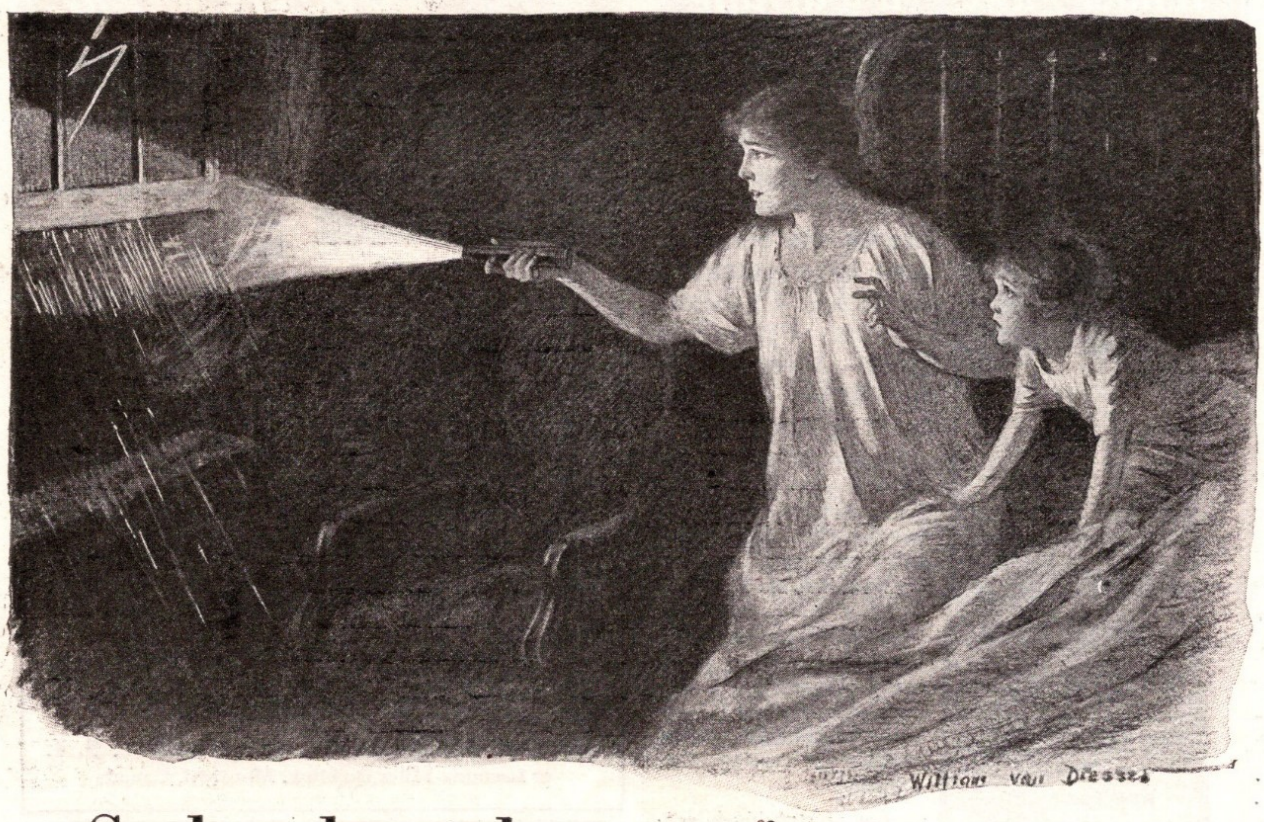
In 1844, an early US telegraph system bridging 44 miles between Washington and Baltimore, carried the test message, “What hath God wrought?”. Sent by Samuel Morse on paper-tape using his binary on-off language of dits and dahs, it was repeated back to complete the test. How disturbed Morse would have been to have received instead, “An electronic vessel for the sharing of faith, science, culture, cat videos and an unfettered bilious torrent of human consciousness. You may regret this. LOL ;)”

That same year across those same cables, a game of Chess was played via a pair of one button telegraph keys. By 1902 underwater telegraph cables encircled the globe carrying the earliest international on-line gaming communities.

The sound of Morse code pulsed ever stronger around the world alongside the glittering of electric lights spreading night after night. By 1922 there was said to be 10 million battery powered torches in North America alone. The popular Eveready Daylo flashlights sold alongside a free “Signalling with Eveready” booklet. Such resources enabled night-time children to silently defy bed-time curfews. Surreptitious communication from bedroom to bedroom, house to house, tent to tent. The game was to avoid interception. Whether by passers-by, teachers or worst of all, your parents. Lights out NOW!

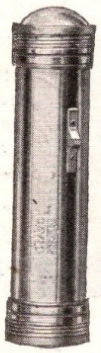
One torch game that children and adults continue to play to this day was in trying to dispel a fear of the dark: One press to banish the shadow monsters. It was something primal that Eveready recognised.

Always keep a Daylo under your pillow!



So handy and convenient; —a household necessity!

Is the rain coming in?
What was that?
What time is it?
Is the baby all right?
Did I lock the cellar door?
Where are my slippers?



No. 2631

Important

For your protection the registered name Eveready DAYLO is stamped on the end cap.

Accept no substitute.

The ideal Daylo to have under the pillow. 77 styles, many especially designed for home use.

The Light that says:
—"There it is!"

EVEREADY DAYLO

All Eveready dealers are now well stocked

604

With that long-lived *Tungsten Battery*

Fear sells. Especially when linked to losing your slippers. However, as argued in Jill Tomlinson's children's book The Owl who was Afraid of the Dark: Dark is [also] fun. Fun fairs and amusement arcades are at their most magical once the dark descends. This is where the next wave of electric one-switch games appeared.

1929 saw the arrival of both the Great Depression and Exhibit Supply Company of Chicago's Love Tester. Insert a coin then squeeze the grip to set a sequence of lights flashing wildly. Once released, the lights would settle upon a single position announcing to all how irresistible or repulsive you clearly were. Obviously, pay to play again if you didn't like the results.

1931 brought cheap one-button thrills in the Rotary Merchandiser also by Exhibit Supply Co. Unlike the love and personality testers, this was a game of skill.

The wheelchair accessible Rotary Merchandiser featured a turn-table laden with jewellery, sweets, toys or other riches. If these were placed in round cases, you'd have been wise to stay away. Inserting a coin put all in motion encircling an upwards ramp to the central drop chute. Pushing the "Stop Turntable" button set a metal arm dragging through the prizes towards the centre. If timed right, a prize would be nudged up into the drop zone to fall into the prize collection drawer. Here it would wait for the grasping hand of its new owner.

The first one-switch home television games arrived in 1951 courtesy of Zenith's "Lazy Bones" single button wired remote control. This device gave Americans the power to change their two or three TV channels from the comfort of their chairs.

The television games people played included: Find something worth watching. Mash up two or more channels to make your own programme. Race to change the channel to protect the moral fibre of your family from offensive content.

For UK readers, the advert above shows a Dad furiously trying to change the channel before his wife and son see the V-sign being flicked right at them.

After a few years of pets and people tripping over the long Lazy Boy cable, came Flash-Matic Tuning in 1955. However, this was not a one-switch device. The user would need to accurately aim a futuristic torch at a light-sensor on their TV. When lined up a quick squeeze would flash light at the sensor to change channels. The sun would do this too depending upon the time of day.

Using very similar “electric eye” technology, Robert LaVoy a teacher at El Portal del Sol School for Cerebral Palsied Children, California designed a communication device to aid those with “poor control of major parts of body and unable to verbalise”: The 1957 “Rick’s Communicator”.

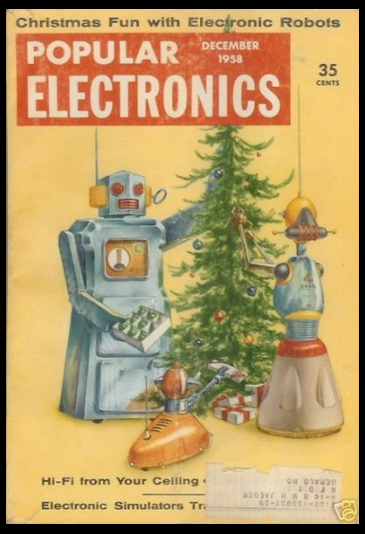
The device consisted of a motorised clock hand, display board of interchangeable communication cards and an always on light-beam sensor. When the child broke that beam of light with finger, head, foot, or any part of the body the clock hand rotated around the board of communication cards. When they moved out of the light, the pointer would stop. over a letter, number, word, colour, or picture to communicate that selection.

Teaching examples were explained in the 1957 Exceptional Children magazine, including learning the alphabet and counting. “Example: Flash card is held up, such as ‘4 + 1’ and child stops indicator on ‘5’. This gives the student an opportunity to participate in group games.”

Games would have been in the toolkit of any good teacher trying to motivate a child to take interest and get involved. This must have felt like a steppingstone into a future where anything could be possible.

Public fascination for Science fact and fiction was whipped into a frenzy in the 1950s. TV shows such as Science Fiction Theatre and The Quatermass Experiment. Books such as Isaac Asimov's I, Robot. Films such as Forbidden Planet featuring Robby the Robot and an entirely electronic musical score fed this. Most of all people reacted with a mix of hope, fear and wonder at the launch of the Russian Sputnik 1 satellite in 1957. It beeped a simple radio signal whilst orbiting Earth to make one statement: "I am here".

In 1958 on the crest of this wave, Masudaya Co. Japan created a range of wireless remote-control toys activated via a single button "spark-gap" handset. First in line was the Radicon Robot swiftly followed by Mrs Radicon Robot, Boats, Buses and Cars. Each press would cycle through a different function, left, forward, right, forward, backwards and stop (repeat). Games of skittles, chase a pet, obstacle course runs and mock interplanetary robot invasion ensued.

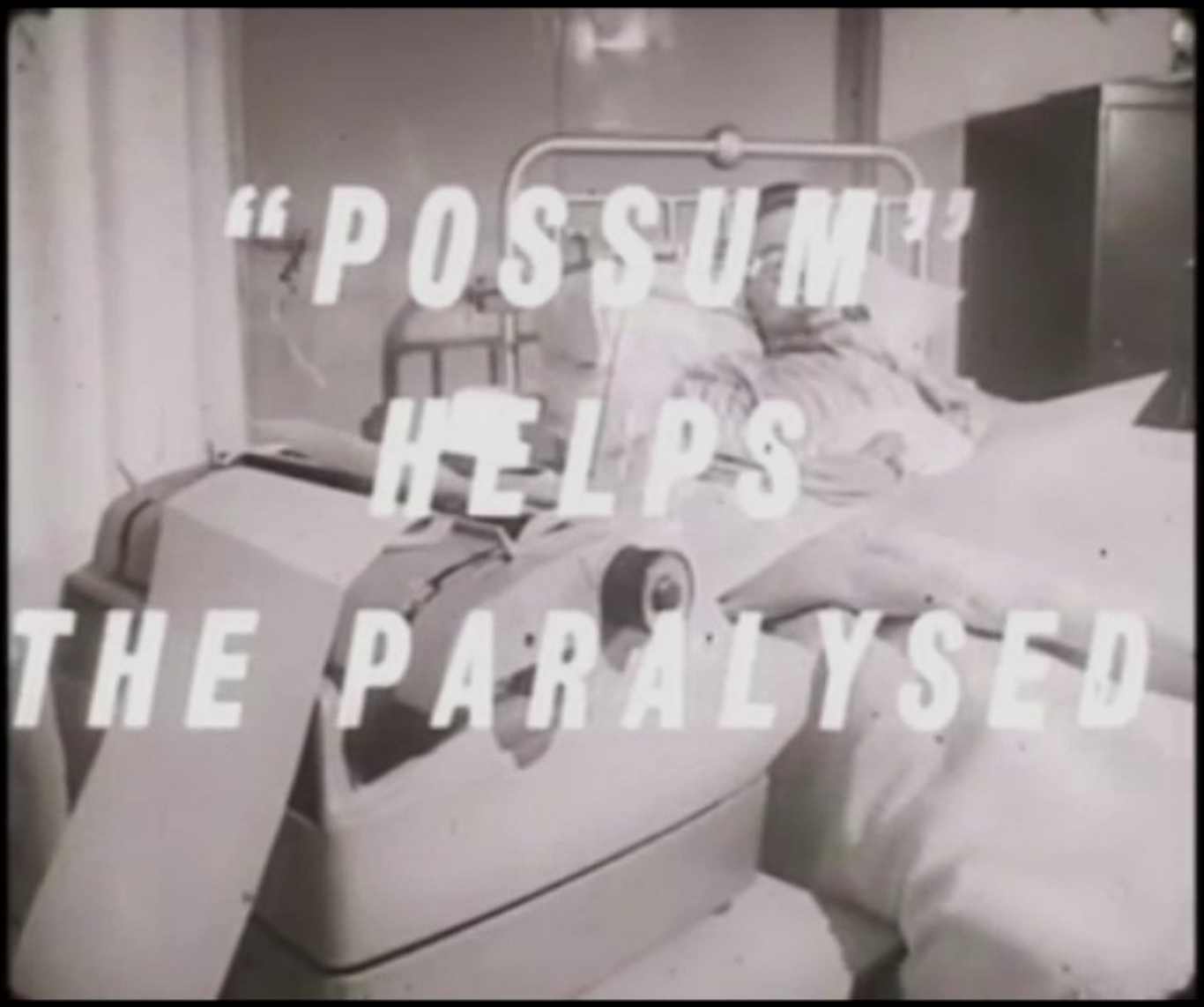


Earlier one-button battery powered toys existed, such as Telegraph trainers, light-bulb novelties, and the Marx Train-set voice controller. Radicon toys differed in bringing far more power to a single button.

Back in the amusement arcades, UK gaming company Jamiesons introduced a range of wall mounted one button gambling games. Titles from 1959 onwards included Roto Light, Electro Dart, Roto Fruit, Roulette, Roto Pool and Bingola. One game, one penny. Pressing a chrome push-button started a trail of encircling lights. The aim was to release and stop the lights on a prize-winning spot. The odds were fixed against you, but it didn't stop people being drawn in by the mesmerising display and promise of easy money.

Although the Rotary Merchandiser and Electrodart had simple one button controls, they still posed barriers. Then as today, some would have found the controls out of reach or requiring too much strength or precision to operate.

Curiously, the Jamiesons games share much in common with the more serious POSM (Patient Operated Selector Mechanism) built the following year. This would be the biggest step towards inclusive gaming.



2. POSM (Reg Maling and Derek/Dorothy Clarkson 1960)

Stoke Mandeville Hospital in the UK is famous as the birthplace of the Paralympic movement in 1948. It's less well known as being a massive part of the most influential era in electronic assistive and communication technology.

Riding upon a surge of 20th century medical innovation and refinements, people were increasingly surviving accidents, illnesses and conditions that previously would have killed them.

Two priorities followed survival: Improving independence and improving quality of life. Ideally this led to people freeing bed space, going home, being with loved ones, finding meaningful occupation and making their way in the world again.

POSM, the Patient Operated Selector Mechanism, was a revolutionary invention that made this possible for some of the world's most disabled people. It began in August 1960 at Stoke Mandeville's National Spinal Injuries Centre when two ex-soldiers met. The 33-year old patient, Ian Pritchard and 32-year old hospital volunteer and engineer, Reginald Maling.

Ian arrived at the hospital from Southern Rhodesia paralysed from the neck down after a water-skiing accident. From the confines of his hospital bed, a police whistle suspended by a piece of string just above his lips was his main method of summoning help. For the first time since being a baby, he could do little himself.

He spoke of his wish to record his experiences during the Mau Mau Uprising in Kenya for a book. Reg wondered if there could be a way for him to operate a dictating machine independently rather than relying upon the sporadic help of visitors and ever busy hospital staff.

Reg's epiphany was in realising that if a patient could control the air in their mouth to blow a whistle, then the same process might be used to operate electrical switches and relays. This could bring control over lights, tape recorders and almost any number of electrical appliances.

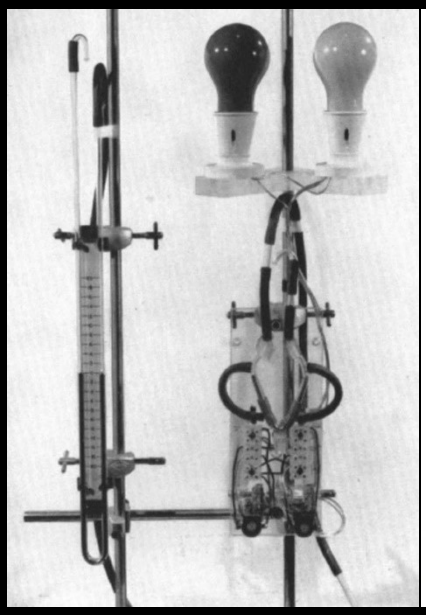
Reg was an industrial chemist by trade but had long been tinkering with electronics. Aged five he was said to have built an electric fence to stop other children from getting at and breaking his toys. He was known for his inventiveness, single-mindedness, good heart, grin and dancing eyebrows when an idea was flourishing. Needing extra help to take his ideas further, he teamed up with fellow hospital volunteer and engineer Derek Clarkson (later Dorothy Clarkson).

Derek's background included servicing Typex cipher machines in World War II (an "unbreakable" British Enigma used to encrypt secret messages). When Derek paired up with Reg in 1960, he was working at General Precision Systems in Aylesbury on computer aided flight simulators.

Working Saturday mornings in the flight simulator lab and spare evenings on Reg's Mother's sitting room floor, the first prototype POSMs took shape.

General Precision Systems (formally Air Trainers Link Ltd) advert, in Flight magazine, 8th July 1960.

The resulting Tape Recorder System was a breath controlled dictating machine using a liquid mercury manometer. This was the first electronic sip-puff assistive technology. With this, Ian swiftly gained independent control to record and organise his thoughts.



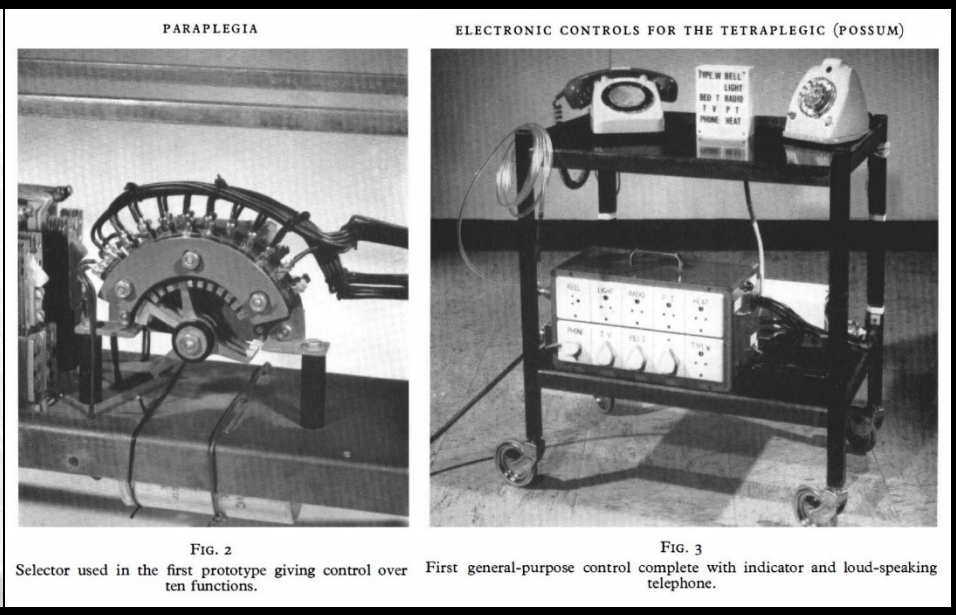


FIG. 2
Selector used in the first prototype giving control over ten functions.

FIG. 3
First general-purpose control complete with indicator and loud-speaking telephone.

The second wave of POSMs were far more powerful. The Environmental Control Unit (ECU), built from parts donated by General Precision Systems, enabled “scan and select” control of ten items. These would go on to include control over alarms, lights, heaters, radios, door mechanisms, page turners, projectors, telephones, televisions and typewriters. The earliest of these ECUs made use of uniselectors, relays, and switch control to cycle through the available choices illuminated by lightbulbs. The similarities between this and a Jamieson’s Electrodart machine make me wonder if Reg or Derek ever played one at a fun-fair and took inspiration.

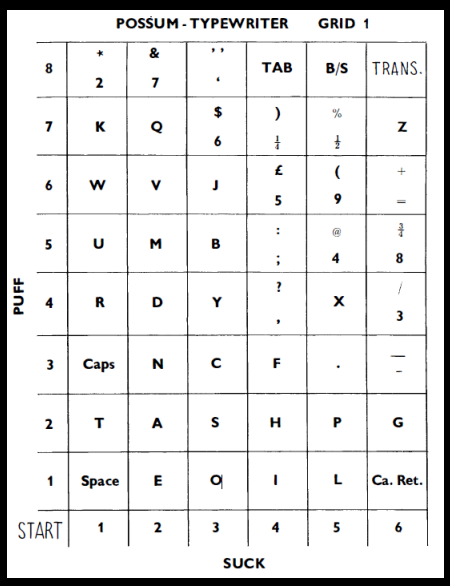
Reg and Derek’s experiments were so successful that upon demonstration to Sir Ludwig Guttmann in the Occupational Therapy Department his vital approval for further development was given. Funding was found from the Polio Research Fund and work continued in earnest. A small team grew to include Joy Wakefield and Roger Jefcoate who would undertake much of the early assessment work.

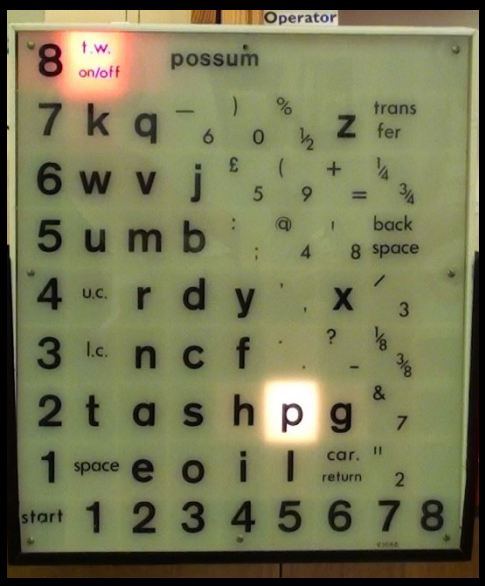
POSM transformed into Possum Controls Limited as a self-contained business moving out from the hospital Electro-Mechanical Laboratory into their own premises, secured at “mates’ rates”.

In 1966 pivotal to their ultimate survival Possum were awarded an NHS contract by the Ministry of Health. This was to supply their systems and support free at the point of need (with some conditions) to patients around the UK.

One of the most powerful Possum accessories was the Type Writer Control System (TWC). One or more switches were enough to scan and select from a grid of letters and symbols to print out via an electric typewriter. Row then column selection was much like picking a square in Chess. Here, a single switch was enough to converse, to convey ideas, wants and needs. And play crosswords.

Some users memorised the grid, often out of necessity if unable to reliably look at the card. Others would use an animated box of lights, transferring between the smaller ECU box and the TWC as needed. Bespoke methods of control were developed to match each user's needs, including a four-switch sip-puff device and "Word Store" system enabling much faster typing speeds for some.





Throughout, Reg and his team travelled the world to promote the benefits of the Possum systems. Often Reg would fly small borrowed planes, not always getting full air clearance en route. He was said to have caused a diplomatic incident in Israel on one support flight, being buzzed and escorted by their military jets. Alternatively, he'd squeeze Possum gear into his MG sports car to take where needed. Safer that way.

In 1968 the Possum User Association (now The Sequal Trust) was formed by Elizabeth Beeston, the head OT at Southport Spinal Injuries hospital and Roger Jefcoate. The PUA was a support group and magazine set-up to support and empower Possum users. Most importantly it was run by Possum users themselves. Rebranded "Possibility" in 1969 it had subscribers across Europe, Scandinavia, Israel, North America, Canada, Singapore, Australia and New Zealand.

Possum users blazed a trail with their enabling technology. Dick Boydell programmed computers at Ford in the early '70s. Hilary Pole MBE, described in newspapers as the most disabled person in the world, had poems published. Joy Wakefield's "Sequal 25 Years" booklet details many more life affirming stories.

Reg was ousted from Possum in 1973, after disagreements with the trustees, and Sir Ludwig Guttman. In solidarity and protest key members of the team left too. Despite this, by 1974 the National Health Service had supported over 500 POSM installations around the UK enabling many people to live more independent and enriched lives. An entire industry formed, inspired by the original POSM devices as can be seen in “Aids for the Severely Handicapped” by Keith Copeland. This 1974 book features a dozen or so different environmental control and AAC (Augmentative and Alternative Communication) systems.

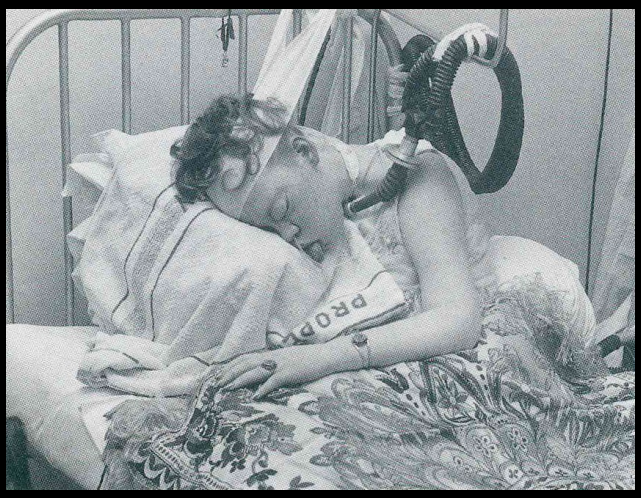
Rival companies brought innovations of their own to the field as with Essex based Zambette Electronics’s System 7 and 8. Options from Zambette included a proximity switch enabling non-touch control with minimal strength, toy control and reportedly a wall projected typewriter. Zambette would later be absorbed by Possum. From Reg and Derek’s early work, a cross pollination of ideas and practices were bursting into vivid life.

Reg went on to form Maling Rehabilitation Systems and later Telemachus which ran the UK’s first on-line disability information resource in 1979 using Prestel. He also gave advice on the cutting-edge MAVIS (Microprocessor Audio Visual Information System) project. Without an NHS contract, it was difficult for Reg to make as much of an impact, leaving him somewhat cast adrift.

Roger Jefcoate left Possum with Reg, going his separate way to form the Aidis Trust in 1975. This was perhaps the first charity to support people needing a wide range of electronic assistive technology. Roger also co-founded AbilityNet in 1997, to provide advice on making computer technology more accessible to all. AbilityNet, The Aidis Trust (now Everyone Can), Sequal and Possum all continue to make the world a better and fairer place for disabled people to this day.

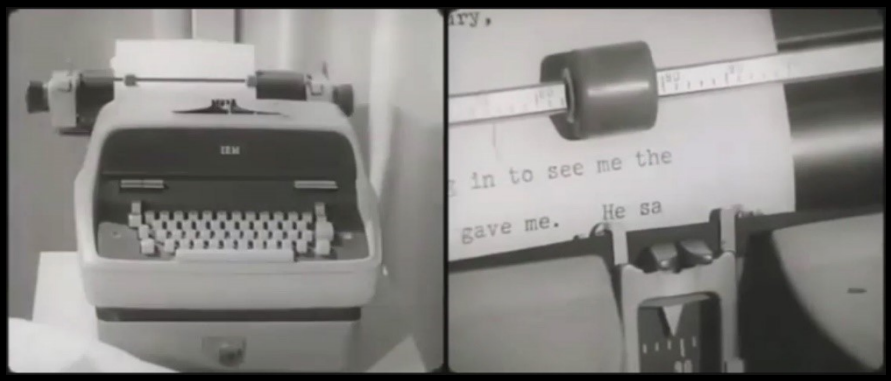
“Our work has received tremendous assistance from a wide range of individuals, firms and corporate bodies. But it is to the severely disabled themselves that the major thanks must go; it was their courage in adversity which provided the determination to start and continue the project... I remember one lady who had literally only a flicker of movement in one toe. She went on to write a beautiful book of poems – it was quite extraordinary... We made a difference."

Reg Maling

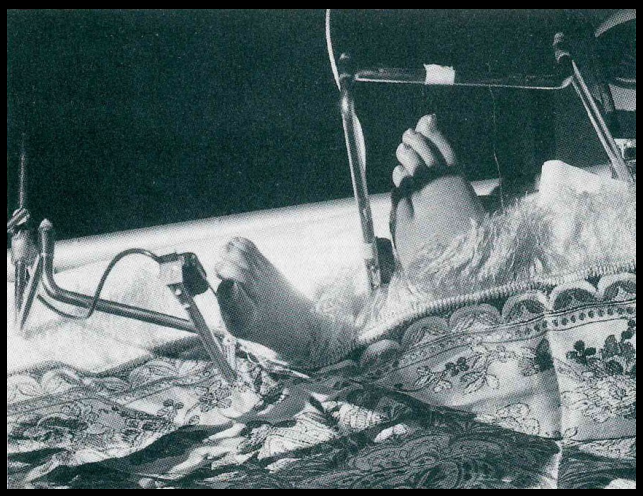


My World

I have a world that's mine alone,
A world where no-one else can roam,
Of books I've read and plays I've seen,
An opera, a ballet theme;
Of roads I've walked and hills I've climbed,
Woods and fields stored in mind.
So if at night I cannot sleep,
I do not end up counting sheep,
Instead I think of days gone by,
Of picnics 'neath a clear blue sky,



The thrill of watching unawares
A pair of boxing, mad March hares.
I wander down Lapal Lane again,
I find a nest, I see a wren,
The fields are full of ripening wheat,
The banks are white with meadow sweet.
And searching closer to the ground,
Bashful violets I have found.
I squelch along the bridle path
(thus awakening Mother's wrath),
I tear my coat, I cut my knee,
But there's a squirrel's drey to see.
The landscape blurs, light fades fast,
I smile, and fall asleep at last.



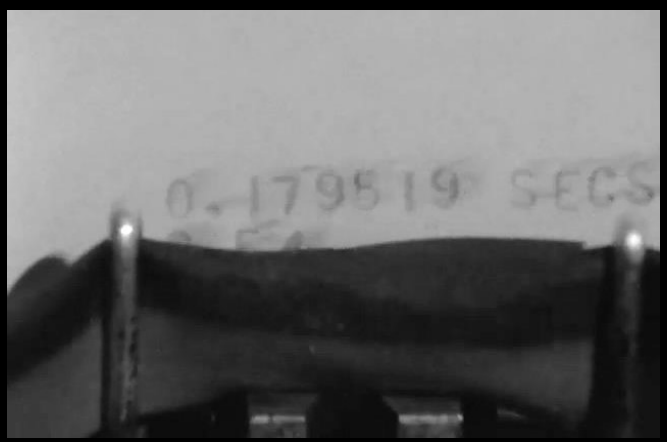
Hilary Pole

3. Reaction Tester (Forest Grammar School c.1969) National-Elliott 405

In 1965, the students and staff of Forest Grammar School in Winnersh, England were donated enough parts to build their first ever computer, a National-Elliott 405. The 405 was originally designed for accounting and statistics, cost around £200,000 in 1957 and weighed nearly six tons. It wasn't long before the children renamed their one "Nellie" and had it playing games.

Alongside invincible noughts and crosses was a one-button "Reaction Tester", the essence of which predates all games known to humanity. Wait for something to happen (a buzzer to stop) then react as fast as possible (by hitting a switch): Computerised slapsies with your time hammered out on a clattering teleprinter. That was when the machine was working. Nellie broke down roughly once every 12 hours. She broke down for the last time in 1971 and was sold as scrap.

Cause and Effect. PC simulation exists.



4. Remote Controlled Wall Games (Various c.1972 onwards) Coin-op

In the year that Magnavox brought television Tennis to homes, and Atari did the same for bars and arcades, there was a one-switch lower-tech alternative: Midway's Table Tennis. A huge 'Wall Game' played with remote control single button controls.

Remote Controlled Wall Games were aimed at bars and restaurants running out of space but wanting to bring coin-operated fun to their customers. The appeal for players was in not having to leave the comfort of the bar or table you were seated at, and a chance to perform in front of the public. The games were typically hung like large pictures on the wall or mounted on plinths.

In Midway's Table Tennis, the motion of the ball, the bats and game messages were all conveyed with light bulbs turning on or off in sequence. Each player held a one button wireless controller to serve or return the ball with. Mechanical scoring reels kept track of the left and right player scores.

Proceeding wall game themes included baseball, basketball, bowling, darts, football and shooting games. There was also the brilliantly named Electro Kennel Club, sadly nothing to do with night clubbing dogs. Of geek interest, the Gremlin wall games were amongst the very first arcade games to use Microprocessors. As for the games, if you can imagine a giant coin-operated Nintendo Game and Watch using light bulbs, with boxy one button remote controls, you're 90% there.

Very accurate timing skills needed. Trap Shoot simulation exists for Windows PCs.

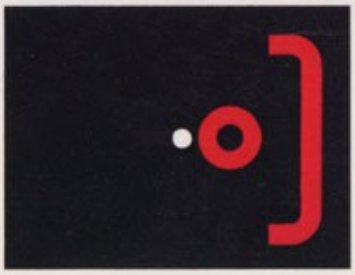
1973 Counter Attack by Sunbird: “a space invasion in our own galaxy!”

fooswall by Gremlin

Continuous two player action (or one player vs computer).

Player who best times his "kick" gains offensive ball drive.

Ball takes a neutral path after tied or missed kick.



Player defends when ball is immediately in front of goalie.

FOR THE PLAYER

1. Skill level selected by Pro/Amateur switch.
2. Deposit 2 coins for two player competition.
3. Deposit one coin to challenge the computer.
4. Audio and visual rewards for good kicks and goals. Hit sounds, flashing lights, crowd cheers, music.
5. Four periods of intense play against "the clock."
6. Overtime for tie scores (greater skill required).
7. Group interest...spectator enthusiasium.
8. Convenience of remote play.
9. For added realism better kicks produce more direct goal shots at greater ball speed.
10. Realistic ball deceleration. Successive passes accelerate the ball.

FOR THE OPERATOR

1. G-Scan® —Gremlin's exclusive new self-test sequence...ask for a demonstration.
2. Adjustable game duration— 1 to 3 minutes.
3. Electronic anti-cheat coin circuit.
4. Automatic advertising sequence.
5. Audio adjustments with volume control.
6. Programmable coin acceptor.
7. No floorspace required.
8. Gremlin's comprehensive service manual.
9. Unique solid state player control (full year warranty).
10. New display concept— provides high visibility.

Gremlin
The games people really play.

1976 Gremlin Fooswall Wallgame: "Not sure about those socks, mate".

Overleaf: Play Ball! (baseball), Duck Hunt (target shooting game), Golf Champ (pitch and putt) and Electro Kennel Club (greyhound racing). Two battery powered one-button remote control units.


MAJOR LEAGUE
PLAY BALL
FREE GAME
CASEY 23 CURVE CHANGE UP
LEFTY 18 SLIDER FAST BALL
HOME RUN!
play ball!
by Gremlin
The Wall Game With Challenge!
It's the most versatile, smoothest-action wall game -- completely programmable and maintenance-easy. Best of all, Play Ball draws players because of its true-to-life action, all by remote control! Pitcher can throw Fast Ball, Curve, Slider or Change Up. Batter scores points for Home Run, Triple, Double or Single. A Strike scores a point for the other team.
As player skills develop they can switch from Minor League to Major League, speeding up the action.
Play Ball provides a true contest of skill and stimulates interest and competition in both players and spectators.
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LAP 3
LAP 3
PLAY ELECTRO KENNEL CLUB
7
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START
Electro KENNEL CLUB...a sure bet to win!
Electro Kennel Club packs all the thrills of a greyhound dog race into an exciting, new electronic game by the makers of the famous Electro-Dart. At the first flash of They're OFF, players release their speedy canines to chase the mechanical rabbit.
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CHECK THESE FEATURES:
Completely electronic—even the scoring.
Maintenance-free—no moving parts to wear.
Solid-state reliability insures continuous game operation.
Fast installation—no complex wiring.
Wireless remote control via radio link.
Single plug-in circuit board replacement makes on-the-spot servicing a breeze.
Control unit can be placed anywhere, or may be hand held.
Silent operation—not even a click.
Occupies no floor space; takes only nine square feet of wall area.
Colorful, attractive appearance.
Two-player action adds competitive excitement.
Game requires skill and good coordination.
Appeals to young and old, men and women.
25c vend—accepts up to 9 quarters.
Has special appeal to "better places."
A smash hit wherever it's been installed.
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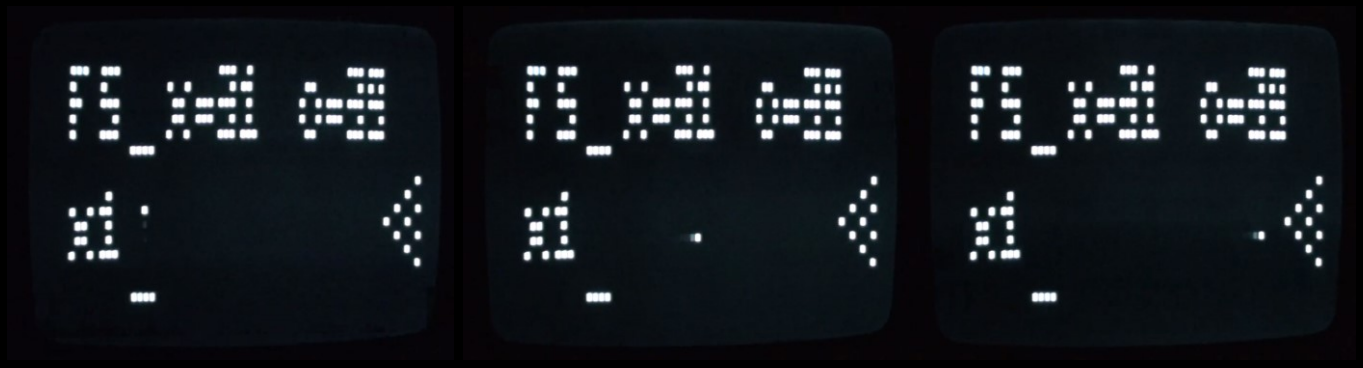
LEFT PLAYER
PLAYER SERVING PRESSES BUTTON TO START ACTION.
TO RETURN BALL, PRESS BUTTON AT PROPER TIME TO START PADDLE MOTION.
IMPROPER TIMING IS INDICATED ON SCORE GLASS.
TO START NEW GAME, WHEN CREDITS ARE PRESENT, PRESS BUTTON AT END OF GAME.


RIGHT PLAYER
PLAYER SERVING PRESSES BUTTON TO START ACTION.
TO RETURN BALL, PRESS BUTTON AT PROPER TIME TO START PADDLE MOTION.
IMPROPER TIMING IS INDICATED ON SCORE GLASS.
TO START NEW GAME, WHEN CREDITS ARE PRESENT, PRESS BUTTON AT END OF GAME.

5. FRED J. Weisbecker (1972 and 1974) FRED

The earliest home one-button video games were found on FRED “The Flexible Recreation and Education Device”. Bowling (1972) and Jackpot (1974).

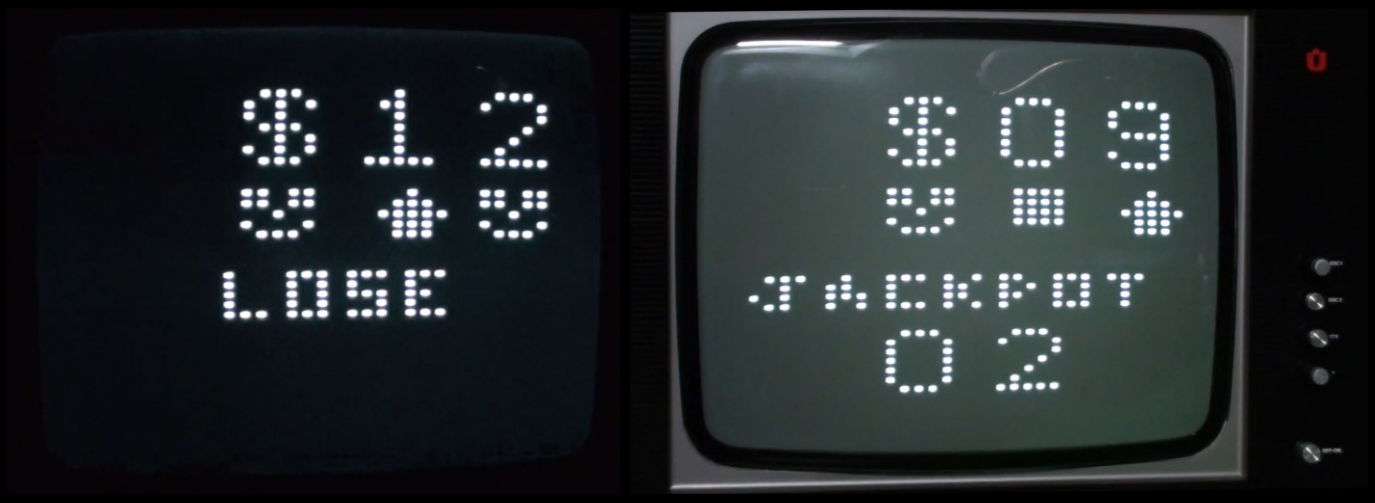
RCA engineer Joseph Weisbecker launched the FRED project in 1969 out of his own pocket. By 1972 with RCA onboard, FRED was a working template for a (more) friendly and affordable computer. It could display graphics on a standard TV in 16x64 or 32x32 resolution. The most refined version of FRED (pictured above) had a detachable 16-key keypad for user input, and a punch-card reader for inserting the likes of YES and NO communication cards. It could use a standard tape-recorder for loading software and for playing sounds. Recordings included sound effects, quiz questions and predictions for the future of computing.



Bowling was one of 18 initial programmes written to give a taste of computing to come. Joe Weisbecker squeezed a simplified but fun game of bowling into 1K of memory. Two players (X vs O) competed across five frames. One button control was facilitated by a pioneering aiming method. Each ball continuously moved from side to side before the foul line (somewhat drunkenly to make it less predictable). To throw the player would press any key on a 16-key hexadecimal keypad. When

the ball started rolling on-screen a short burst of real-life bowling ball alley sounds would sound from the cassette recorder.

Immediate beneficiaries of FRED included Joe's two daughters Jean and Joyce. It was Joyce who most fell in love with the system. In 1974 she wrote a one-button game of her own: **Jackpot**. Play was simple. Start with $10. $1 a play. Press a key to spin. Press again to stop each reel in turn. Match three for a win. Three different symbols for a small win. Nothing for a pair. Get to $50 to break the bank.

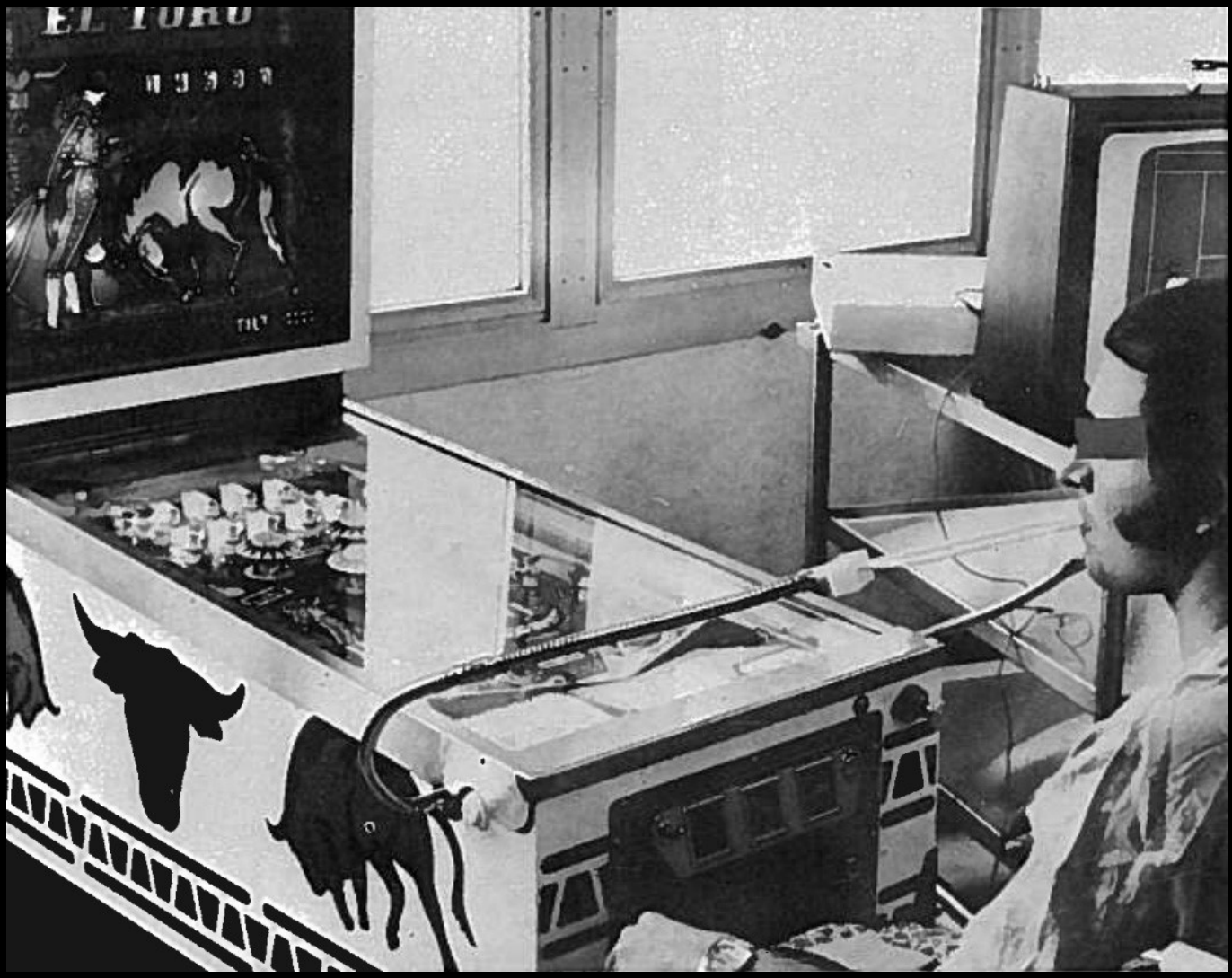


FRED had huge aspirations. The manual mentions the concept of "smart TV" with the system being integrated into consumer televisions a possibility for the future.

Once RCA managed to shrink the core circuitry down to a chip or two, notably the RCA 1802, affordable computing projects started to seem realistic. A prototype coin-operated video game system, the FREDOTRONIC, with interchangeable games was dabbled with. Kit computers were sold for hobbyist and educational use. Later the RCA Studio II game console would be released.

Of note, Joyce Weisbecker was paid in 1976 to write some games for the RCA Studio II. TV Schoolhouse I quiz, Speedway and Tag. With this, she became perhaps the first ever paid indie games programmer in history.

Bowling and Jackpot are low pressure games. Emulated in Emma 02.



6. El Toro (Veterans Administration Prosthetics Center 1973) custom

In New York in early 1973 the VAPC's Bioengineering Research Service were at the cutting edge of accessible gaming.

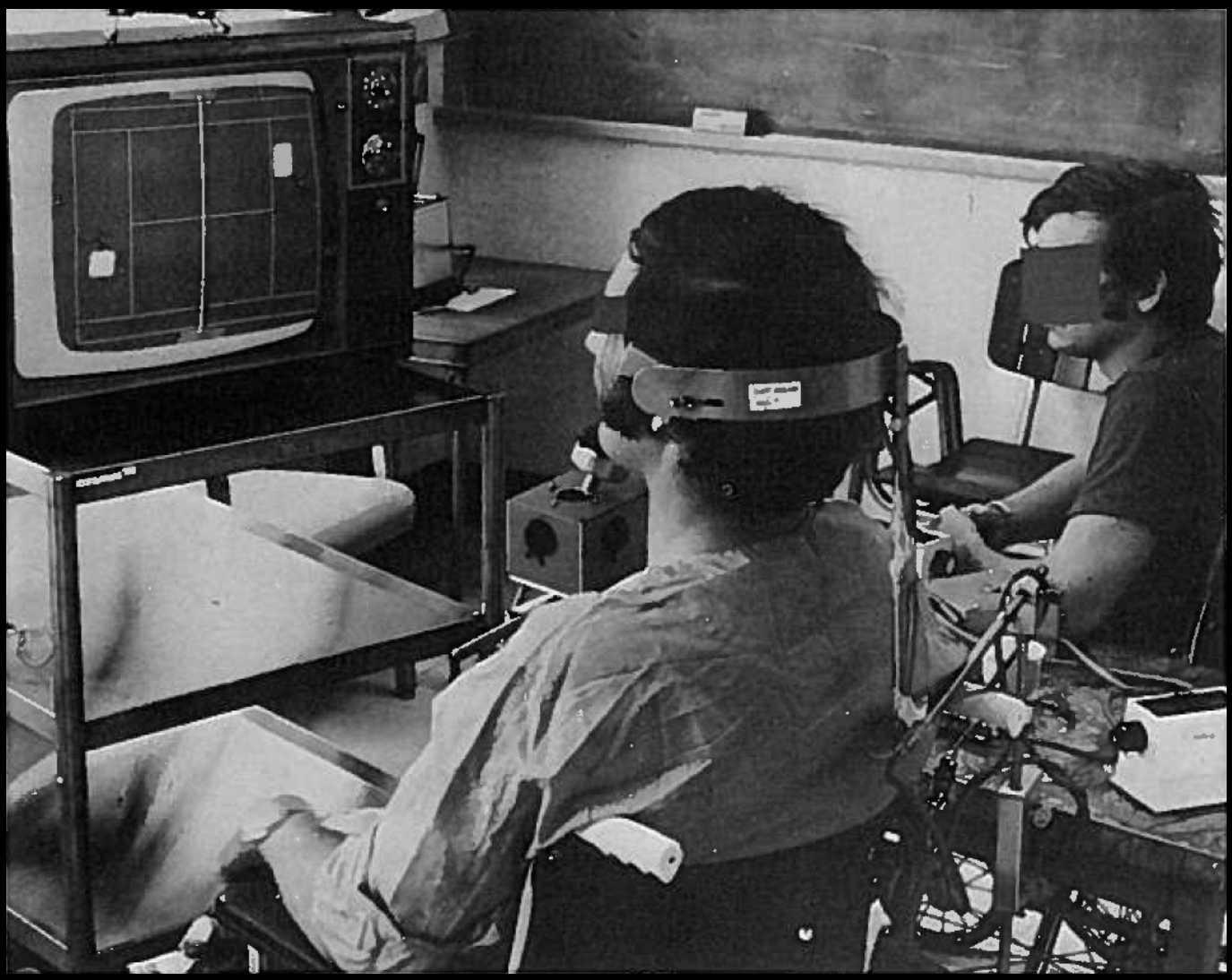
Seeking to find recreational activities to boost the independence and well-being of severely disabled war veterans, success was found in adapting some of the latest gaming technology of the day. The revolutionary Magnavox Odyssey "electronic game simulator for your television set" was picked for the lab treatment alongside Bally's bull-fighting themed pinball machine El Toro.

Most notably for the One Switch 100 was El Toro's facility to be completely controlled using sip and puff controls. With the ball in play, one puff could be set to trigger both flippers simultaneously enabling one-switch play.

Clinical Engineer Saleem Sheredos described a bright possible future for accessible leisure in the Spring 1973 Bulletin of Prosthetics Research: "Scrabble, Chess, back-gammon, roulette, cards, bowling games, sport games, model-making, painting, drawing, auto-driving simulators, labyrinth, model cars and trains, and flying model airplanes" were all mentioned. One day...

Fast reactions needed. Emulated in vPinball.

A Magnavox Odyssey Television Tennis game for chin control in use at the VA Hospital, Miami, Florida. This was also tested at the VA Hospital, Bronx, New York to a “highly enthusiastic” response. The programme was due to be expanded to provide more games to various Veterans Administration Hospitals throughout the USA.



“A closed circuit electronic playground” promotional photo and El Toro pintable full view.

7. Drop Zone 4 (Meadows Games 1975) Coin-op

The first commercial one-switch video game pioneered the game mechanic later used in Canyon Bomber, Air-Sea Battle, Air Attack and Blitz: Drop bombs from a plane that flies across the screen on autopilot. Paradoxically, it is also the first example of an anti-war video game.

Drop Zone game designer, David Main, actively involved in anti-war activities around the time, added a rule to the game that he unofficially dubbed the “Peace Option”. Normally the player would score 1, 2 or 4 points per ship hit depending on the difficulty of the shot. However, if a player dropped all 15 of their bombs without hitting a single “ship”, they would be awarded a bonus game.

David’s boss at Meadows was said to be horrified by this idea choosing to mask the pacifist route as “a special bonus for novice players”. However, it would take expert skills to ever achieve that peaceful option. In the follow up game, Bombs Away (1976), the abstract blocks evolved into recognisable ships. When hit, these sank to a watery grave making the moral choice all the clearer.

“All war represents a failure of diplomacy” – Tony Benn

drop zone 4

Single player ***action game***

- **Requires no tuning**
- **Two-pushbutton control**
- **Front access coin box**
- **Attractive multi-colored display**
- **A game of Skill**
- **1 year logic board warranty**
- **30 day Monitor warranty**
- **Complete front and rear accessibility**
- **Handsome vandal-resistant wood cabinet**
- **Progressively challenging**

Object of game; "Bomb Release" button is pressed to drop bombs from a moving jet to hit moving targets. Total of 15 bombs per game.

Player has optional HI/LO scoring for non-repeatable "game credit". 40 points = free game, 0 points = free game.

Scoring and misses are accompanied by visual and audio effects. The screen explodes with light and the explosion sound is varied in accordance with the value of the target hit. A miss gives a splash effect. The three differently colored target values are 1, 2, and 4 points.

The jet plane increases speed at 20 points and again after 30 points to test skill of player.

Distributed by:

MEADOWS GAMES, INC.
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Sunnyvale, Calif. 94086 ▪ (408) 732-8110

Steeplechase™

- Competition horse racing thrills
- 25¢ for every 2 players. Gives 75¢ vend potential
- 1 through 6 players
- 23″ monitor with six attention attracting color overlays, 1 for each horse and race lane
- Lighted buttons control jumps, match color of track lanes
- Realistic sound effects—bugle, galloping hoofbeats, cheering crowds
- Locking cash box, dual coin mech

ATARI
Innovative leisure

8. Steeplechase (Atari 1975) Coin-op

Up to six players could squeeze together to race rubbishly named horses in Atari's Steeplechase. Insert coin. Choose a horse. Wait for the off, then race down a virtual racecourse, hitting your switch to jump hurdles as accurately as you could. Stumble and your rivals would gain ground. Cheating by elbowing and jostling your rivals probably helped.

Steeplechase was one of many early Atari games trying to repeat the broad appeal of Pong with its easy to learn, difficult to master ethos. It didn't sell thousands but did show that one-switch video games could be sociable and fun.

Accurate tracking and timing needed. Start button needed. Emulated in DICE.

9. Shooting Gallery and TV Powww!

Bundled at launch in 1976 with the Fairchild Video Entertainment System was the first video game ROM cartridge: the multi-game 'Videocart-1'. Nestled between Noughts and Crosses, Doodle and (DJ voice) "great for parties" Quadra Doodle, was a one-switch game called Shooting Gallery.

Inspired by TV light gun games of the age where you shot a moving white square, Shooting Gallery reduced the controls down to the trigger alone. The instructions read: "Electronic rifle versus dead ducks. Rifle repositions [on the left side] after every shot". The deceased ducks appear on the right-side of the screen, ever looping from top to bottom, and changing position after each hit.

Fairchild boosted one-button accessibility further by offering a range of game variations. You can adjust the speed of the game, and additionally the time you are given to hold back the zombie-duck apocalypse.

In 1978, a voice activated version of Shooting Gallery would find fame in the kids' television show "TV Powww!" syndicated across the USA and beyond. Shouty, violent, laggy and running the risk of public humiliation, for many this was a glimpse into the dark side of on-line gaming to come.


TV POWWW
481-2200
12345


04


CLUBHOUSE
POW


01 00:10 04


EVENING


Tv POWww!
08 00:00

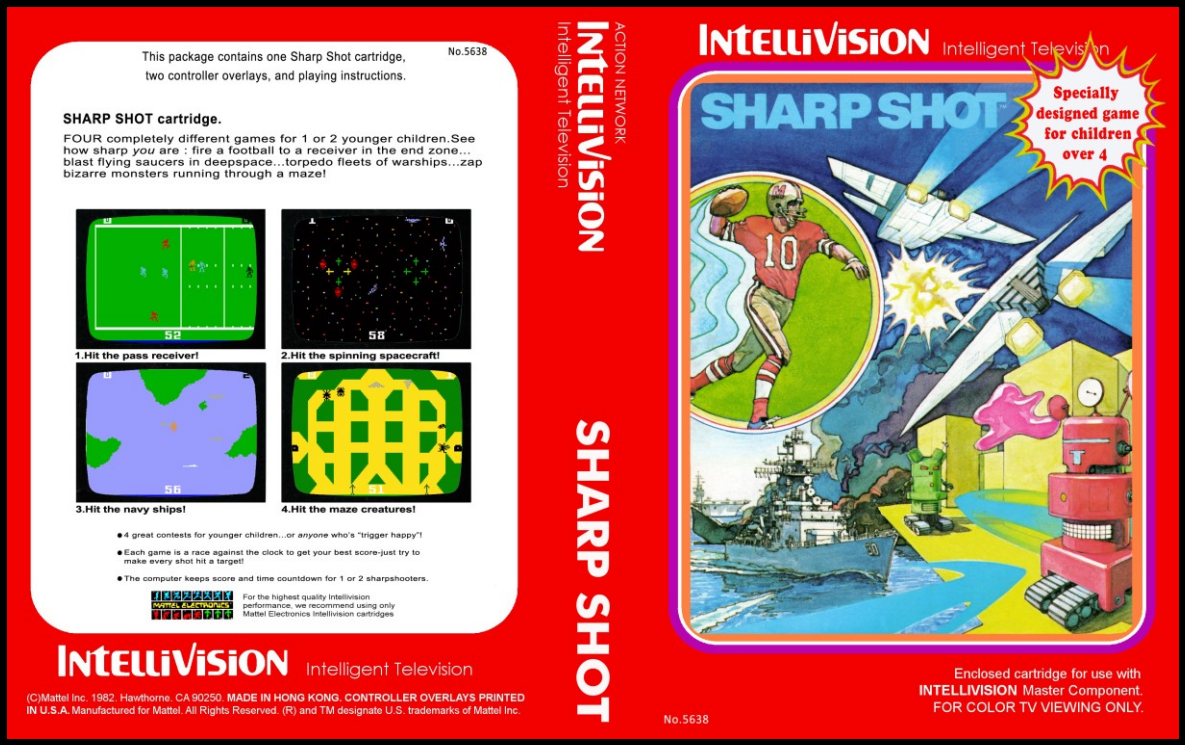
Dependant on the channel, lucky callers would get 15 to 30 seconds to score as high as they could by shouting “Pow” or “Pix” down their telephones. Scoring well was rewarded with better prizes. Versions were adopted across the USA, South America, Italy and Australia.

As a side note, this wasn’t the dawn of televised video gaming. The children’s programme Crack-a-jack in the UK featured regular head to head games of Pong games in 1975. In 1964 West Germany’s Der Goldene Schuss (The Golden Shot) featured a phone in television shooting gallery game, albeit with up, down, left, right human controlled aiming. In late ‘40s USA, the Dialling for Dollars lottery game show transferred from radio to TV. If called and you could recite a special password, you’d win that day’s prize. Cheap filler TV and hugely popular.

Around 1980 Mattel’s Intellivision console took over from rapidly ageing Fairchild Channel F and its chunky duck-shoot, bowling and baseball games. New games with better graphics included Jackpot a space shoot-em-up and US Football. Some of these inspired the release of the 4-in1 cart Sharp Shot in 1982, a mix of four timing-based target games.

With a slight lack of respect for the one-switch genre, these were marketed as for younger children. They also lacked speech control. Kids would have to wait for the likes of the BBC Micro “Micromike” found in UK Special Education settings before they could have fun using any “P” word they liked to play. There are a *lot* of rude words beginning with “P” in English, should you be that way inclined.

Timing skills beneficial. One-switch playable. Emulated in MESS.



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We're the games you play on your own TV set. We're the Atari Video Computer System™. (Remember "Pong™"? Well, that was just the beginning.)

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Atari features a greater selection (20 different Game Program™ cartridges, over 1300 game variations and options—and with many more to come!). We're sport games. We're mind games. We educate. We entertain. We can be played by one player (against the computer), two players, three or four.

We're the system that's especially designed to change colors to protect and safeguard your TV tube from any damage. We offer crisper colors (when played, of course, on a color TV). We pride ourselves in truer-to-life sound effects, which play through your own TV's sound system.

We're Atari. And if someone in your family hasn't asked for us yet, get ready. They're going to.

ATARI®

20 cartridges now available. 1300 game variations.

10. Canyon Bomber (Atari 1977 and 1978) Coin-op and Atari VCS

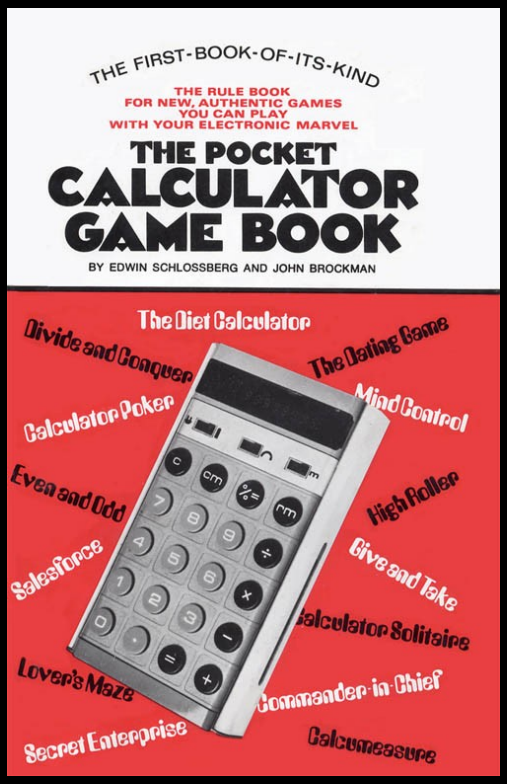
Atari's Canyon Bomber remains a massive challenge for anyone. Your aim: Clear a canyon by dropping bombs from auto-piloted blimps and planes. Fail to hit a boulder or to drop a bomb on a flyby, five times and its game over: Upside-down Breakout with gravity and one-button control.

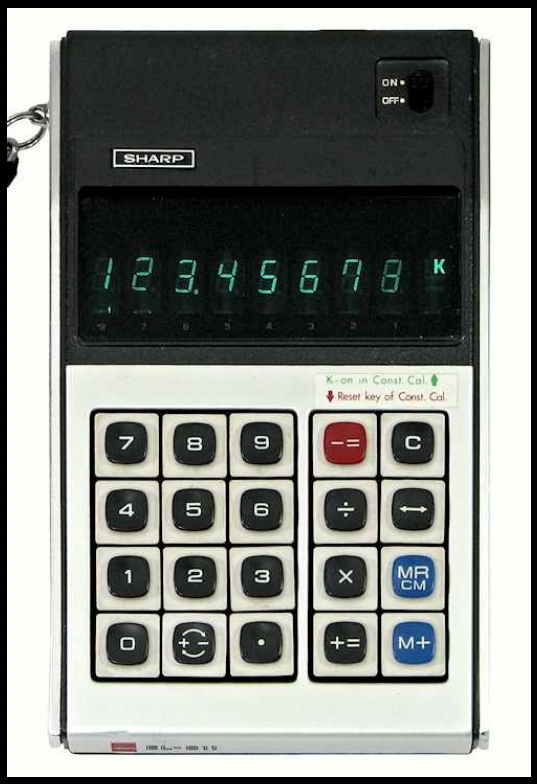
The limited release Atari VCS version featured easier play options and colour. Both home and arcade games would quickly be washed away in the digital wake of another Breakout inspired game: Space Invaders. It seems that people found saving the world from aliens a more exciting prospect than making a hole.

Accurate tracking and timing needed for high scores. Emulated.


Bombenkassen
mit Bubble Canyon
Bubble Canyon
THE END OF THE "BABY-KILLER."


CANYON BOMBER™
• Exciting new blimp and bi-plane bombing action
• Time-adjustable to 3, 4, 5 or 6 misses per game
• Extended bonus play reward as player skill increases
• 1 or 2 players
• Built-in self-test system
• Coinage options
• 4 video message language options
• 23" monitor
© ATARI, INC. 1977





11. Handheld One Button Gaming 1970-1980

Handheld electronic gaming took a giant leap with the advent of the battery powered calculator (1970) and digital watch (1972). Freed from the tethers of mains electricity and heavy Cathode Ray Tubes digital games could be played anywhere.

Pocket calculator gaming books and articles were commonplace throughout the seventies. Games were often enticingly named, such as “The Dating Game”, “Calculator Poker” and “Mind Control”. The reality more of a sinking disappointment. More fun would be had in trying to spell upside down words in numbers.

The most popular calculator game didn’t get a mention in game books. It was one switch playable and was discovered instinctively or by word of mouth: Add 1 repeatedly by mashing the “=” button in a race from 1 to 100. Set up the battle with 1+, 1++ or 1.0000001X. Variations included using any constant mathematical operation to reach a total. More destructively, it was common to try to burst the calculator’s memory limits, in a hollow victory of man over machine. The constraint was always to play within a time limit or boredom threshold.

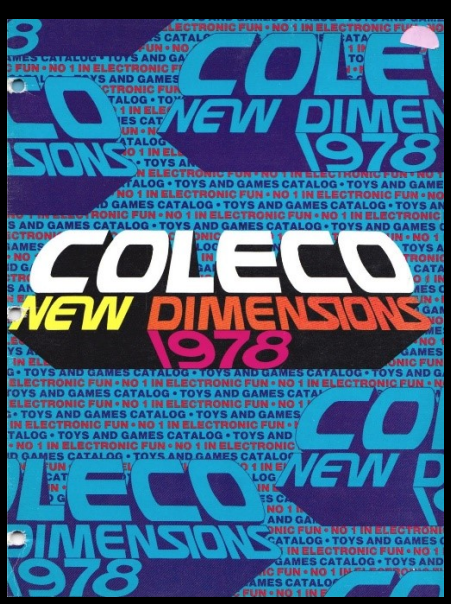
As calculators became increasingly affordable, head to head battles ensued. Some players would fall from the wayside immediately as not all had a recursive constant operation feature. Early sleepy solar powered calculators didn’t have a chance. LEDs were pitted against LCDs. Young against old. Expensive against cheap. “My

calculator's better than your calculator" taunts would ensue. It was a drag-race, normally when kids should have been concentrating on schoolwork.

More options arrived when Seiko pioneered the inclusion of a digital stopwatch in their 1975 Seiko 0634 wristwatch. With the ability to stop and start a timer, a variety of games were adapted to fit the new technology. Initially these would have been played only by the very rich, but the likes of Casio and Timex democratised the joy years later. Some of the games played were more mature than others. They included …

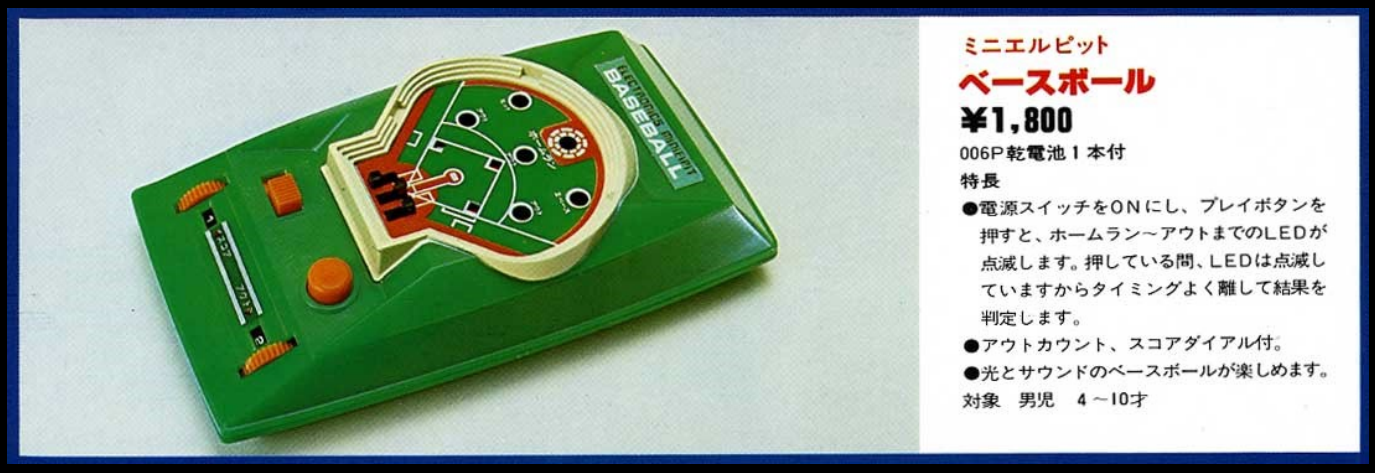
- Fastest time to start then stop the watch wins.
- Closest to stop on a specific time without looking wins.
- Longest held breath wins.
- Longest burp wins.

In 1976, Mattel developed Auto Race, the first highly successful all-electronic handheld game. Two years later Coleco released Zap! (or Zamm! In parts of Europe). A two player one-switch tug of war. Portable, playable in the dark and very noisy. Imagine a long car-drive with this as your accompaniment.



Between 1978 and 1980 toy giant Bandai developed at least 11 battery powered one-button electronic handheld games. All were designed for two players.

Game play was typically snakes and ladders on a theme. Players would take turns to roll a random LED light and beep sequence on the push of a button. When the light settled the player would adjust a reel or slider to add or subtract the highlighted score. First to an agreed point the winner.



First of these jumbo pocket games was roulette. Then Baseball, Soccer and Bowling. Games like these were the first taste of computerised entertainment a child might realistically hope to own. All riding on the crest of the Space Invaders craze. In 1979 The Electronic Generation had arrived.

Which micro-toy?

A seasonal evaluation, by David Tebbutt and the PCW "kids."

'Tis Christmas in the late 70s and living as we do in a rising tide of silicon, it's hardly surprising that this year our most festive of seasons brings with it new demands from the eager young recipients of our bountious generosity. "Dad, gimme one of those spaceship things that blows up aliens"... "Mum, I don't wanna boring old train set, I want to blast green meanies with phaser guns". To those of you living in the 'Scrabble-ised' backwood of children's home entertainment, beware, there may be a nasty surprise lurking under the counter of your local toyshop. This year, the electronics industry has struck at the very heart of our children's pleasure. You want to know more? (You should, because the kids certainly will). Then read on and stay one step ahead of this year's notes to Santa.

Whapp ... dringg ... whirr ... freep ... whoop, whoop, whoop — somehow things weren't turning out as planned! The idea had been to get twelve children (aged variously between four and thirteen years) to spend roughly ten minutes playing with each of twelve micro-controllable toys. The plan also suggested that we cull the testers' opinions at the end of the session — via a tape recorder — and also that each of them complete a simple questionnaire.

So much for the plan ... actually, the result was — er — chaos! Well, maybe not quite ... we did gather up eleven of the twelve children, twelve of the twelve toys and the questionnaires were, believe it or not, duly completed.

Big Trak: A tank which can be preprogrammed with details of direction, distance, pauses and the firing of 'phaser' guns.

Toys under test

Alphie: This looks like a robot and can play five tunes, set simple tests and be used in special board games.

Digital Derby: Race your way round a two-lane track without hitting other cars. A lap counter measures your performance.

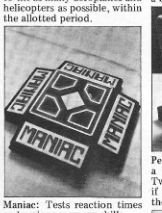
Amaze-A-Tron: This particular 'gizmo' challenges players to find their way round invisible mazes.

Electronic Battleships: Exactly what it says — an electronic version of the pencil and paper game, plus sound effects.

Photography by Ian Dobbie

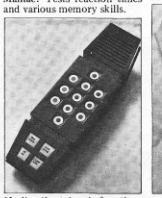
Hit and Missile: Fire rockets to hit as many aeroplanes and helicopters as possible, within the allotted period.

Super Marksman: An owl with a target painted on its stomach! The player fires a light gun and the owl hoots if a bullseye is scored.



Maniac: Tests reaction times and various memory skills.

Pegs: Several games based on a double-sided peg board. Two players insert pegs and if the holes chosen coincide then the device warbles.



Merlin: Contains six functions — noughts and crosses, plays music, blackjack, magic square, echo and mindbender.

UFO Masterblaster: Flying saucers descend towards the player's rocket launcher. They must be blown up before they land.

Simon: Based on the game 'Simple Simon Says' — the game tests a player's memory.

First impressions

Anyone with experience of young children will know how difficult it is keeping them amused for any length of time. Well, not any more, for the solution is at hand. Many of these toys and games hooked our young testers' attention so well we almost had to tear them away at the end of the day. Every child found at least one of the twelve units to be totally absorbing. The review lasted about three hours and, if it hadn't been for frantic parents ringing up in search of their offspring, they'd still be playing now.

The main attractions of the toys seemed to be their sounds and their intelligence. Most played merry tunes or blew raspberries, depending on the state of play. Some of the toys met with mixed success in their attempts to imitate the sounds of gunfire, shellfire, explosions, car crashes and owl hoots.

Mostly, the noises were fun — for a while, anyway! As for intelligence, well, if it's anything to go by, I know people who play noughts and crosses worse than Merlin. Perhaps THE indisputable benefit of micro toys is their infinite patience. They'll merrrily keep on playing the same game until the child tires (or the batteries run out). Compare this, dear parents, to being asked to play your fifteenth game of, say, Bulls and Cows.

The three most popular games were Digital Derby, Simon and Big Trak, the least popular being Pegs, UFO Masterblaster, Merlin and Maniac. By the end of the review, however, it had become clear that some of the more complicated games had not been given a fair test and so, the following weekend, we picked up where we had left off. On this occasion Battleships, Big Trak and Hit and Missile turned out to be the star attractions, while Pegs and Maniac remained unpopular.

Analysis

Alphie: A lovely little game for the very young, say up to six years old. The repertoire is limited but I understand extra quiz game cards are available from the makers.

Amaze-A-Tron: A game for older children — say from nine years old. Only one of our test group liked it, the others had a go but quickly lost interest. It was probably not visual enough.

Big Trak: A super toy this — universally liked. Dads also should have a great time with this one. It's extremely well-made, but one of the most expensive.

Digital Derby: This turned out to be an electromechanical toy — no micro, no electronics! Despite this it did prove popular during the first review but eventually it got overtaken by Hit and Missile.

Electronic Battleships: If your children like playing Battleships, they'll love this. A continual 'sonar' sound can be irritating, but the shells whining and the 'wumph' of explosions more than make up for this. Highly recommended, although rather more expensive than pencil and paper.

Hit and Missile: Mentioned earlier, this is also an electro-

Announced in the USA Bandai 1980 catalogue were Basketball, Football, Hockey, Space Shot, Moto Scrambler and Hot Rollers.

Very similar games from Sears and Tiger came out soon after. Tiger's unique feature was interchangeable overlays. Sky Capture and Gone Fishin' are one example of this 2-in-1 system.

Bandai put some heft behind this line of toys, advertising their Hulk and Spider-man games on US TV and in comics.


WOW! MY VERY OWN –
ELECTRONIC MARVELS!!
TV AS SEEN ON T.V.
Help SPIDER-MAN™ Rescue His Friend!
Help HULK™ Escape From His Enemies!
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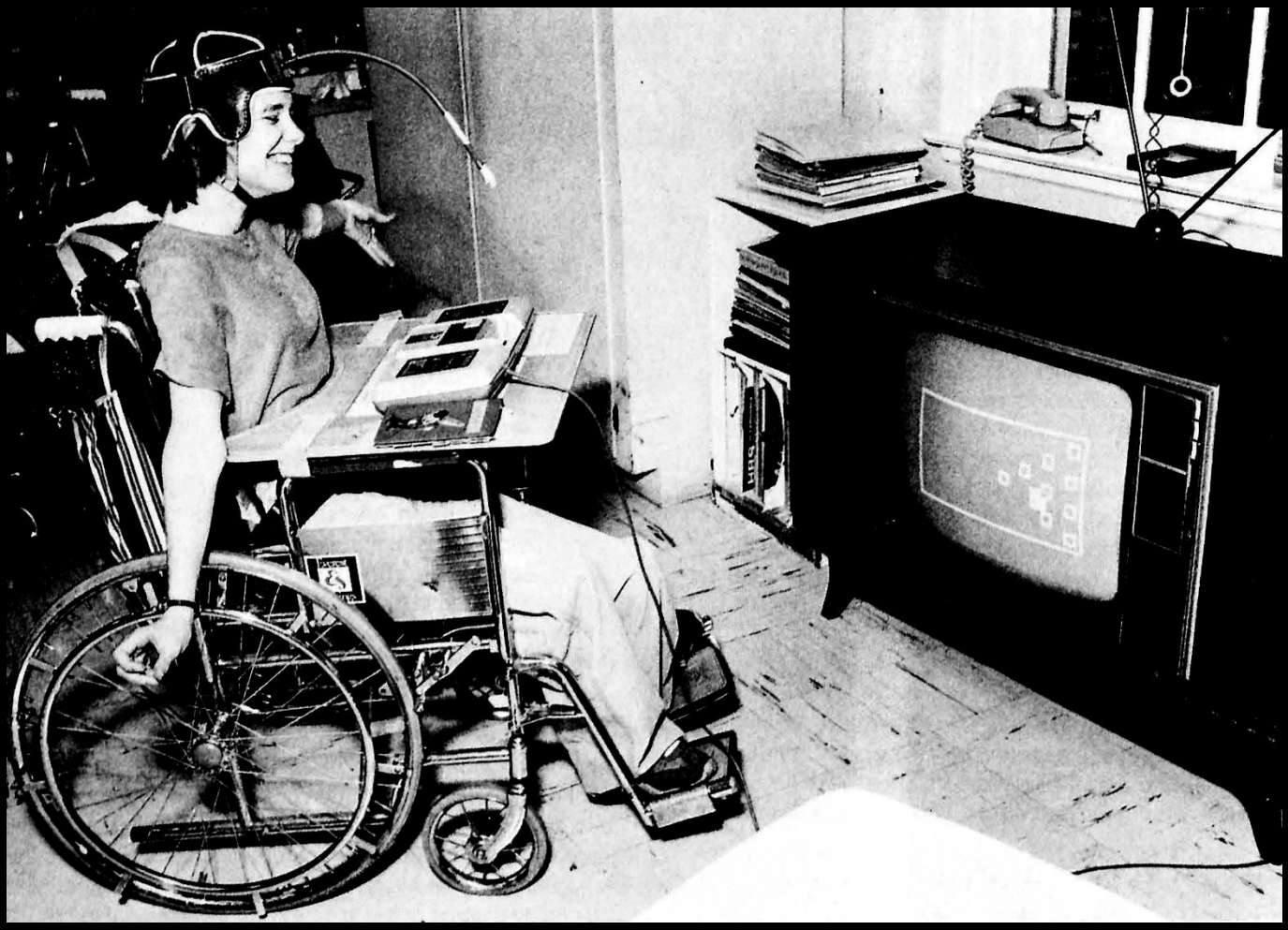
PLAY BUTTON
SPIDER MAN
RESCUE
PLAYER 1
PLAYER 2
HULK
ESCAPES
BANDAI AMERICA
Order from: Markline, P.O. Box 171, Belmont, MA 02178
ONLY $8.99 EACH
SEND TO: Markline
P.O. Box 171, Belmont, MA 02178
Yes, please rush me the following electronic game(s) with sound and flashing L.E.D.'s. Allow 4-6 weeks for delivery. Offer expires May 31, 1981.
Quantity
Spider-Man Rescue
Hulk Escapes
I have enclosed
Check in amount of
Money Order in amount of
Master Charge
Visa # Exp.Date
NAME
ADDRESS
CITY STATE ZIP



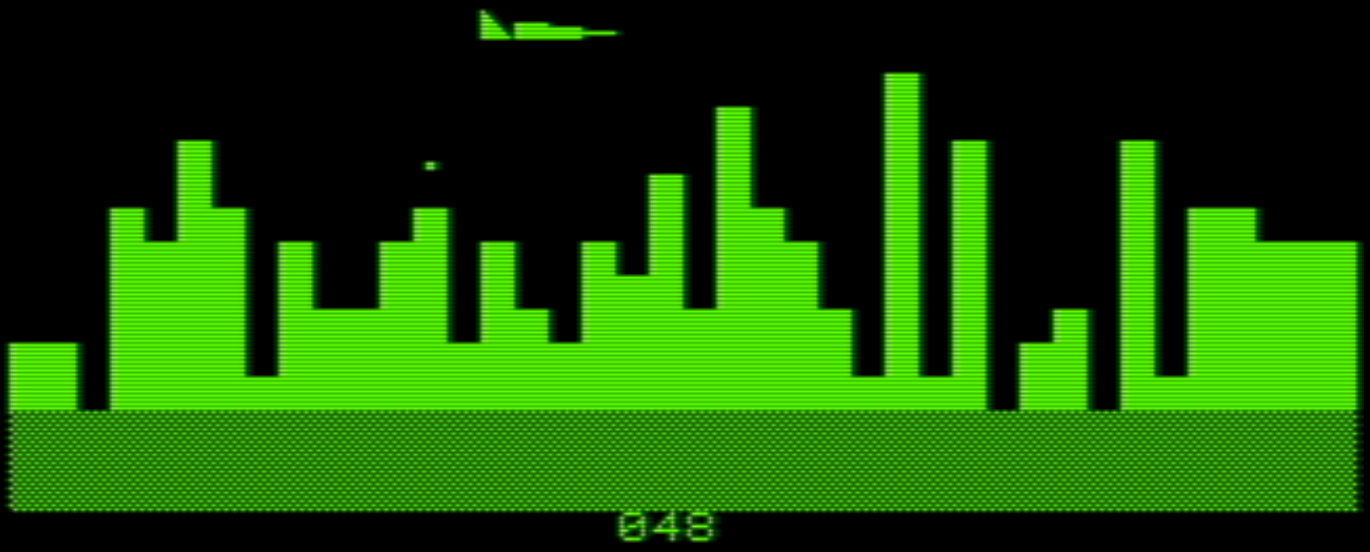
12. Bowling (FRED 1972, Bally 1973, RCA Studio II 1977, Fairchild 1978)

10-pin bowling computer games were amongst the earliest to be played in true "one-switch" style. As with POSM a switch is put within reach of any part of your body best suited to activate it. This could be via a large push-button switch on its own, a sound sensor, a head-wand…. Almost anything you can imagine.

Most cartridge games consoles of the 1970s had a bowling game. With most the ball would sweep constantly from side to side behind the foul line. Hitting a single button threw the ball in a straight line into the pins. Most excluded the misery inducing no-score gutters running down both sides of a lane.

In 1978 a hugely empowering adaptation for real world bowling arrived: Bumper Bowling. Special-education teacher Zena Sheinberg and her fiancé, Alex Wortman in Ann Arbor, Michigan saw the need. Sensing the frustration of a group of special needs students constantly bowling gutter-balls, the pair experimented with blocking the drains. Starting with long cardboard carpet tubing, people could at last reliably get a ball to the end of the lane and into the pins. The method developed to inflatable tubes and Phil Kinzer's rival bumper rails system. Business boomed and many tears were saved from children and adults alike. For those unable to throw a physical bowling ball, ramps and rare EM one-switch bowling machines would follow.

No rush to take shot. Aiming assistance (often) not needed.



13. Air Attack (Supersoft 1979) Commodore PET

This is not a one-switch terrorist simulator, but the premise seems eerie now.

"A plane crosses the screen from left to right, passing over New York and moving one line lower after each crossing... The object of the game is to demolish all of the buildings by dropping bombs so that the plane can be brought in to land at ground level - which at first will seem impossible! The game ends when the plane hits a building."

Surely your one switch control should be “veer off into the nearest river?” It’s “Bomb” though. I feel better by imagining that the city has been evacuated.

Back in 1979 you could get this game via the December edition of Personal Computer World, by typing it in, line by line, or buy an enhanced version on cassette with four-colour overlay for £3. Great if you had a B/W monitor, not so great with a green-screen monitor.

Significantly, you can start, play and restart Air Attack with the Space Bar. Making the game truly one-switch accessible would have then required a custom-built user interface and changes to the Air Attack code. The experimental spirit needed for this however was par for the course in the early days of home computing.

Highly accurate tracking and timing needed. Emulated in Retropie VICE.

PROGRAMS

```
200 N=0
210 IF LEFT$(A$,1)="*" THEN
    N=VAL(RIGHT$(A$,LEN
    (A$)-1)):RETURN
220 FOR I=1 TO LEN (A$)
230 A=ASC(MID$(A$,I,1))-48
240 N=16*N+A+7*(A>9)
250 NEXT:RETURN
```

FUN & GAMES

Air attack

by Peter Calver

A plane crosses the screen from left to right, passing over 'New York' and moving one line lower after each crossing. The plane has an inexhaustable supply of bombs, which are dropped by pressing the space key — however, there is a constraint in that a bomb may not be dropped until the previous bomb has exploded. This puts a high premium on accuracy. The object of the game is to demolish all of the 'buildings' by dropping bombs so that the plane can be brought in to land at ground level — which at first will seem impossible! The game ends when the plane hits a building — so to prolong the game and get a high score you must aim for the highest buildings. If you do succeed in landing the plane — and it's only been done once to my knowledge — the game restarts with your score carried over.

LISTINGS

If you have a PET with the new ROM, change PEEK(547) at line 370 to PEEK(166). An enhanced version of AIR ATTACK is available on cassette from SUPERSOFT at 28 Burwood Avenue, Eastcote, Pinner, Middlesex at a special price of £3 post free. This includes a four-coloured overlay which colours the buildings in layers thus adding a new dimension to PET games.

```
100 REM******  AIR ATTACK  *******
110 REM****  BY PETER CALVER  ****
120 POKE59468,12
130 SH=48:SD=48:SU=48
140 Y1$="▚▀▀▄▄_"
150 BK$="▮▮▮▮▮!"
160 SP$="■  "
170 PRINT"▒"
180 PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒";
190 PRINT"■          ▚ ■                                 ▚ ■        ";
200 PRINT"■ ▚ ■     ▚    ■        ▚  ■          ▚ ■    ▚  ■      ";
210 PRINT"▚  ■     ▚     ■        ▚  ■          ▚ ■    ▚   ■  ▚ ■  ";
220 PRINT"▚    ■  ▚      ■      ▚    ■        ▚    ■   ▚   ■  ▚ ■  ";
230 PRINT"▚    ■  ▚        ■      ▚    ■        ▚        ■  ▚    ";
240 PRINT"▚    ■ ▚         ■     ▚     ■   ▚             ■  ▚    ";
250 PRINT"▚                ■  ▚         ■  ▚            ■ ▚    ";
260 PRINT"▚                ■ ▚          ■ ▚                  ";
270 PRINT"▚                                                 ";
280 PO=32773
290 FORI=1TO3:PRINT"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒";:NEXT
300 POKE33746,SH:POKE33747,SD:POKE33748,SU
310 PRINT"▚";
320 FORI=1TO40:T=TI+8:GOSUB330:GOSUB390 :NEXT:LL=LL+1:GOTO320
330 PRINTBK$;SP$;Y1$;
340 PO=PO+1:IF(PEEK(PO)AND191)<>32THEN490
350 IFPO=33607THENLL=0:GOTO170
360 IFB1THENGOSUB410 :IFB1THENGOSUB410 :RETURN
370 IFPEEK(547)<>6THENRETURN
380 B1=1:I1=I+2+40*LL:P1=32808+I1:Q1=50000:F1%=1+4*RND(TI):RETURN
390 IFTI>TTHENRETURN
400 GOTO390
410 POKEQ1,32:K1=PEEK(P1)AND191:IFK1=32THEN450
420 IFK1<>160THENF1%=0
430 IFF1%=0THENGOSUB460 :B1=0:RETURN
440 F1%=F1%-1:SS=SS+1
450 POKEP1,46:Q1=P1:P1=P1+40:RETURN
460 SU=SU+SS:SS=0:IFSU<58THENPOKE33748,SU:RETURN
470 SU=SU-10:POKE33748,SU:SD=SD+1:IFSD<58THENPOKE33747,SD:RETURN
480 SD=SD-10:POKE33747,SD:SH=SH+1:POKE33746,SH:RETURN
490 PRINT"▒▒▒▒▒▒▒                    ▚GAME OVER
500 PRINT"▒             ▚PRESS ANY KEY TO RESTART
510 FORI=1TO200:NEXT
520 GETX$:IFX$<>""THEN520
530 GETX$:IFX$=""THEN530
540 RUN
```

Listing courtesy of Lion House.

Space Slalom

by Geoffey Salt and Steve Withers

This program, for Apple][, is written in Applesoft, and makes use of the low resolution colour graphics facility.

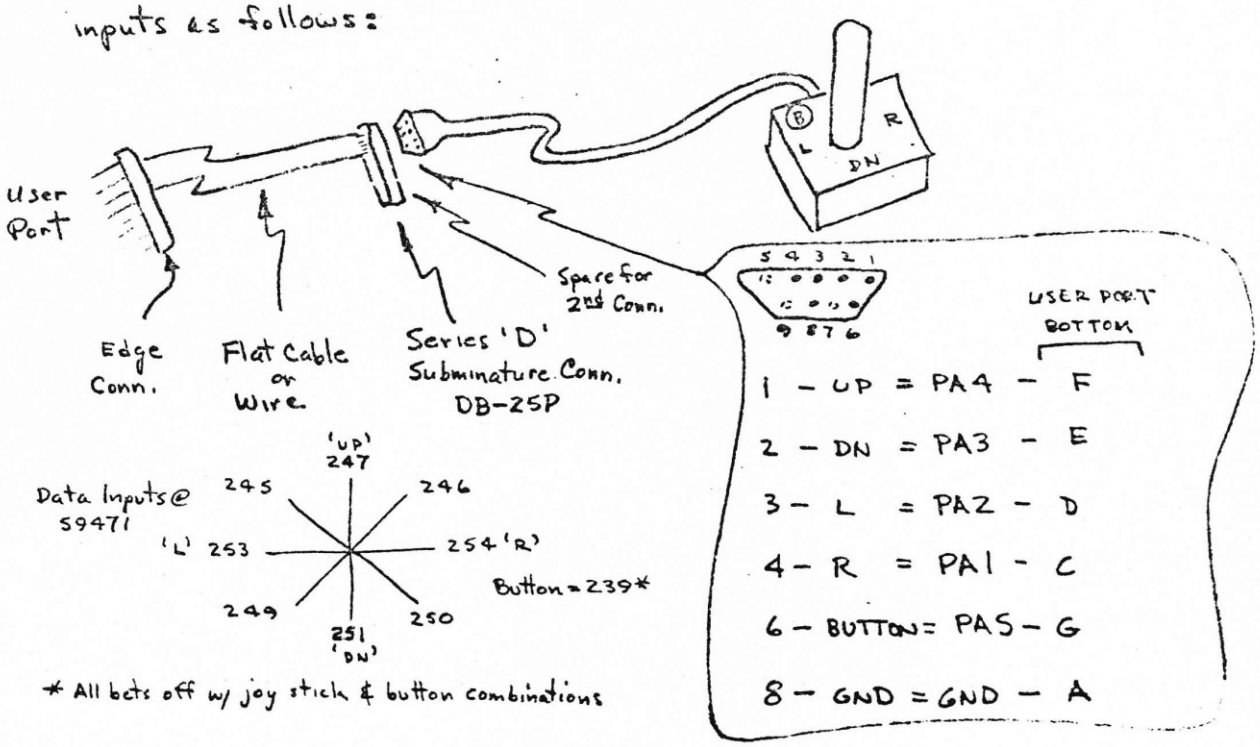
The object of the game is to get a spacecraft from the bottom of the screen to the space station at the top, without being hit by any of the asteroids, and without hitting the sides of the space station. You move the spacecraft using paddle 1. The program interprets its value in one of three ways: with the control fully anticlockwise the craft will step left; with it fully clockwise the carft will step right; with it central it will not move horizontally at all. In addition, if the pushbutton on Paddle 1 is pressed the craft will move up.

PCW is always on the lookout for original programs

December 1979 Personal Computer World (UK): Air Attack BASIC programme listing.

ATARI® JOY STICK INTERFACE

The joy stick furnished with the ATARI TV game provides simple contact closure for each of the four positions. Moving the stick at 45° produces two contact closures. Interfacing to the User's Port requires only connecting to the inputs as follows:



'BREAKOUT' PATCH - Delete or change

```
200 J = PEEK(59471): IF J=255 THEN PM=0: GOTO 220
205 IF J=253 THEN PM=-1
210 IF J=254 THEN PM=+1
220 PP = PP + PM  (No Change)
```

You Can Develop the Patch to have the Button Start a New Game

TEST PROGRAM - RUN 1000

```
1000 ? "[♡]" ← Screen Clear
1010 ? PEEK(59471)
1015 ? "[S]" ← Home
1020 GOTO 1010
```

George Milum
(415) 284-1856

(6)

4/24/78

1978 Method of connecting an Atari VCS joystick, aka 5 on/off switches, to a Commodore PET. The fire button and some modification to the BASIC code of Air Attack would make it a true one-switch game.

14. Team Play

Asteroids was never a one-switch game, you may think. Well it was to me and a group of other kids one evening in a 1980 UK holiday resort pub.

Two flashing start buttons drew us to a vacant Asteroids machine left in credit by some too bemused, too busy or too boozed player. It didn't seem fair that just one of us got to play the game, so we took one button each and played in hive-mind style. I recall the kid in charge of Hyper-Space made it a very quick game. Hyper-Space, aka The Suicide Button.

All too rapidly the start buttons ceased to flash, and with no 10p's between us, we were left to annoy the coin-return slot and "play" the demo.

In accessible gaming, this method of sharing controls between a team is invaluable. If at least one button does something fun or important, then there is a way. Atari recognised that this method could be enjoyable in their VCS version of Space Invaders. This included two-player partnership options. Games 97-112 had player one moving the turret left and right, and player two using one-switch to FIRE.

SPACE INVADERS*

		ONE-PLAYER														
Basic Game	A.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		TWO OPPOSING PLAYERS														
Alternating Turns	B.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Competing at Same Time	C.	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Competing at Same Time Alternating shots	D.	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
		TWO-PLAYER PARTNERSHIP GAME														
One Player Moves Right Other Player Moves Left	E.	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Alternating Firing & Control	F.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
One Player Moves Other Player Fires	G.	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
MOVING SHIELDS																	
ZIGZAGGING BOMBS																	
FAST BOMB																	
INVISIBLE INVADERS																	

*SPACE INVADERS is the trademark of Taito America Corp. 1980

Games 97-112: “Partnership” options in the massively popular Atari VCS Space Invaders (1980).

15. Pre 1981 Electronic Assistive Technology

Assistive Technology unifies humanity. It's something we have always used for both good and evil. Perhaps it started with the earliest humans finding a good strong stick to help them cross rough terrain. Perhaps in sharpening a big rock to bash a rival's brain in with. Good or bad, sharing, and refining knowledge got us to where we are today.

Handicapped, Invalid, Disabled, Person with Disabilities. Words are important. Where I use the term "disabled person" it is in the context of them being disabled by a barrier in their environment or society. The joy in Electronic Assistive Technology (EAT or AT for short) is that is seeks to remove these barriers. The aim: to boost independence giving better access to a fairer world.

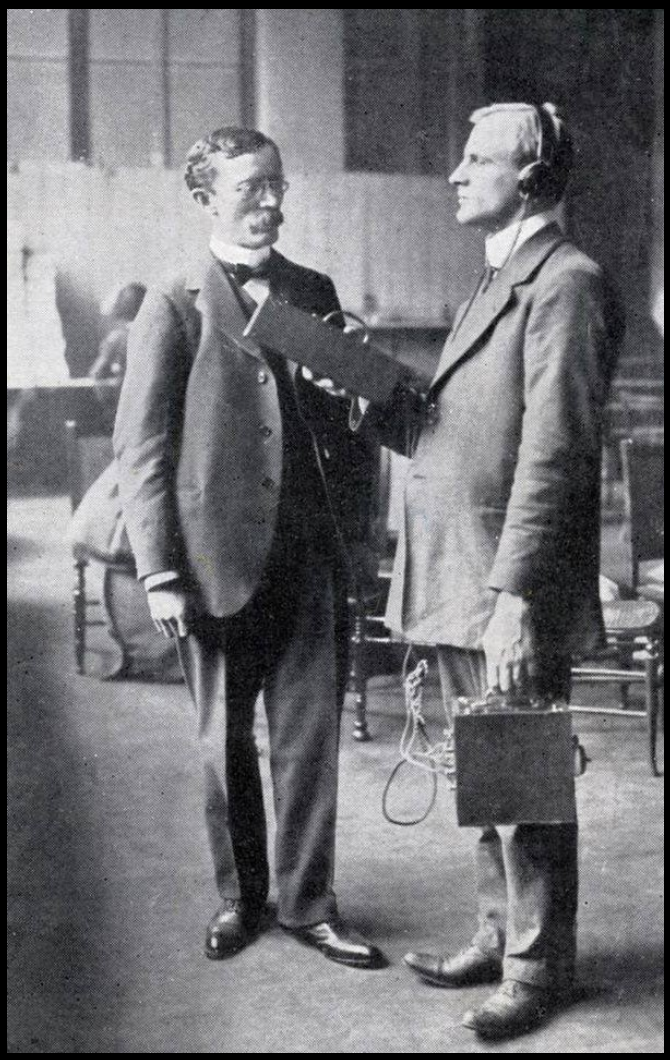
The following pages detail a lucky dip timeline of some Electronic Assistive Technology up until 1981: The United Nation's International Year of the Disabled. As a disclaimer, wherever I claim something is the first, that only means the first that I'm aware of. I could be wrong. I could be right. My apologies to all the under recognised inventors of the world.

1898: Following the ear trumpet and acoustic chair (!) came the first portable electronic hearing aid, the Aukophone. Inventor Miller Reese Hutchison would later go on to create the first electric car horn in 1908.

Pictured above from 1933 shows two dapper chaps on a train using their new-fangled "radio ears for the deaf". Possibly a pair of spivs up to no good.

1912: The Exploring Optophone. Invented by Dr. Edmund Edward Fournier D'Albe at the University of Birmingham in the UK. This handheld pointing device translated light to a graduated humming in a set of headphones, enabling the blind to hear the difference between light and darkness.

As written in his brilliant 1924 book The Moon-Element: “The blind are enabled to locate lamps in windows and other high lights and to trace the outlines of large, well defined-objects. The instrument makes the moonlight distinctly audible and sunlight a roaring noise”.



“I can hear the light”. The Travelling Optophone demonstrated at the 1912 Optical Convention of the United Kingdom at the Science Museum, London. Pictured above left, a blind man, listens to the sun. Pictured right, listening to a burning match held by Mr. Arthur Burrows (later to be the first person to read the news for the BBC). Fournier D’Albe is seen in both pictures wearing a bow-tie and serious expression.

Released to great acclaim and fascination, Edmund was brought crashingly down to Earth upon receiving a letter from blind solicitor Sir Washington Ranger: “The blind problem is not to find lights or windows, but how to earn your living.”, he wrote. The romance of hearing the sunrise was not enough.

This wake-up call galvanised Fournier D'Albe into developing his invention further. In 1913 he unveiled a Text Reading Optophone prototype. By 1914, two months before the Great War, Fournier D'Albe had a machine that could enable users to read from books and newspapers. At a time when only one in ten thousand books were translated to braille, the Optophone made them all possible to read.

In use, a book would be placed on a glass plate. The operator would use a handle to manually trace across each letter. Letters were scanned as a pillar of 8 divisions expressed as musical tones through a telephone headset. A full stop would sound a single low note. The letter I, a chord, like one blown on a mouth-organ. The diagonally shaped letter, V a descending and rising tune. A sound alphabet said to be similar in effort to learn as Morse Code.

Although the average speed of blind readers was typically under 5 words per minute, one or two experts could manage up to 60. Such a person was Mary Jameson seen above in 1921 who helped refine the Optaphone's usability and greatly boosted its reputation through numerous public demonstrations.

These typically consisted of a user reading from randomly selected text from impressively large books such as the Bible and Dante's Inferno. In July 1920, a demonstration was given to the King and Queen "who listened to the melody provided by a chapter of the Bible being passed over by the instrument". Earlier that year a group of academics heard Mary read aloud "Will Women Want to Vote? Wait and See."

1919: The RNIB (Royal National Institute for the Blind) starts research into creating talking books for the blind. “Thousands of soldiers lost their sight on the First World War battlefields. They returned to Britain no longer able to read and not all of them had been able to learn braille. Some found the language too difficult, while others had injured their hands making it impossible to read with their fingers. Without state compensation, it was up to RNIB to find another way for them to read books.” - From the RNIB’s “How Talking Books Were Born”.

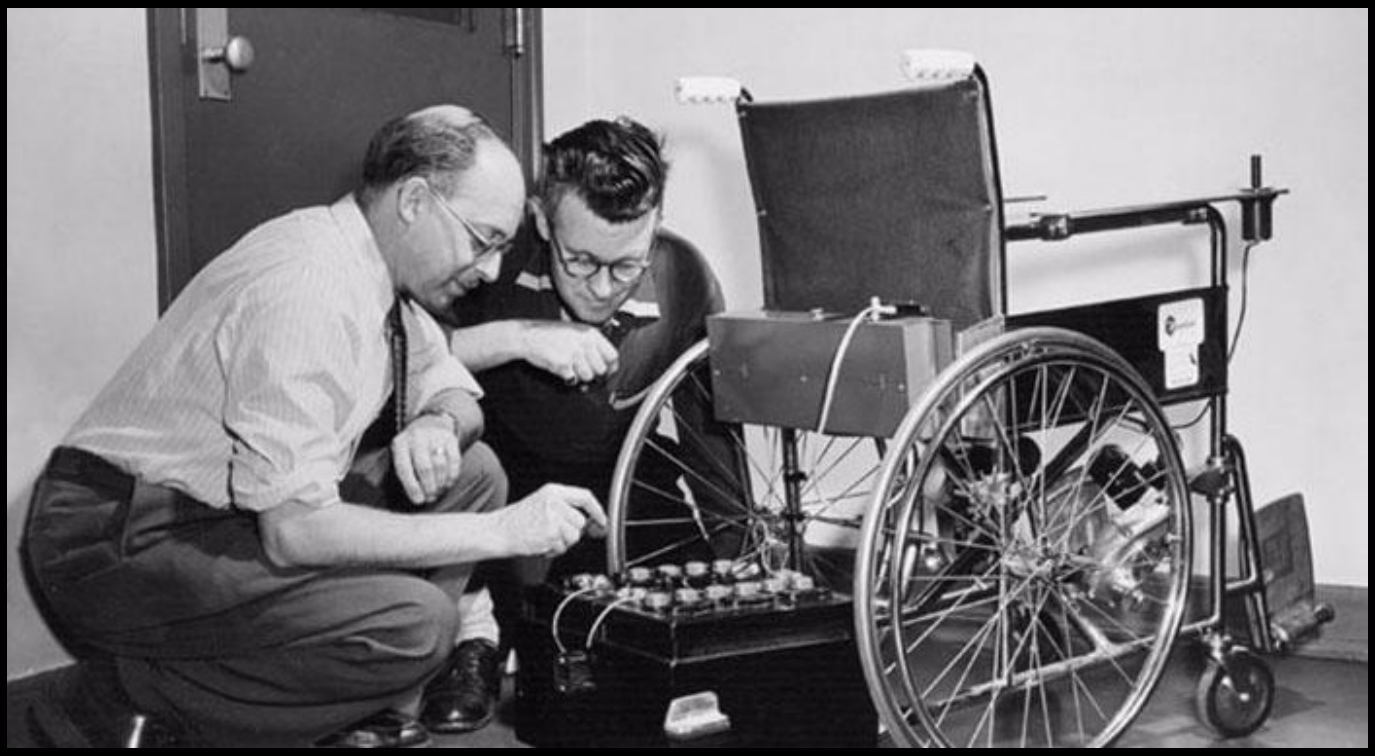
1928: Radio On: The American Foundation for the Blind distributes radios to help blind people gain easier access to news and entertainment. In 1928 you may have been listening to Ravel’s Bolero, Bertolt Brecht’s Mack the Knife and I Scream, You Scream, We all Scream for Ice Cream.

1934: “Books for the Adult Blind Project” is launched in America pre-empting the RNIB by a year. The first talking books in the USA included excerpts from the Bible, contributions from deaf-blind activist Helen Keller and a short story with a twist by O. Henry. In 1935 the RNIB released their format of 24 rpm 12” records. These included part of the Bible, an Agatha Christie murder mystery and a Joseph Conrad yarn, Typhoon, pitting man and machine against the fury of the seas.

Much of Typhoon is set in pitch blackness towards the eye of a terrifying storm. Many passages dealing with individual fear and courage battling against the odds must have struck a vibrant chord with the intended audience.

1949: The Garod Telezoom. A one button TV remote that toggled between a standard or zoomed in view. The Pittsburgh Post Gazette painted the benefits of this innovation as including being able to admire attractive women in more detail.

1950: Electric wheelchairs. George J Klein (pictured below left) developed the first practical electric wheelchair for veterans of World War II at the National Research Council of Canada labs in Ottawa. “It was wonderful to have been at the lab because it was fun. Serious fun.”



1952: “Man’s Breath Runs Typewriter. [Armenian American Emik Avakian] uses a complex code, four microphones and electronic impulses to type without hands”. Profiled in the 1st of December 1952 LIFE magazine, Emik’s story as an ingenious man with Cerebral Palsy was syndicated across the USA and beyond. Alongside the adapted typewriter a range of his other inventions were showcased. This included a a system of knee and foot operated buttons used to operate a tape recorder, radio, TV, electric razor, and lights.

TYPING WITHOUT HANDS

Sirs:

I was delighted to read your story, "Man's Breath Runs Typewriter" (LIFE, Dec. 1).

Two months ago Emik invited me to be the first cerebral palsy victim besides himself to operate his typewriter. My physical limitations are quite similar to his.

At first glance the weird assortment of tubes, wires and boxes led me to believe that Emik's invention would be very hard to operate. To my amazement within 20 minutes I was typing without error. Since I have good control of my feet, I discovered that the push-button method was easier for me than the microphone system. I experienced a real feeling of independence.

GIL S. JOEL

Mount Vernon, N.Y.

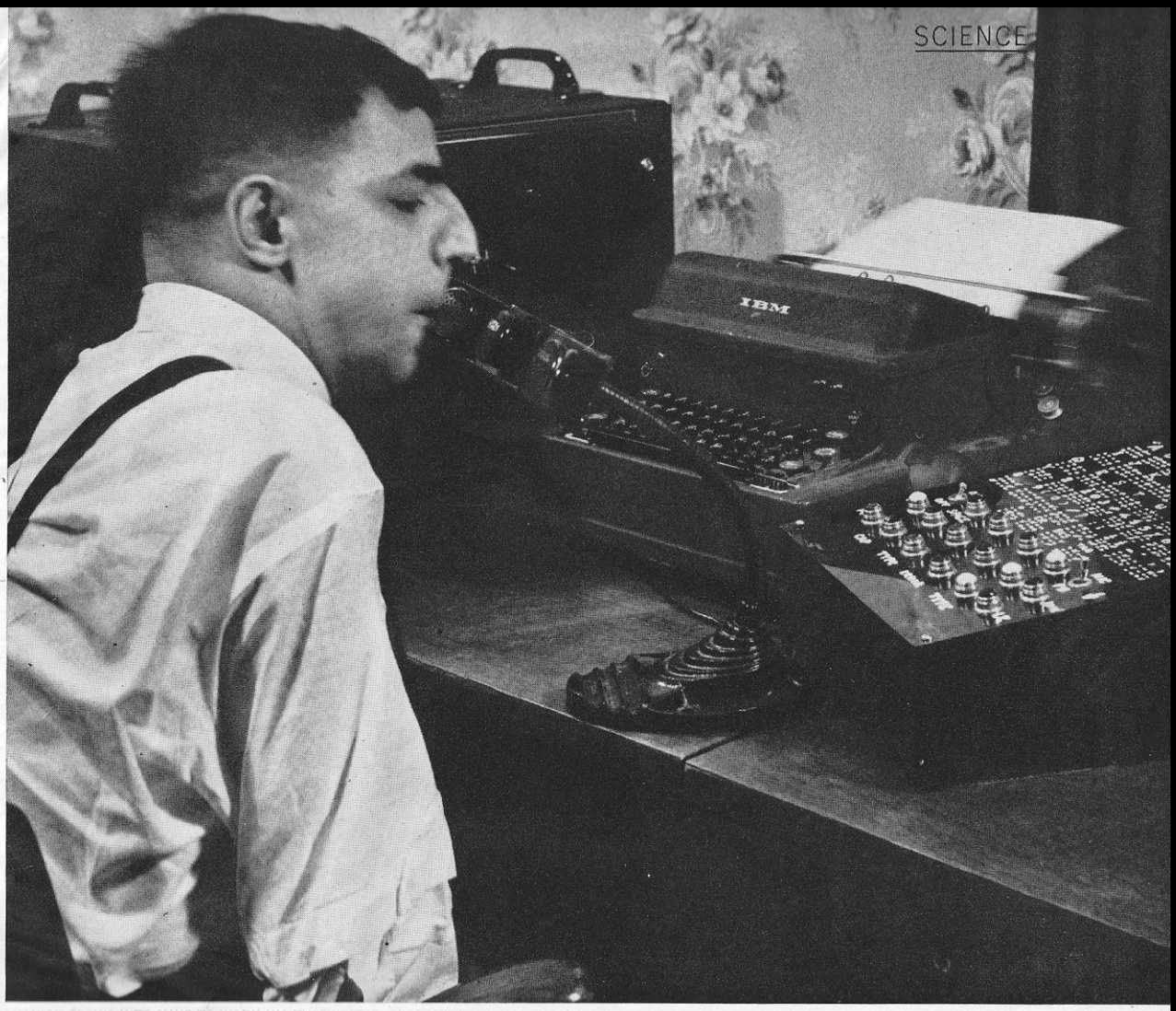
Sirs:

During 1949 I contracted polio and spent eight months in a hospital. Emik Avakian was in the same ward with me. His daily words of encouragement helped me orient myself both physically and psychologically.

Emik had already perfected a typewriter idea in his mind. I helped him put some of his notes on paper by typing while he dictated and other patients also assisted.

WILLIAM E. TALLON

Glens Falls, N.Y.



AVAKIAN BLOWS INTO MIKE TO WORK HIS TYPEWRITER. ELECTRIC IMPULSES FROM MIKE GO THROUGH CONTROL BOX (RIGHT) AND ELECTRONIC BRAIN (LEFT)

MAN'S BREATH RUNS TYPEWRITER

Palsied inventor uses a complex code, four microphones and electronic impulses to type without hands

Emik Avakian, a 28-year-old suburbanite New Yorker, is an M.A. from Columbia, electronics consultant for International Business Machines Corp. and an inventor. But he is also a victim of cerebral palsy and thus his remarkably active brain has at its command only halting speech, and almost useless arms and legs. In going through school Avakian had to rely on dictating to typists who could barely understand him to put his thoughts on paper. Now he has perfected a typewriter (*above*) which he can operate by sound of his breath blown into four microphones. It is slow but it is more accurate and much cheaper than hiring typists.

Avakian's typing machine utilizes an I.B.M. electric typewriter, to which is attached an ingenious junior-size electronic brain. Avakian uses a code (diagram at right) based on blowing four times into one or more of the mikes. The sequence in which Avakian blows is translated by the brain into a letter which the typewriter then prints. A director of the Cerebral Palsy Foundation thinks the machine would have great value to the seriously paralyzed or disabled, and Avakian estimates it could be marketed for about $550. Avakian now thinks that if he can teach himself to make two different brain waves at will, he could use the electrical impulses these waves produce to run his typewriter with lightning speed.

a 3344	A 3341	k 2322	K 2321	u 2344	U 2341	6 2134	¢ 2131
b 2422	B 2421	l 4344	L 4341	v 3422	V 3421	7 3134	& 3131
c 2232	C 2231	m 2122	M 2121	w 4122	W 4121	8 4412	* 4411
d 2112	D 2111	n 3222	N 3221	x 3212	X 3211	9 4112	(4111
e 2222	E 2221	o 3322	O 3321	y 3122	Y 3121	0 3412	) 3411
f 4434	F 4431	p 4212	P 4211	z 4312	Z 4311	/ 4134	? 4131
g 4244	G 4241	q 3434	Q 3431	2 3112	@ 3111	, 2434	: 2431
h 2212	H 2211	r 2244	R 2241	3 4234	# 4231	' 4144	" 4141
i 4422	I 4421	s 4222	S 4221	4 4334	$ 4331	- 2312	— 2311
j 3312	J 3311	t 3334	T 3331	5 2334	% 2331	. 3144	. 3244
BACK SPACE 4322		TABULAR 2411		CARRIAGE RETURN 2144		SPACER 1000	

FOUR-NUMBER CODE (in black) shows how each letter (in red) is typed. For example, to type small "a," blow into the third mike twice and then into the fourth twice. First three puffs set up the letter, last puff types it. If last puff is into the second or fourth mike, letter is lower case; if into the first mike, letter is in capitals. A letter set up by the first three blows can be canceled by blowing last puff into third mike. A single puff blown into the first mike makes a space.

"The Four-Number Code (in black) shows how each letter (in red) is typed. For example, to type small "a" [a=3344], blow into the third mike twice and then into the fourth twice." This could also be controlled by foot push-buttons.

2231 2222 2244 3122 1000 2232 4344 2222 3422 2222 2244

1953: Breath controlled TV. Polio was rife in the 1950s confining people, such as Mary Kitsmiller above, to long spells within an iron lung. When the president, Ray Moloney, of the Lion Manufacturing Co. and gaming giant Bally, learnt of Mary's incarceration, he set the Lion engineering team to work on a breath-controlled Television that she could operate herself. Mounted on a goose-neck stand, one sensor would turn the TV on/off and the other would cycle through two or three channels. News of this invention was reported by Mary's local press and within the USA wide coin operated gaming newsletter Coin Machines.

1957: Light-beam controlled communication system. "Ricks Communicator" gave an electronic method of pointing at a specific word, letter, number, or picture for those who could not easily do so otherwise. Breaking a light-beam moved a motorised pointer around a range of communication tags. Removing a hand, leg, head, or finger from the light would stop the motor and make the selection. Master A-Z and anything could be said.

1960: POSM (Patient Operated Selector Mechanism. An electronic environmental control and communication system operated via sip-puff, switches, or joysticks. Made available free at the point of assessed need via the UK's National Health Service. Promoted, copied, and eventually improved upon around the world. Perhaps the most important moment in electronic assistive technology history. See Chapter Two for more on this world changing invention.

1965: Dr. Leslie Kay of New Zealand brings the “KASPA Sonic Torch” and “Binaural Sonic Glasses” to market: A far more practical evolution of the 1912 Exploring Optophone.

During the Cold War Dr Kay worked as a scientist for the British Navy developing underwater sonar technology using sound waves to find submerged objects such as submarines, torpedoes and mines.

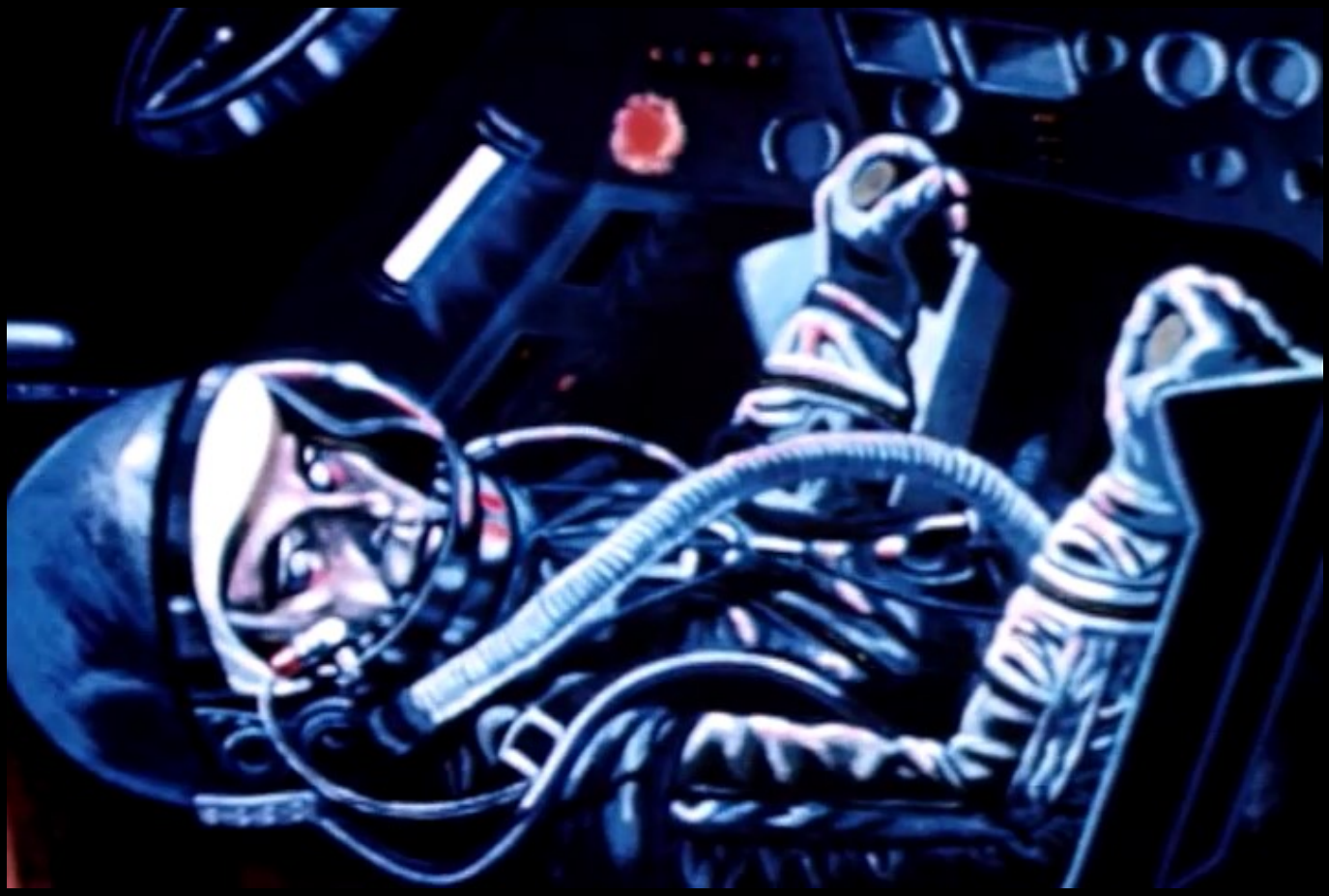
In 1959 Dr Kay’s interest was sparked by a news item covering the Queen Mother’s visit to a school for the blind to open some new facilities, including a swimming-pool. He wondered how the children would find their way about in water and decided to make a sonic device for them to use in the pool.

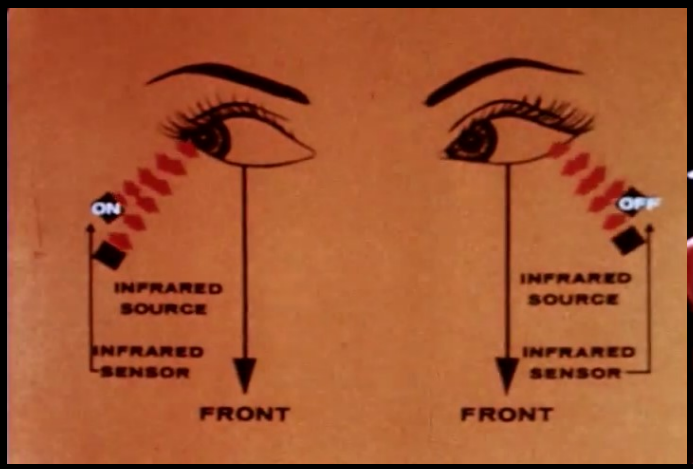
The resulting KASPA (Kay's Advanced Spatial Perception Aid) devices mimicked the navigational ability of bats and dolphins. Ultra-high frequency sound waves would be emitted into the environment with some of those waves bouncing back to the receiver. These would then be converted to a form the user had a chance of making sense of. For the babies to adults using a KASPA, this was in the form of very fast changing electronic sounds, fed through a small earpiece.

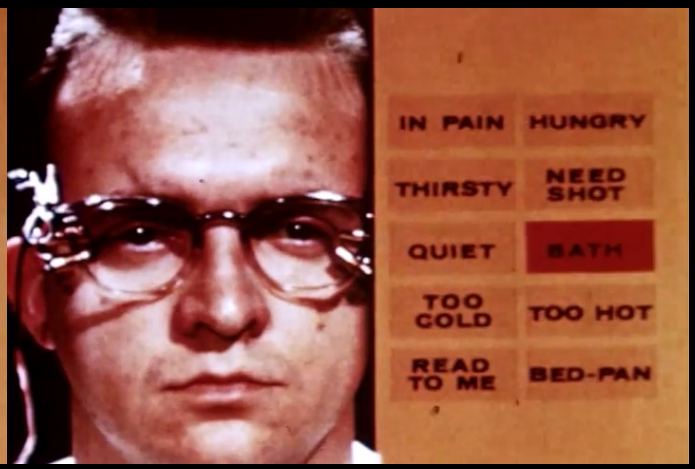
Though a lot of training and practice the proximity and solidity could be gleaned. Water sounded different to a brick wall. The approach of a person different to nearby swaying leaves.

Sighted people must have stopped and stared in wonder. Similar technology would be found 19 years later in the Sound Beam accessible musical instrument that converts movement to music.

1966: Sight Switch. In the race against the USSR to put the first man on the moon, the NASA space agency developed an eye-controlled computer interface. The fear was that astronauts under the great gravitational forces of a space capsule spinning out of control or re-entering Earth atmosphere, would be unable to lift their hands to operate critical controls. A two-switch eye-gaze system with scan and select interface (likely inspired by Possum) could offer a solution.







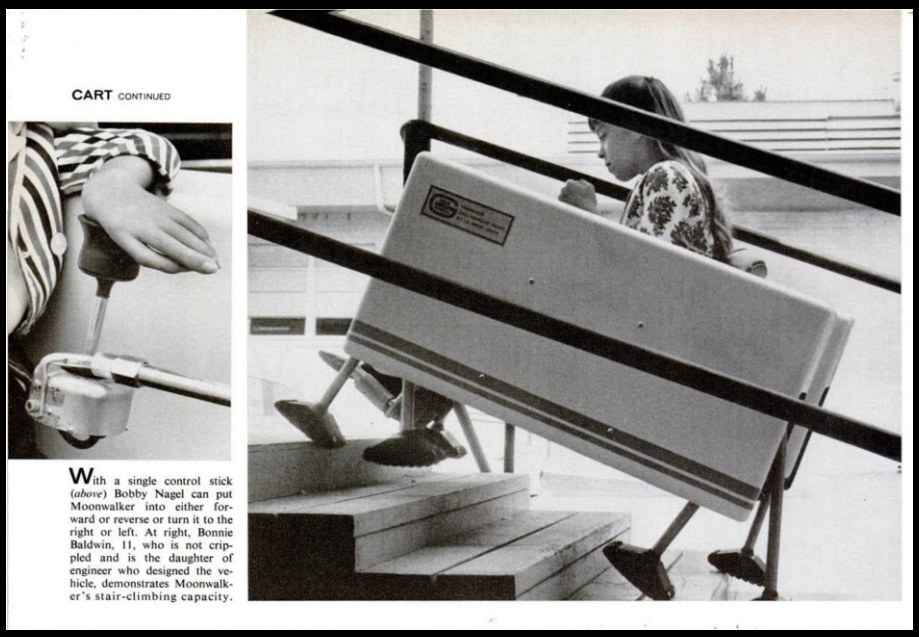
Although discarded for use in the Moon landing, the technology was integrated into an eye-controlled wheelchair and environmental control system. In use it was found to be expensive and unreliable compared to more conventional systems.

From the 1960s onwards NASA showed great commitment to passing on the benefits of their work to disabled people, as shown in “The Conference on Technology and the Neurologically Handicapped” run in September 1971.

1966: Moonwalker. Based on a rejected 6-legged prototype vehicle to explore the moon, a walking wheelchair was developed with encouragement from NASA Engineers. Three 8-legged open cockpit chairs were built in total that could be controlled by one hand or a chin cup arrangement.

MEDICINE A lunar vehicle becomes a joy for crippled children

A Cart Made for Walking



CART CONTINUED

With a single control stick (*above*) Bobby Nagel can put Moonwalker into either forward or reverse or turn it to the right or left. At right, Bonnie Baldwin, 11, who is not crippled and is the daughter of engineer who designed the vehicle, demonstrates Moonwalker's stair-climbing capacity.

From R.F Brodsky's book "On the Cutting Edge": The whole effect was a natty speedster begging for the kids to apply a full regalia of car names and stickers worthy of an Indy racer." The young children testers were said to love the 2 MPH Moon Walker, especially for steps and on sand, but found they could not race down corridors as fast as a conventional wheelchair, nor do wheelies. Cost, practicality and an increase in wheelchair accessible curbs and lifts saw an end to this idea.

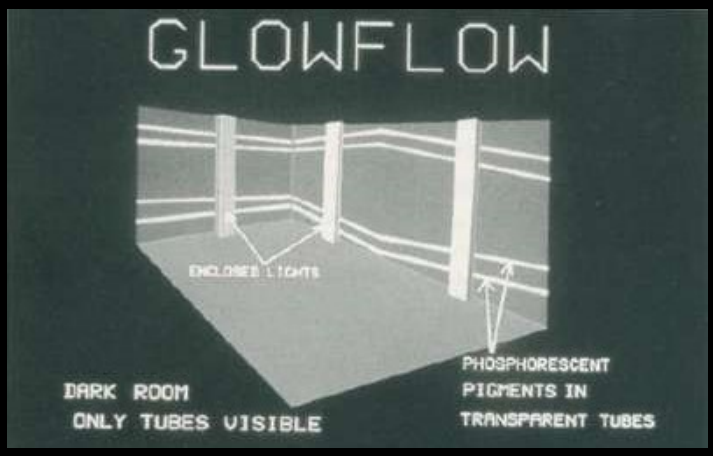
1968: Text-to-Speech. Noriko Umeda heads the first demonstrated English text-to-speech system at the Japanese Government's Electrotechnical Laboratory. Built by Hitachi with a 1500-word vocabulary it had three voices: robotic male, robotic female, and robotic child. A reading of Sleeping Beauty from Grimm's Fairy Tales to Read Aloud was given in Tokyo to showcase the possibilities.

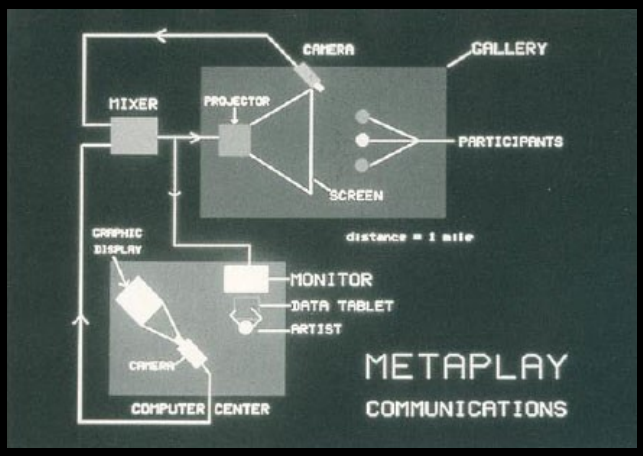
1969-1971 Responsive Environments. In effect, electronic playrooms, in which people used their bodies to interact with computer assisted sound and vision. This movement was driven by the pioneering computer artist Myron Kreuger.

"Glow Flow" was the first of these Responsive Environments, exhibited to the public at the University of Wisconsin, USA in 1969. Imagine a dark room enfenced by six pillars intersected by tubes of ultra-violet reactive water. By each pillar was a floor pressure switch that the shuffling 15-20 people inside could trigger, often by accident. Each press would step through a sequence of lights in the pillar radiating a neon effect down the adjacent tubes. It would also play electronic sounds that could swirl around the room.

Running this magical Human Computer Interaction was a hidden DEC PDP-12

minicomputer and Moog synthesiser. By design, the delayed speed at which these interactions occurred left people in a state of wonder… wondering if they were controlling anything at all.





The 1970 “Metaplay” environment addressed this confusion with a much more direct cause and effect relationship. The technology consisted of a video camera, projector, mixer, and behind-the-curtain Wizard of Oz computer operator.

In a dark gallery room, one to three participants would be greeted by a life-sized black and white video projection of themselves. One mile away, a computer artist would start to paint on this live feed using vector graphics. Gallery participants and the computer operator were free to play together in this new artificial reality.

A treasure trove of ideas were explored: “The artist could draw on a participant’s image or could draw around it so that the participant appeared to be standing in a shower. Or, she could draw a graphic door that opened whenever a participant touched it. Alternatively, the artist could communicate directly by writing words, or could attempt to induce the participant to play a game, such as tic-tac-toe [noughts and crosses]. Finally, she could play with the act of drawing itself, as she transformed one kind of picture into another.

The operator could make an outline dance to music in the gallery. The artist would try one idea after another to try to involve the participants. The artist could also direct the cameraman in the gallery to focus on any individual.

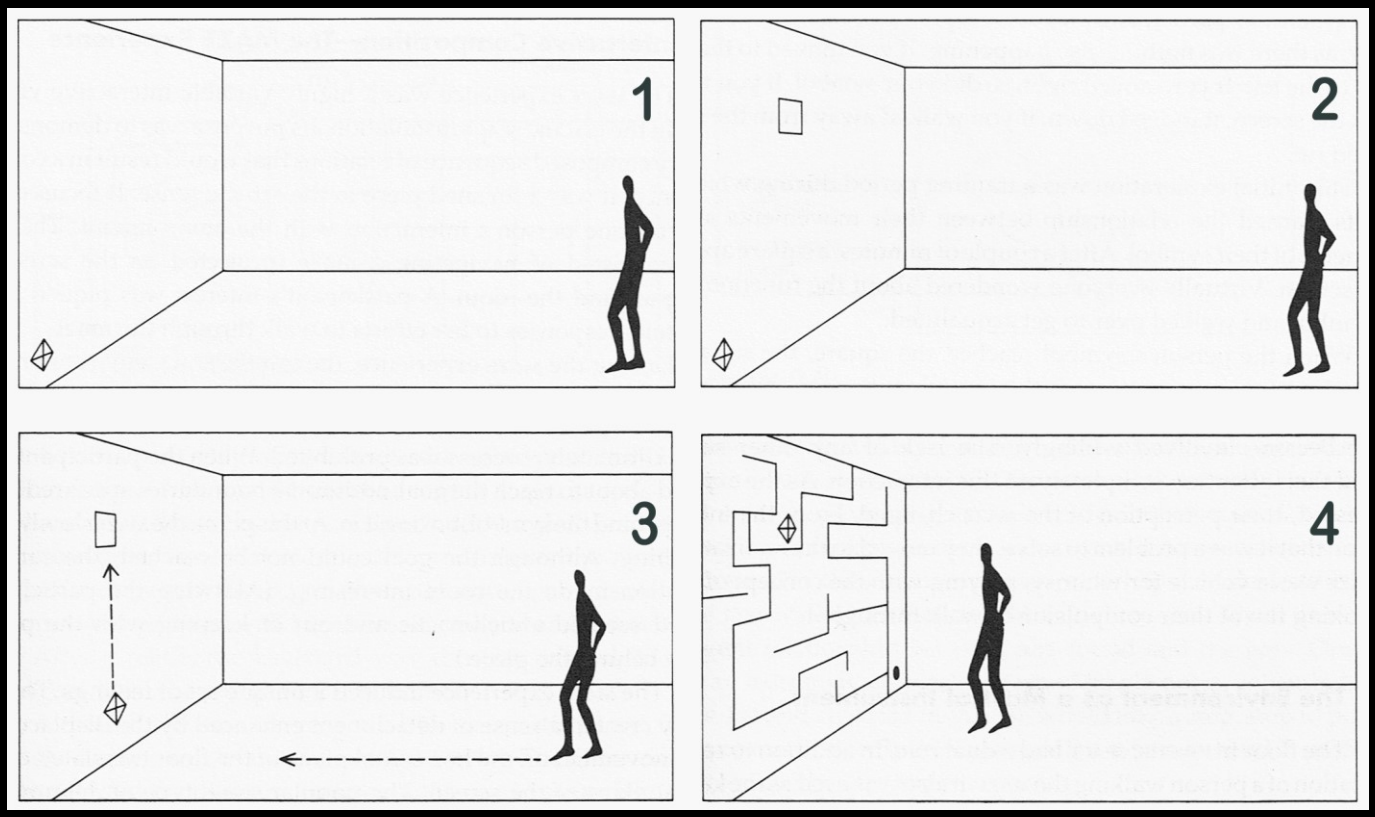
By drawing on a user’s hand and not erasing the mark, participants could draw on screen. Some would pass the drawn line to another’s hand so they could continue the artwork. These interactions were terminated by the lights-dimming and artist writing ‘Good-bye’ or something similar.”

This experience built-upon the work headed by computer graphics pioneer Ivan Sutherland at the MIT Lincoln Laboratory. His 1963 “Sketch Pad” graphical user interface system made the Metaplay artist’s job far more intuitive and immediate. “The Sword of Damocles” tethered and cumbersome virtual reality headset (1968) showed how the real world could be mixed with the virtual world of computers. Psychic Space (1971) took ideas from Glow Flow and Meta Play with an almost fully computerised experience. People queuing up the enter this single-player

experience were let in one at a time, often by a child at the door who would restart the programme and keep an eye on the time.

Upon walking in, you would see a computer-generated diamond symbol appear on a projected screen (1). If the player moved, the symbol would move with them, up, down, left and right, tracked by a grid of floor sensors. As the player moved a different musical note would play depending upon which part of the floor they stood on. The floor became a giant musical keyboard.

A couple of minutes later a mysterious square would appear (2). If the player should lead their diamond symbol to touch the square (3) a maze would appear (4). Taking careful steps to keep within the lines, players could traverse the labyrinth. Cheating had been anticipated. Players cheating by crossing a virtual line might find their symbol disintegrate, or have the line stretch elastically to pen them in. Their symbol might push the maze across the screen, or the maze might rearrange itself. They could never win.



For those more interested in playing musical tunes, the note layout would rotate from time to time to further disorientate the user. After 15 minutes of fun or frustration the player would be ushered out of the room.

From these early Responsive Environments, Myron Kreuger would go on to form the Artificial Reality Corporation paving the way for the likes of the Sony Eye-Toy and Microsoft Kinect. All ways to control a computer unencumbered by anything more than your own body.

1971: Optacon (OPtical to TActile CONverter), a commercial reading device for the blind is produced by Telesensory Systems Inc. With it, two dimensional shapes and symbols could be distinguished through touch alone.

The idea had distant roots. A device using light-sensors, electro-magnets and 64 tactile iron pins to convert text to touch was proposed by French inventor Camille Grin in 1881. Due to lack of funding, and perhaps, it being impossible with the technology of the time as suggested by Fournier D'Albe years later, the "Anoculoscope" did not come to pass.

And yet, in 1964, John Linvill, a professor of Electrical Engineering at Stanford University, alongside his blind daughter Candy Linvill and researcher James Bliss proved the concept. In a filmed demonstration, a gargantuan computer drove a scrolling message simultaneously to an air-fed tactile display and magnified display box of 96 light-bulbs. Candy, read aloud what she sensed through her fingers alone: "There was a time before our time…".

By 1971, the Optacon had been miniaturised to a pen-like camera, wired to a small box holding the battery, intensity controls and tactile array. This array was formed of 6 x 24 pins that jostled up and down under the user's forefinger, buzzing like furious bees as material was manually scanned. 50-100 words per minute reading times were possible by uncommonly skilled users. The material read might be the text on food packaging, newspapers, sheet-music, record labels or computer printouts. Early computer games played using an Optacon, keyboard and printer included Lunar Lander, Star Trek and Dungeon.

```
TRY AGAIN?
(ANS. YES OR NO):YES
FIRST RADAR CHECK COMING UP


COMMENCE LANDING PROCEDURE
TIME,SECS   ALTITUDE,MILES+FEET   VELOCITY,MPH    FUEL,LBS    FUEL RATE
       0              120     0       3600.00      16000.0       K=:0
      10              109  5016       3636.00      16000.0       K=:0
      20               99  4224       3672.00      16000.0       K=:0
      30               89  2904       3708.00      16000.0       K=:0
      40               79  1056       3744.00      16000.0       K=:0
      50               68  3960       3780.00      16000.0       K=:0
      60               58  1056       3816.00      16000.0       K=:0
      70               47  2904       3852.00      16000.0       K=:170
      80               37  1474       3539.86      14300.0       K=:200
      90               27  5247       3140.80      12300.0       K=:200
     100               19  4537       2710.41      10300.0       K=:200
     110               12  5118       2243.83       8300.0       K=:200
     120                7  2284       1734.97       6300.0       K=:200
     130                3  1990       1176.06       4300.0       K=:200
     140                0  5040        556.96       2300.0       K=:170
     150                0  1040     -   21.21        600.0       K=:0
     160                0  1087         14.79        600.0       K=:0
     170                0   606         50.79        600.0       K=:30
     180                0   436     -   27.90        300.0       K=:0
     190                0   581          8.10        300.0       K=:8
     200                0   425         13.17        220.0       K=:10
     210                0   253         10.30        120.0       K=:9
     220                0    96         11.11         30.0       K=:100
FUEL OUT AT   220.30 SECS
ON THE MOON AT   226.12 SECS
IMPACT VELOCITY OF    21.36 M.P.H.
FUEL LEFT:     0.00 LBS
CONGRATULATIONS ON A POOR LANDING
```

```
You are in a clearing, with a forest surrounding you on the
west and south.
There is a grating securely fastened into the ground.
There is a pile of leaves on the ground.

> use egg

I don't understand that.

> egg

What should I do with the jewel-encrusted egg?

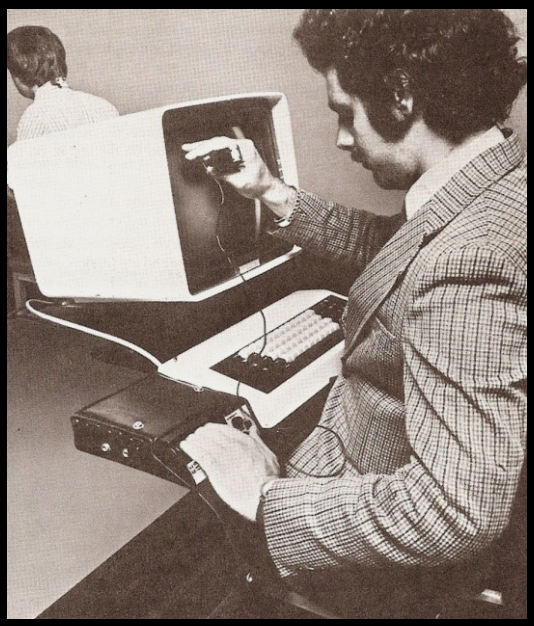
> egg on grating

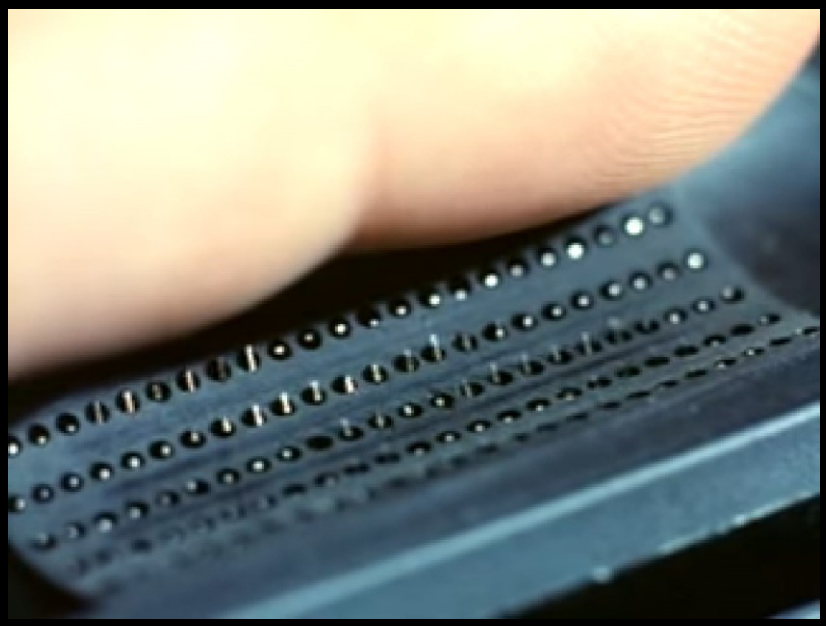
What should I do with the jewel-encrusted egg?

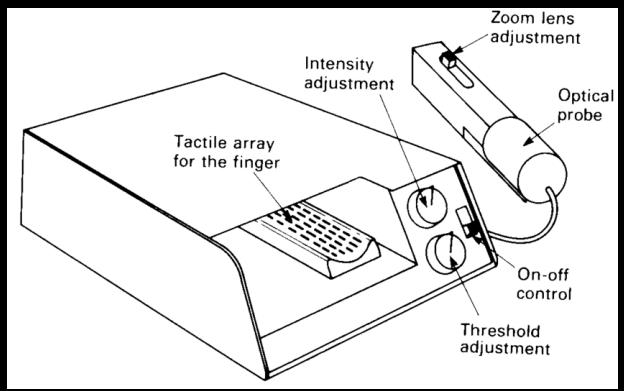
> open grating with egg


You rather indelicate handling of the egg has caused it
some damage.
The egg is now open.
There is a golden clockwork canary nestled in the egg. It
seems to have recently had a bad experience. The mountings
for its jewel-like eyes are empty, and its silver beak is
crumpled. Through a cracked crystal window below its left
wing you can see the remains of intricate machinery. It is
not clear what result winding it would have, as the
mainspring appears sprung.
```

Accessories for the Optacon included a range of camera lenses, including one for screen-reading directly from computer screens: Ready for the explosion of “work” and home computer text games.







SECTION MISSING – TO BE COMPLETED IN 2021

1971-1974: Blissymbols used for the first time by children with cerebral palsy at the Ontario Crippled Children's Centre school (OCCC) in Toronto, Canada.

Blissymbols, previously known as Semantography, and before that as “World Writing” was first published in 1949 by mandolin playing chemical engineer Charles Bliss. It wasn’t originally aimed at giving a voice to disabled children but at giving the entire world a unifying logical language to end all war.

“Sticks and stones may break my bones (but names can never hurt me)”: Bliss (then Karl Blitz), an Austro-Hungarian Jew living through the rise of National Socialism knew this to be untrue. Torn from his wife Claire and his work in electrical patents at the German radio equipment company Telefunken, Blitz was imprisoned at Dachau concentration camp in 1938.

How words were used was the problem. Twisting the meaning of ambiguous words could manipulate ordinary people into justifying all manner of evil acts. The first line of the German national anthem, “Deutschland über alles” (Germany Above All) was made a declaration of racial and moral superiority. However, when first written in 1841, the line was intended as a call for a unified Germany, at a time when Germany was divided into 30 or so separate principalities. “A united Germany above all our divided interests”. Perhaps.

Blitz won release from hell thanks to the tireless petitioning of his German-Catholic wife. It came with the condition that he left for England immediately, never to return. Claire would not be permitted to follow her refugee husband. They saw each other briefly. Karl left for England. World War II exploded.

His new homeland was soon to be bombed mercilessly day after day in the German “Blitzkrieg” (lightning storm). In a tiny act of defiance, Karl changed his name from the war-like Karl Blitz, to the peaceful Charles Bliss.

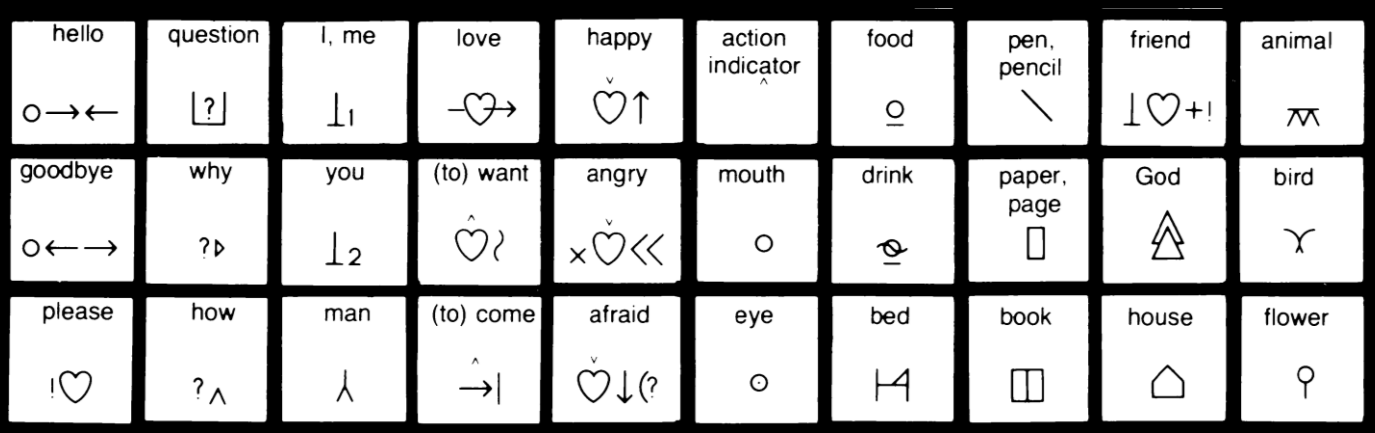
After two painful years apart, Charles and Claire travelled the globe to reunite in Shanghai, China on Christmas Eve 1940. Here they started to make a new life together. Surrounded by Chinese symbols, something clicked for Charles.

Each symbol, so it seemed, was a word which once learnt could be read aloud in any language. The symbol for a person looks like a person. He remembered the electronic diagrams his father used to work on. He thought of basic road signs and chemical symbols; things that can be understood around the globe.

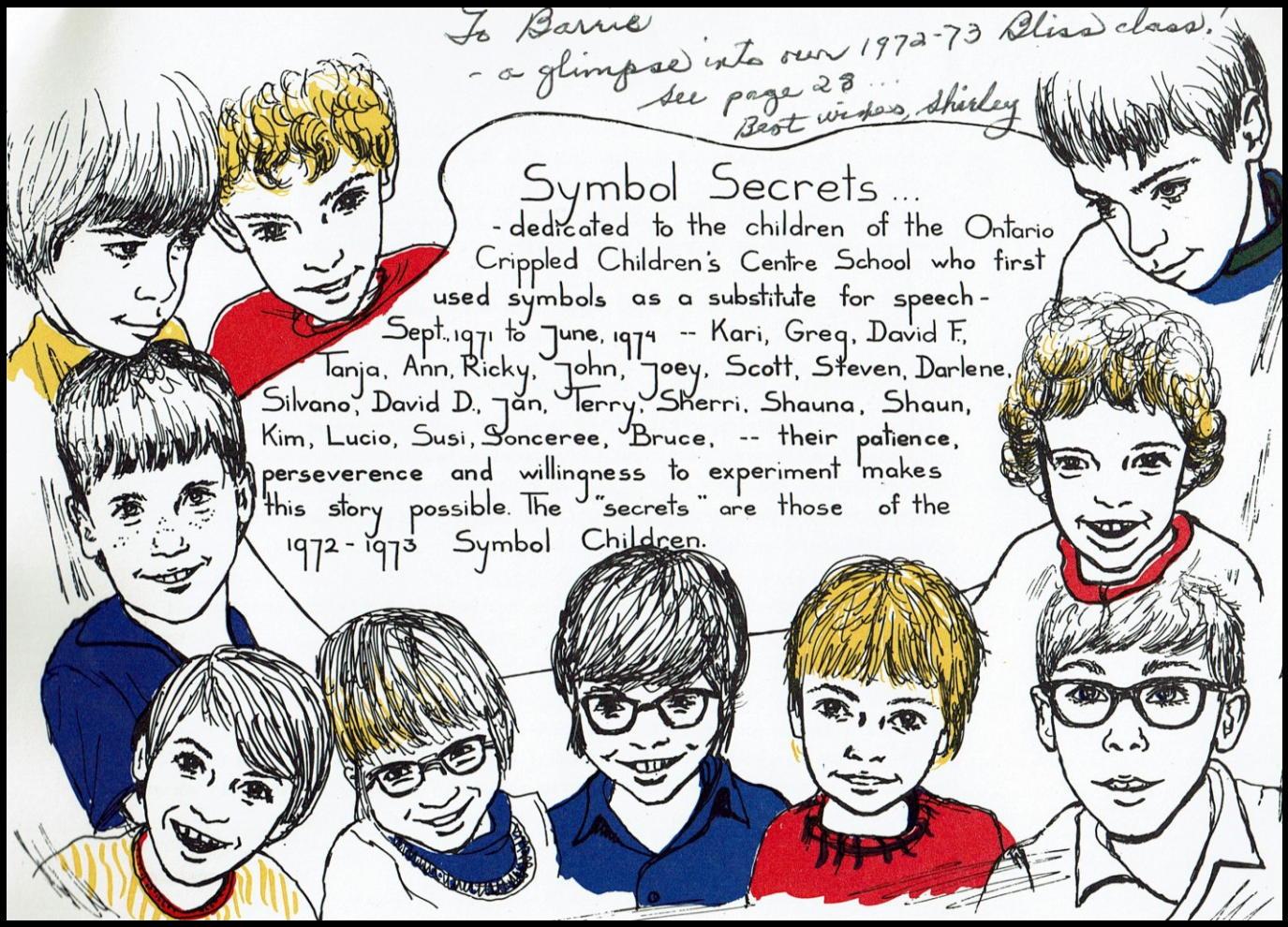
At war’s end, without citizenship, they were forced to move on once again, deciding to settle in Australia. Here, Charles’ dream of a universal language to unite humanity was set to paper, publishing “International Semantography: A non-alphabetical Symbol Writing readable in all languages”. When sent to the United Nations, to academics, philosophers and journalists, the dream was met with an almost total brick-wall. Aside from the occasional brilliant mind, such as Bertrand Russell, no one seemed to care. Twenty years of disillusionment passed.

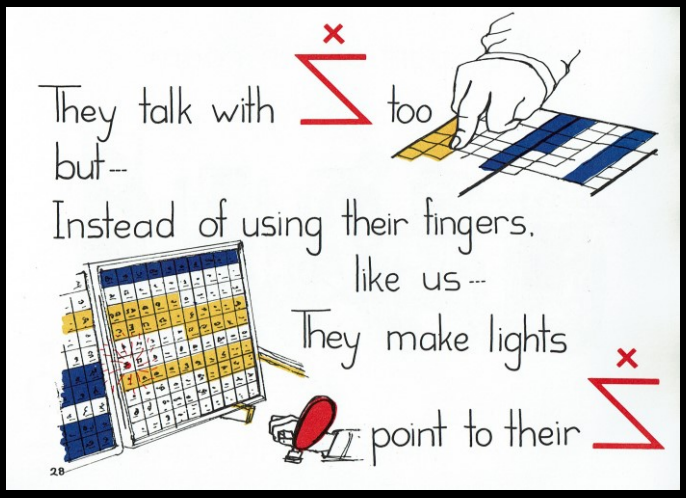
In 1971 out of the blue, a letter floated onto the desk of Bliss of a “beautiful dimpled child using his symbols”, addressed from the teacher Shirley McNaughton from Canada.

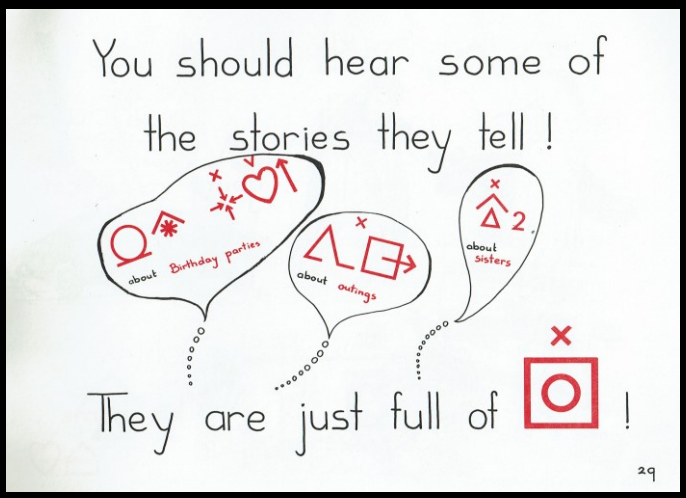
Children who struggled to make themselves understood were being taught how to communicate using Blissymbolics. At first Shirley found that some professionals doubted the intelligence of her students, but it was the sparkle in the eyes that convinced her otherwise. Bliss gave them the means communicate with the outside world. It enabled someone without a clear voice, who couldn’t use a pencil or typewriter to better express hopes and fears, to be cheeky, to ask questions, to tell someone special: I. love. you.

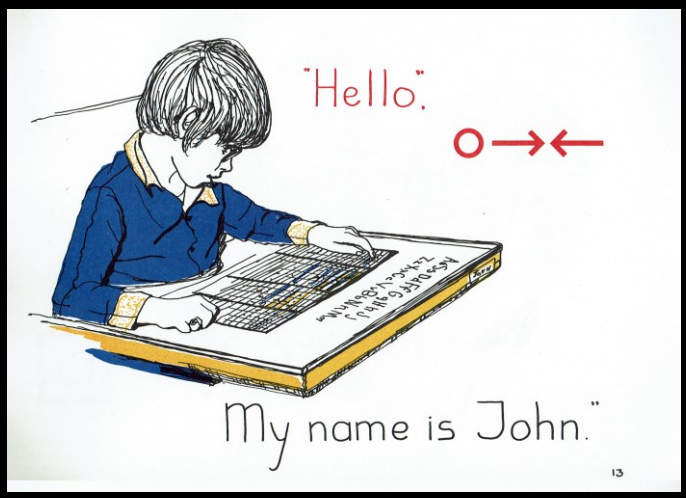


Children started with about 10 basic symbols to point out, such as drink, toilet, bed, growing to around 500 for the most able, about as many as could be put within reach. Symbols could also be combined to make new words. The symbol for long and the symbol for food put together could mean Spaghetti. One child, Terry Martin, when asked what he wanted to dress up as for Halloween pointed to Creature. Drinks. Blood. Night…. He wanted to be a vampire.



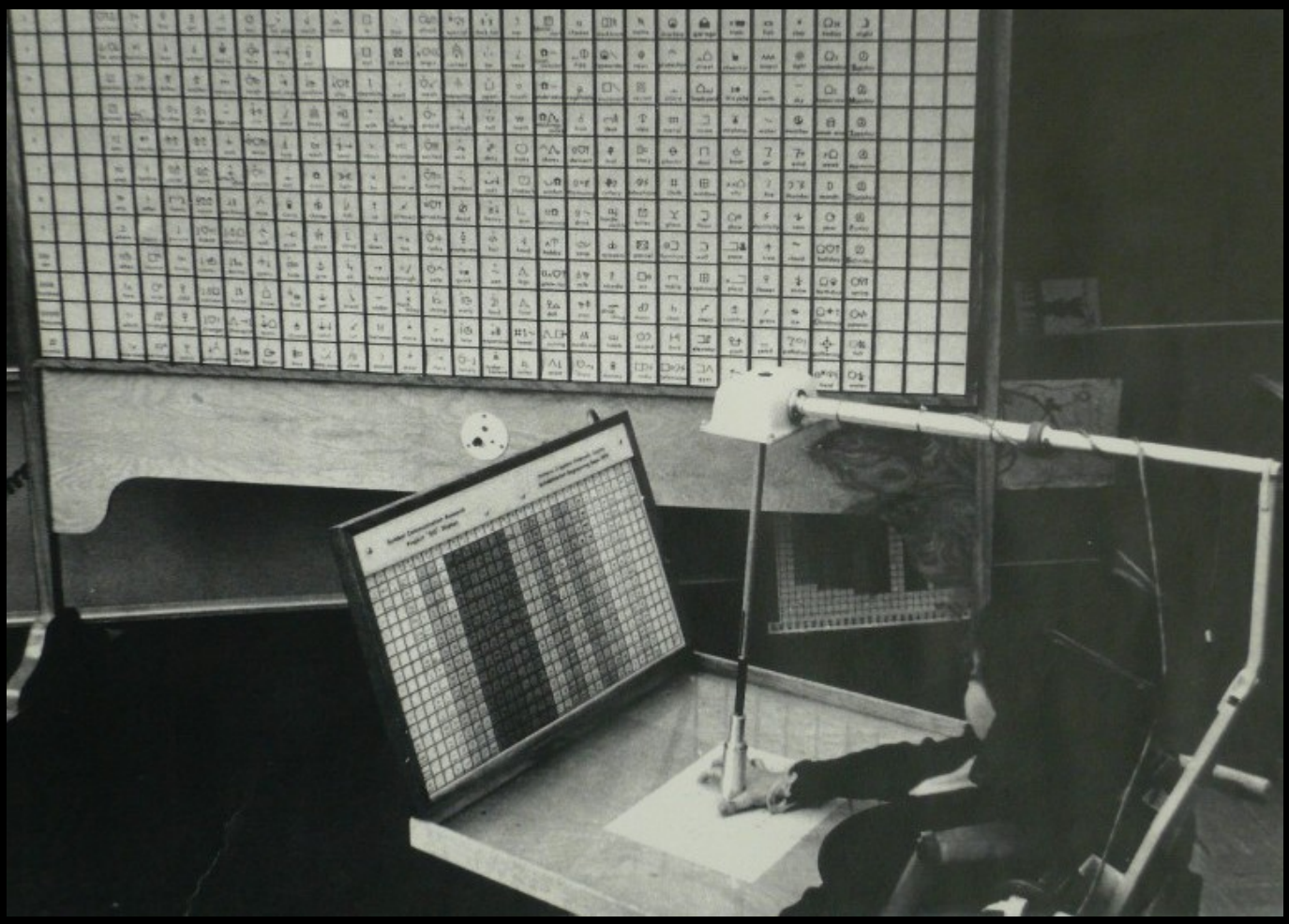






Pages from Symbol Secrets: The wonderful story of the first Blissymbol users.

The OCCC team headed by Shirley McNaughton and Margrit Beesley alongside their engineering department tailor made communication systems to match each child. Some used electronic aids if they could not control their arms well enough. A 512 symbol lightboard system enabled children to use a gated joystick and radio communication to speak to the entire class in illuminated symbols.

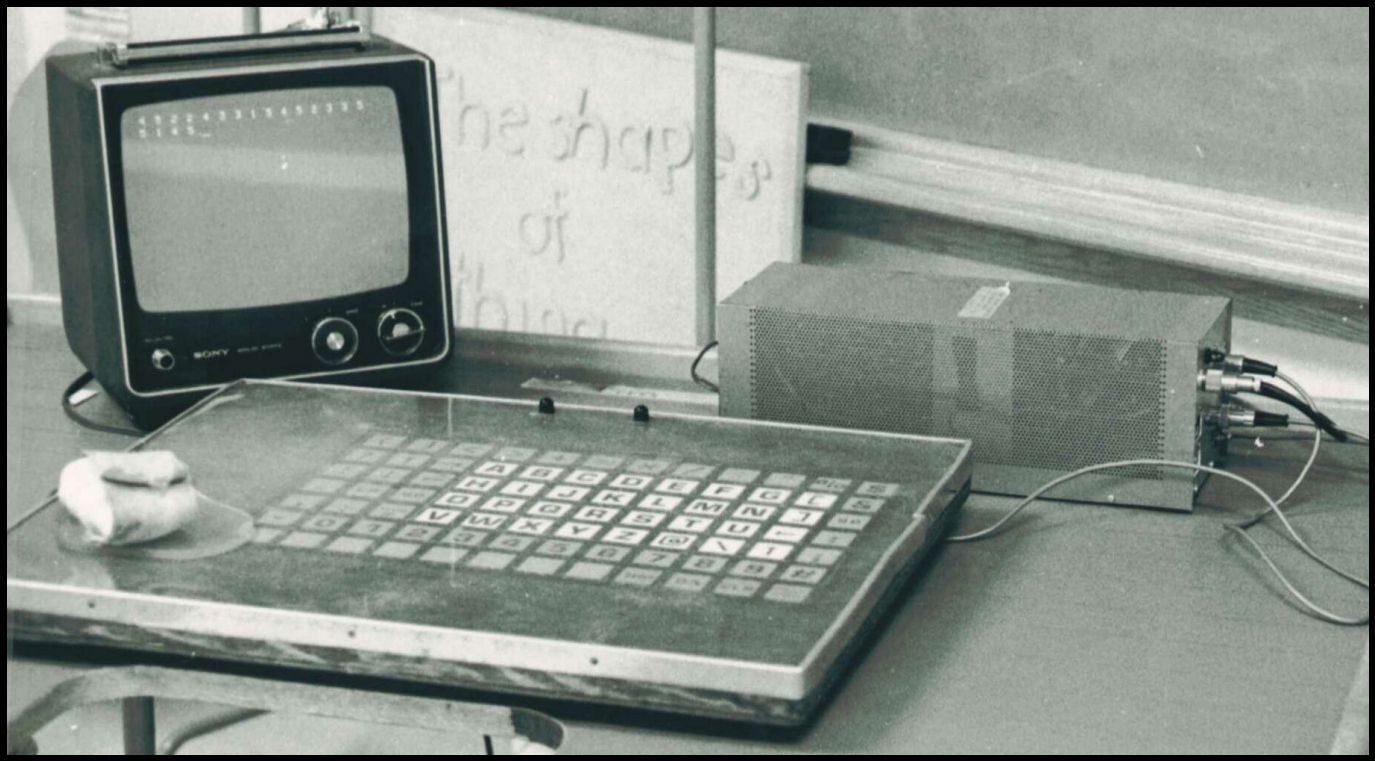


Charles had battled for so long for recognition, that he was said to have danced around and played his mandolin upon receiving Shirley's letter. He mortgaged his home and travelled to Canada to see this all with his own eyes.

He was thrilled and charmed at first, until he started to feel his dream of a pure logical language slipping through his fingers. He was horrified to find his system modified and used as a steppingstone to English. He felt this was a perversion of Blissymbolics, badgering the OCCC team at every turn to revert to his ideals. This escalated to legal action and threats to have Shirley put away for life.

Against this backdrop, Shirley spear-headed Blissymbol Communications International (BCI) in 1975 to further spread OCCC's work. Pockets of specialist children's services started to use Bliss, including England, Hungary, France, Sweden, Israel (with reverse order symbols) and Zimbabwe. Also, Argentina, Brazil, Finland, Iceland, Italy, Bermuda, Guam, Japan, Portugal, Spain, Netherlands, Switzerland, Venezuela, Madagascar and Yugoslavia. Improved electronic Blissymbol devices followed, including the portable one-switch accessible Prentke Romich BSS-100. A World Writing. For a time.

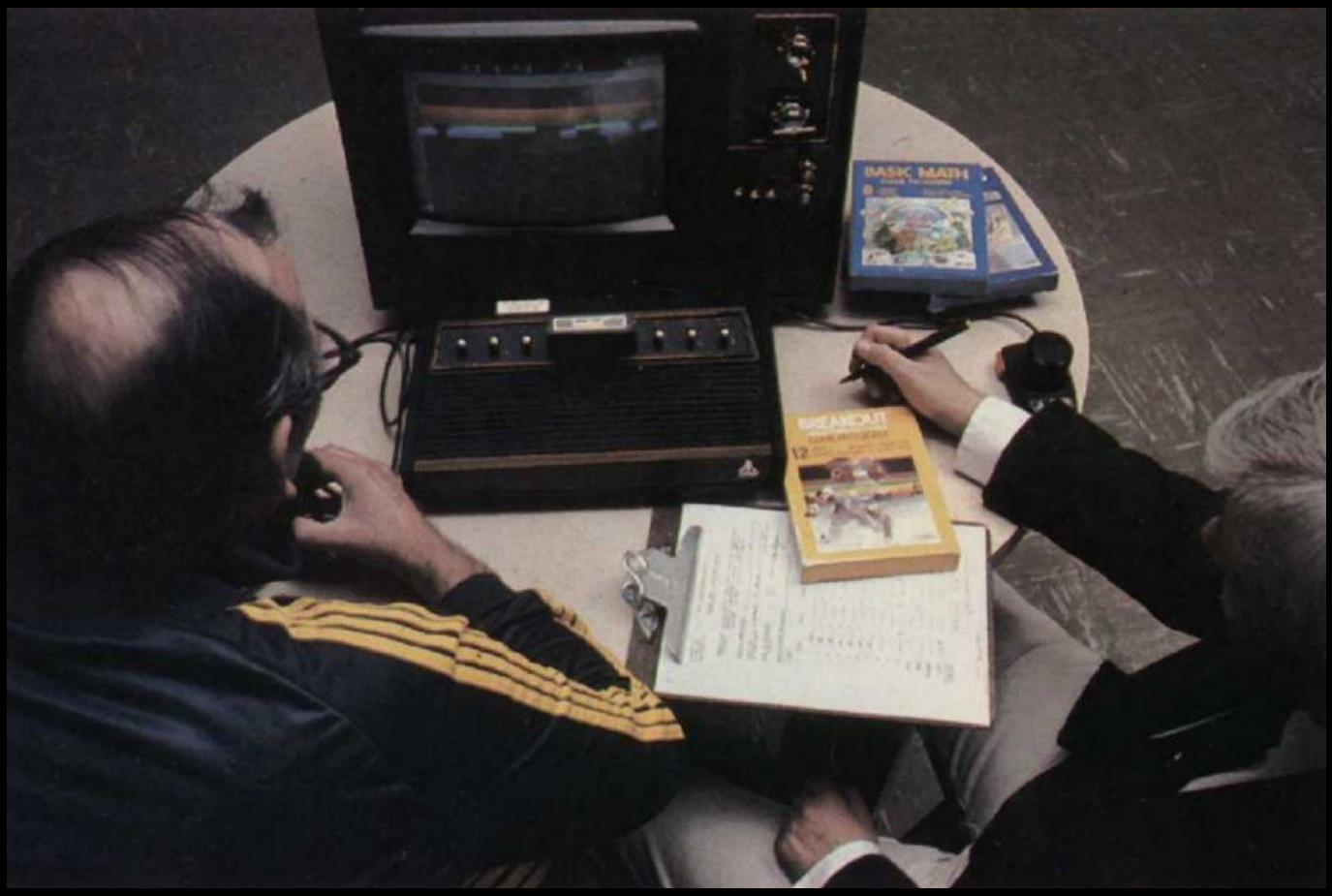
SECTIONS MISSING – TO BE COMPLETED IN 2021



SECTIONS MISSING – TO BE COMPLETED IN 2021

HANDICAPPED CHILDREN ENJOY ATARI GAME

SECTIONS MISSING – TO BE COMPLETED IN 2021



SECTIONS MISSING – TO BE COMPLETED IN 2021

Apl 3rd-7th and Oct 2nd-6th.

'Technology for the Handicapped Child".

Organised jointly by Castle Priory College and Mr.Roger Jefcoate, Con, Assessor and Lecturer concerned with Electronic Equipment for the Severely Disabled.

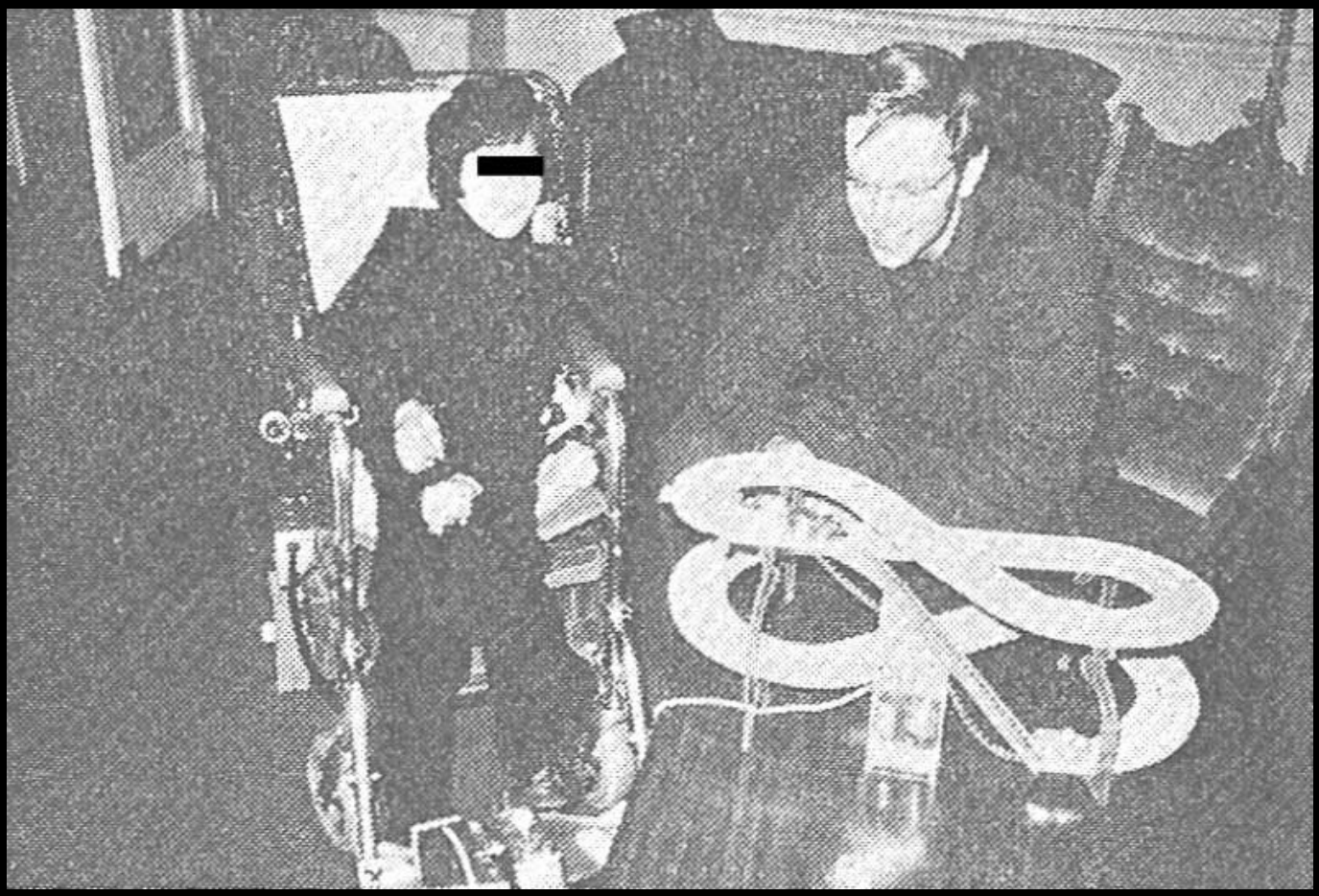
An intensive course covering a broad range of technical aids and special equipment (including toys) with experienced advice on techniques, application and use. It will be of a practical nature and opportunity will be given for discussion and to try equipment demonstrated and on show.
The provisional programme details include: the role of technology; rehabilitation engineering for the handicapped child, electric and electronic typewriters; communication equipment for deaf people, educational technology and teaching methods for the mentally handicapped child; adapted games in the special school; workshop session - make your own toy or game; getting older - technical aids at school, home, work, special education in Britain; matching severe disability to special aids; typewriter teaching for the primary child; special mobility aids, the Bliss Symbol System; a new electronic communicator; pre-school communication and play; adapted toys for disabled children; life can be fun for everyone; T.L.A. film - Good Morning - therapeutic toys.

To be held at: Castle Priory College, Thames St,Wallingford, Oxfordshire OX10 OHE.

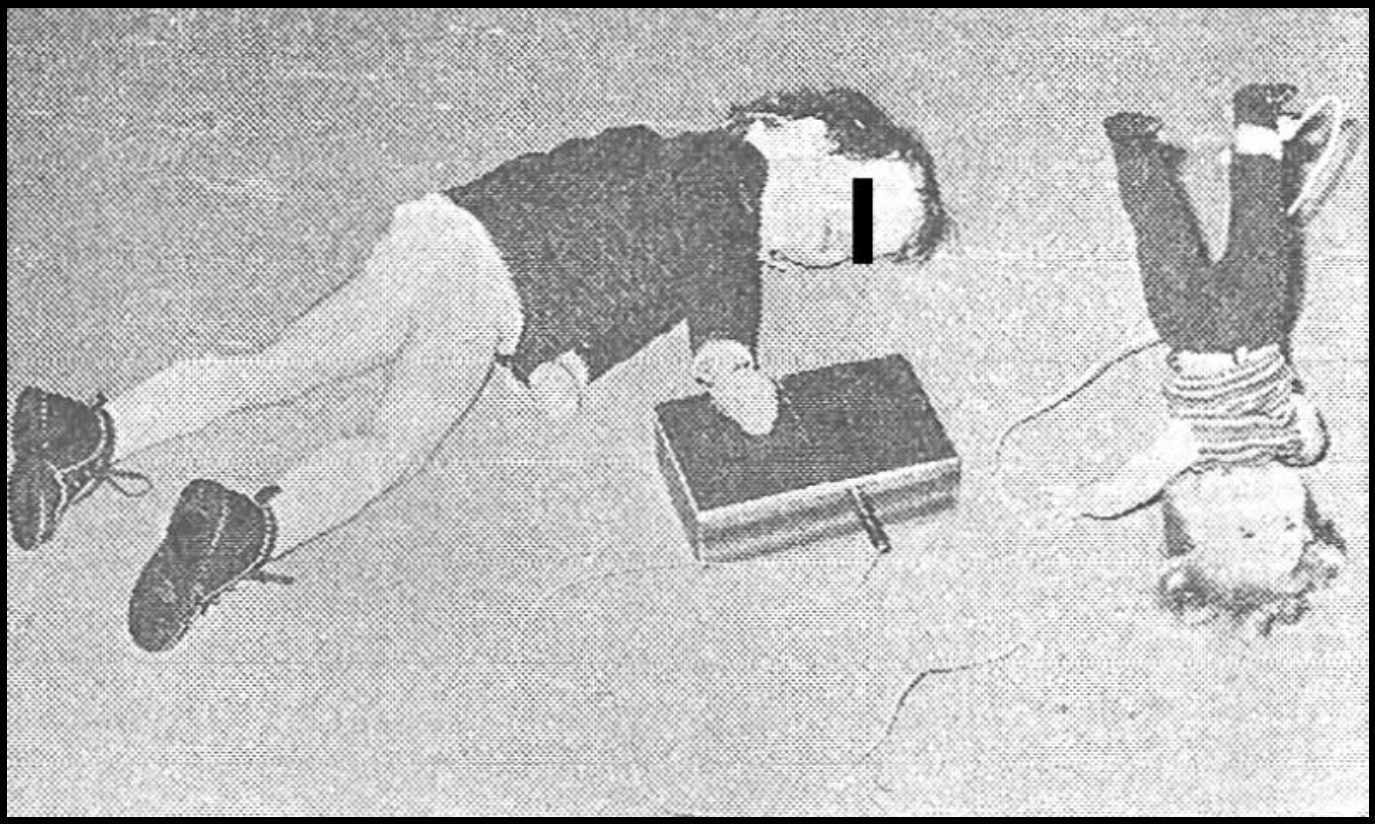
Fee: Tuition £29 Residence £33.
Applications, together with a non-returnable deposit of £5 to: Castle Priory College.

SECTIONS MISSING – TO BE COMPLETED IN 2021

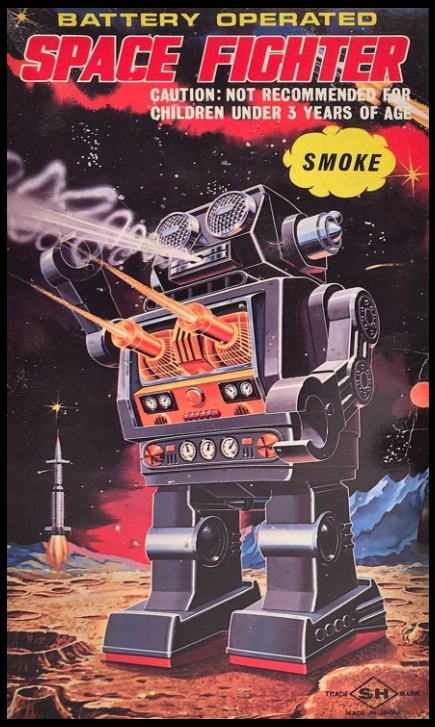
Roger Jefcoate with remote control toys on the Aidis Trust stand in 1979. A begging and barking poodle and smoking and firing “Space Fighter” robot.



Winfield Roller Coaster via a foot switch (bottom)



Palitoy Tippy Tumbles. [pictures via 1980 Japanese article by Roger]



Many battery toys created in the 1960s and 1970s, normally from the far East, were adapted by people like Roger Jefcoate. [link]

1979 Blake's 7 advert for Subtitles on BBC Teletext.

SECTIONS MISSING – TO BE COMPLETED IN 2021

SECTIONS MISSING – TO BE COMPLETED IN 2021

SECTIONS MISSING – TO BE COMPLETED IN 2021

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)

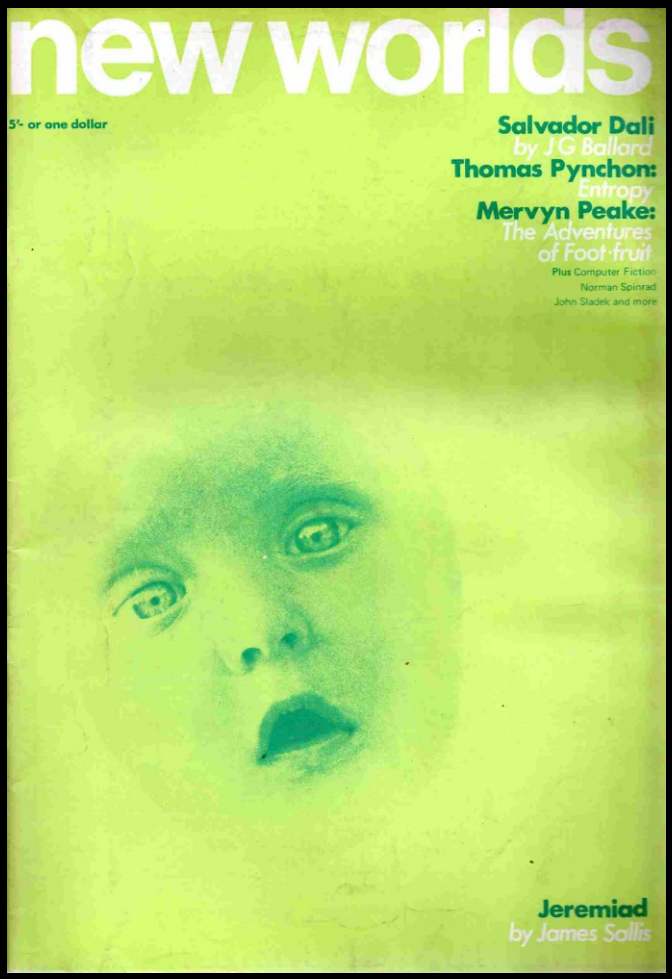
Reg carried with him the formidable reputation of having brought about Possum (see section 2) and the start of the modern-day electronic assistive technology movement. Reg was brought onboard as a consultant, giving advice on problems severely disabled children faced. MAVIS would never have existed without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

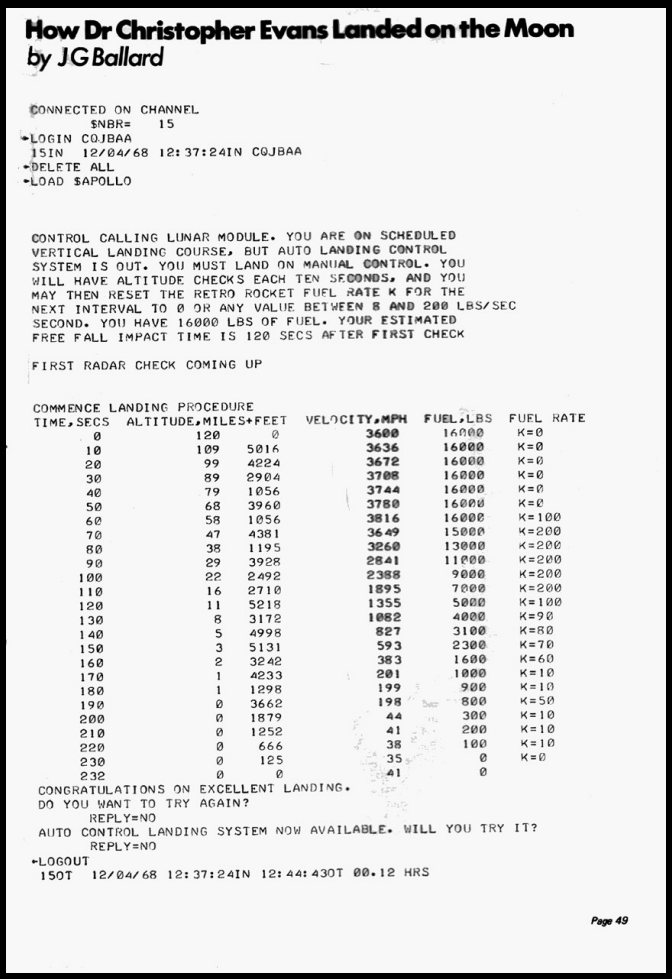
Christopher Evans (29 May 1931 – 10 October 1979)

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

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CONNECTED ON CHANNEL
        $NBR=    15
→LOGIN COJBAA
 15IN   12/04/68  12:37:24IN C0JBAA
→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
 15OT   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'? Ø

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? Ø

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.

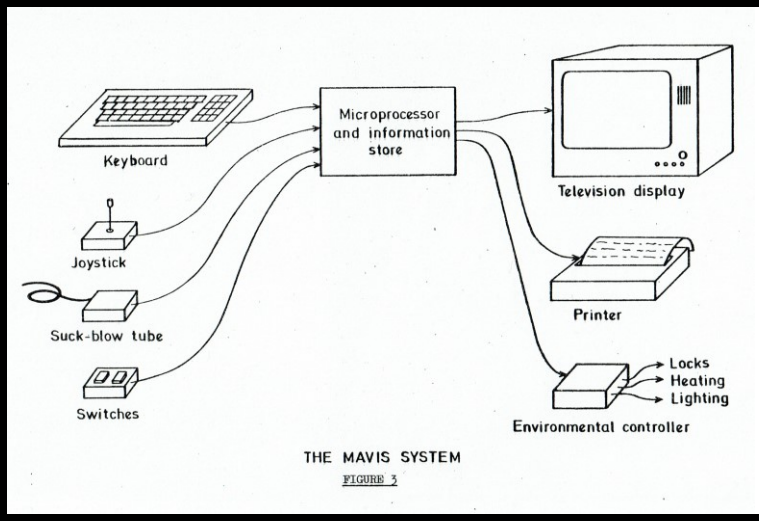
In this early form the system was able to demonstrate large Teletext style colour graphics and text in different sizes. It could speak numbers and play varied musical tones. It could be controlled by keyboard or 'puff-suck' input. A range of software including the talking calculator, text editor and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

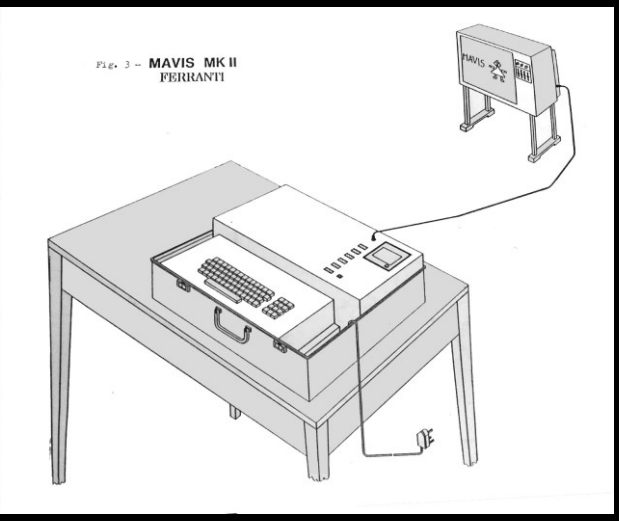
available. Work could be saved to cassette. Nothing this versatile had existed before in the world of assistive technology.

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:

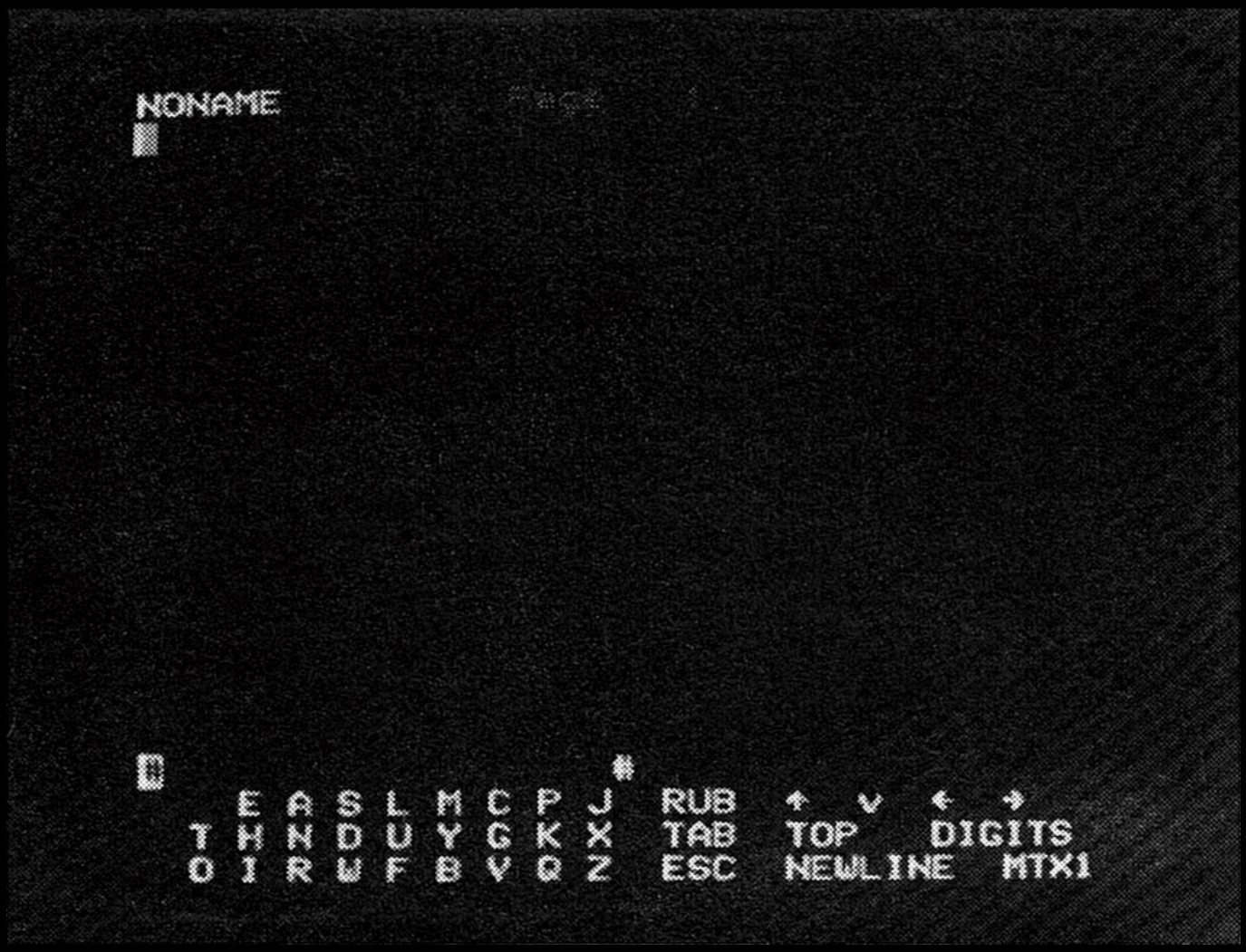
A Z80 CPU @ 2.308 MHz.
14Kb EPROM, 16Kb RAM and 128Kb “bulk store” RAM simulation (expandable).
2x parallel and 2 serial (RS232) interfaces.
69 key lighter touch keyboard with some colour coding.
Built in speaker and cassette unit.
Built in power supply.
16 Opto-isolated inputs and outputs (for user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

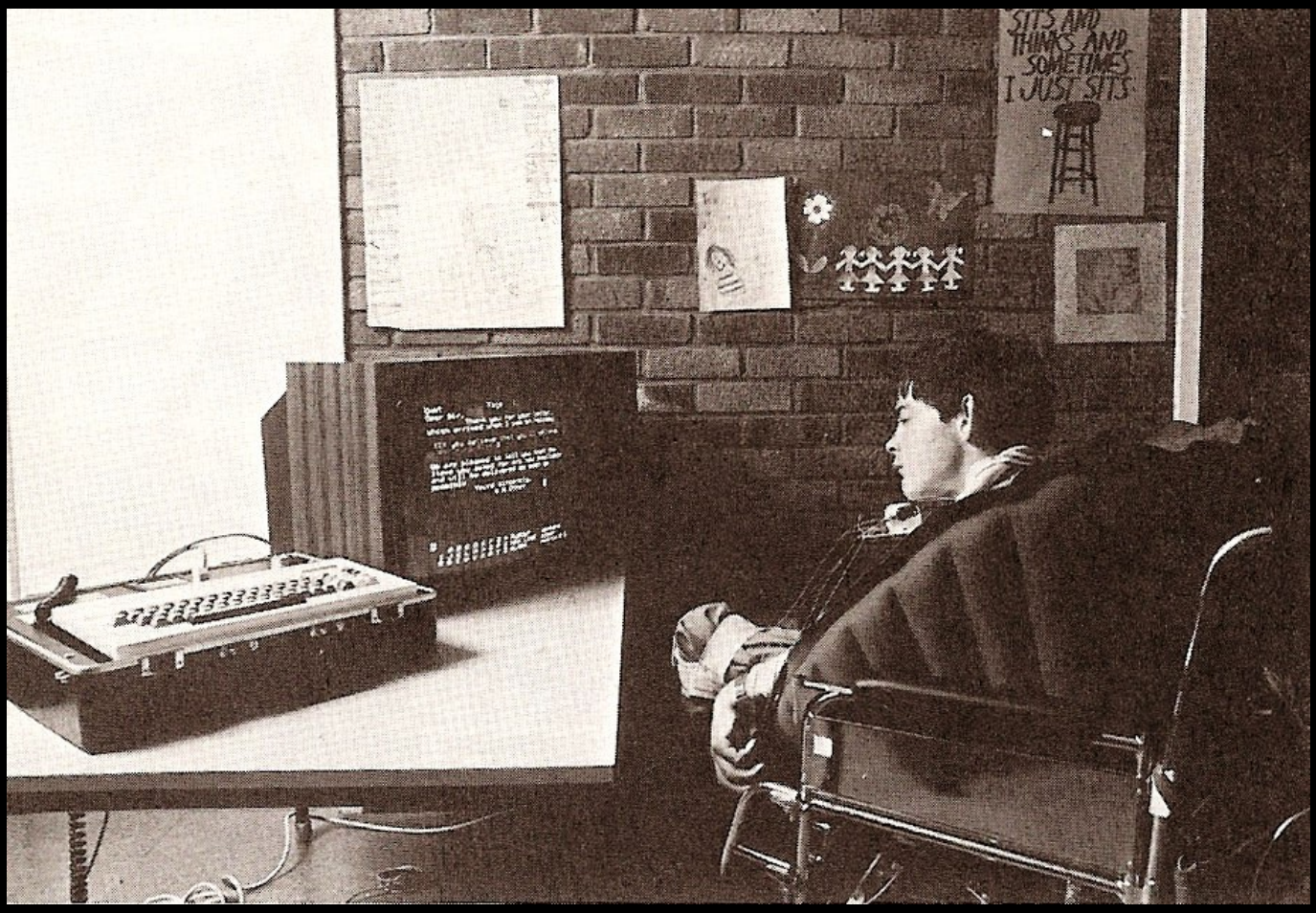
These games proved so successful that a fourth called Simon (likely based on the popular MB Electronics memory game 'Simon') was soon added. More were requested. In London, Joanne played the games too, against her brother Stuart at home. Both as equals.

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.



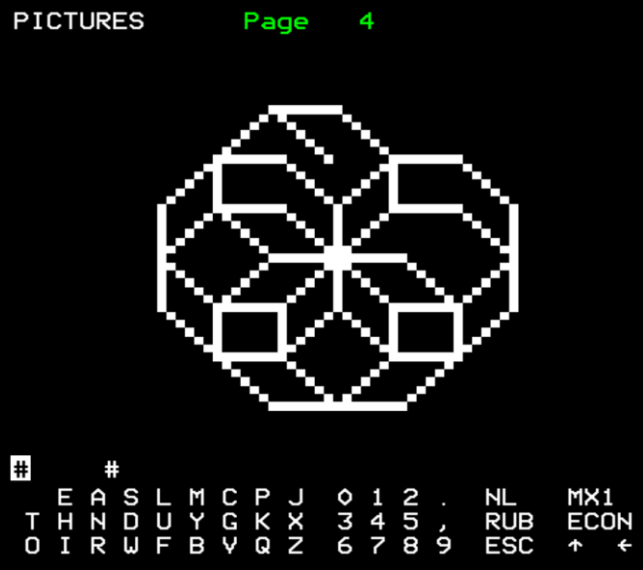
USER RESPONSE SYSTEM

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: The USA's first space station Skylab dropping from the sky out of control back to Earth had caused global panic.

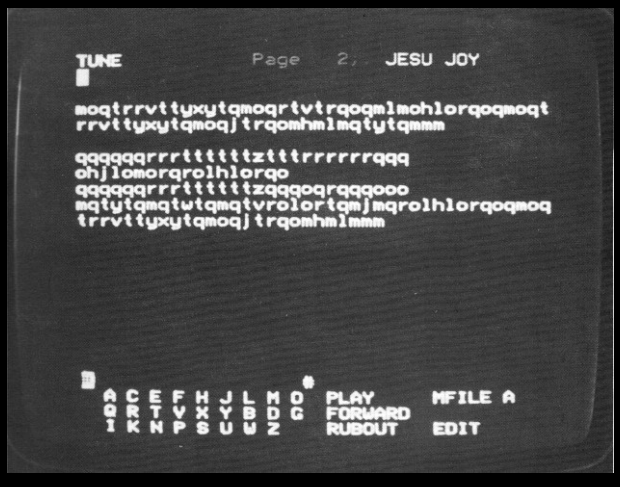
Pictured above is Rachel, who was very weak and unable to speak, creating art using a single finger. She later moved to switch accessible input when her strength reduced further. Rachel very quickly became a competent user of MAVIS using it for communication and all class work, including preparing material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

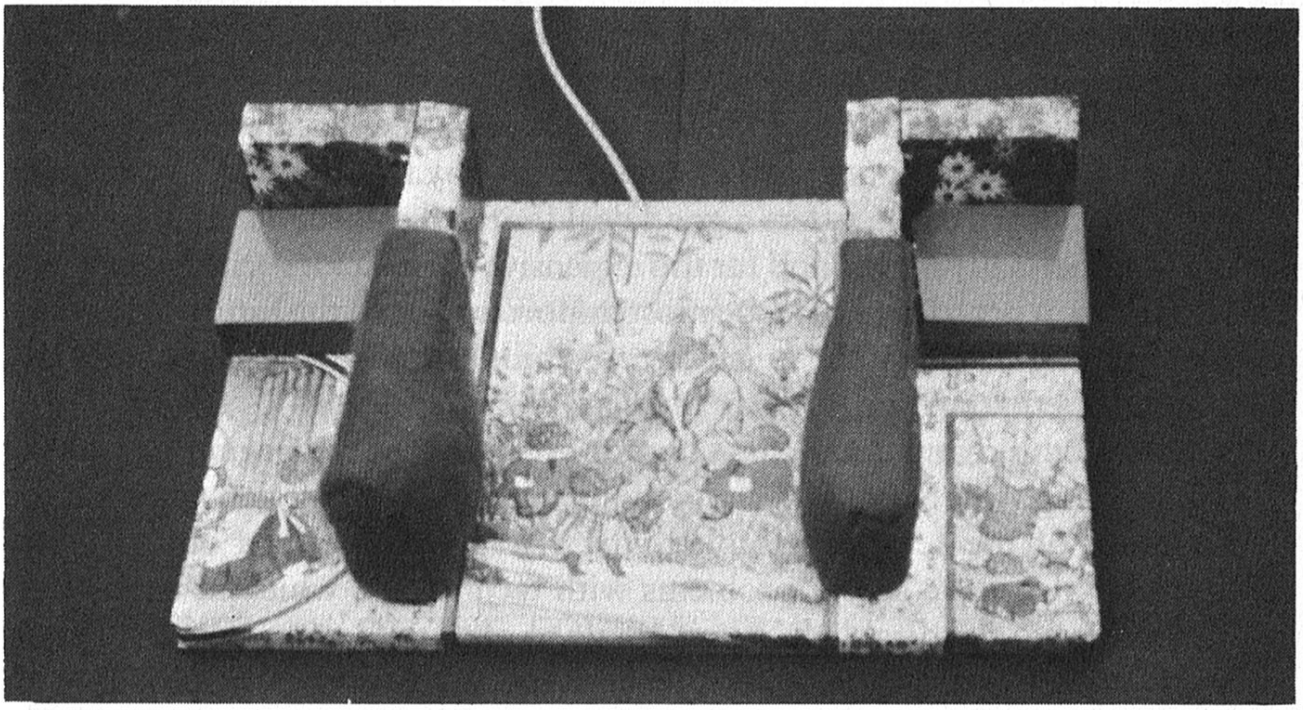


Figure 7.1: Joanne’s latest input. Blue and yellow soft pads at the end of wooden ‘wipers’, and between them a picture of Peter Rabbit. Joanne puts her hand between the pads and is just able to control enough sideways movement to move them, activating microswitches and enabling her to use the matrix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

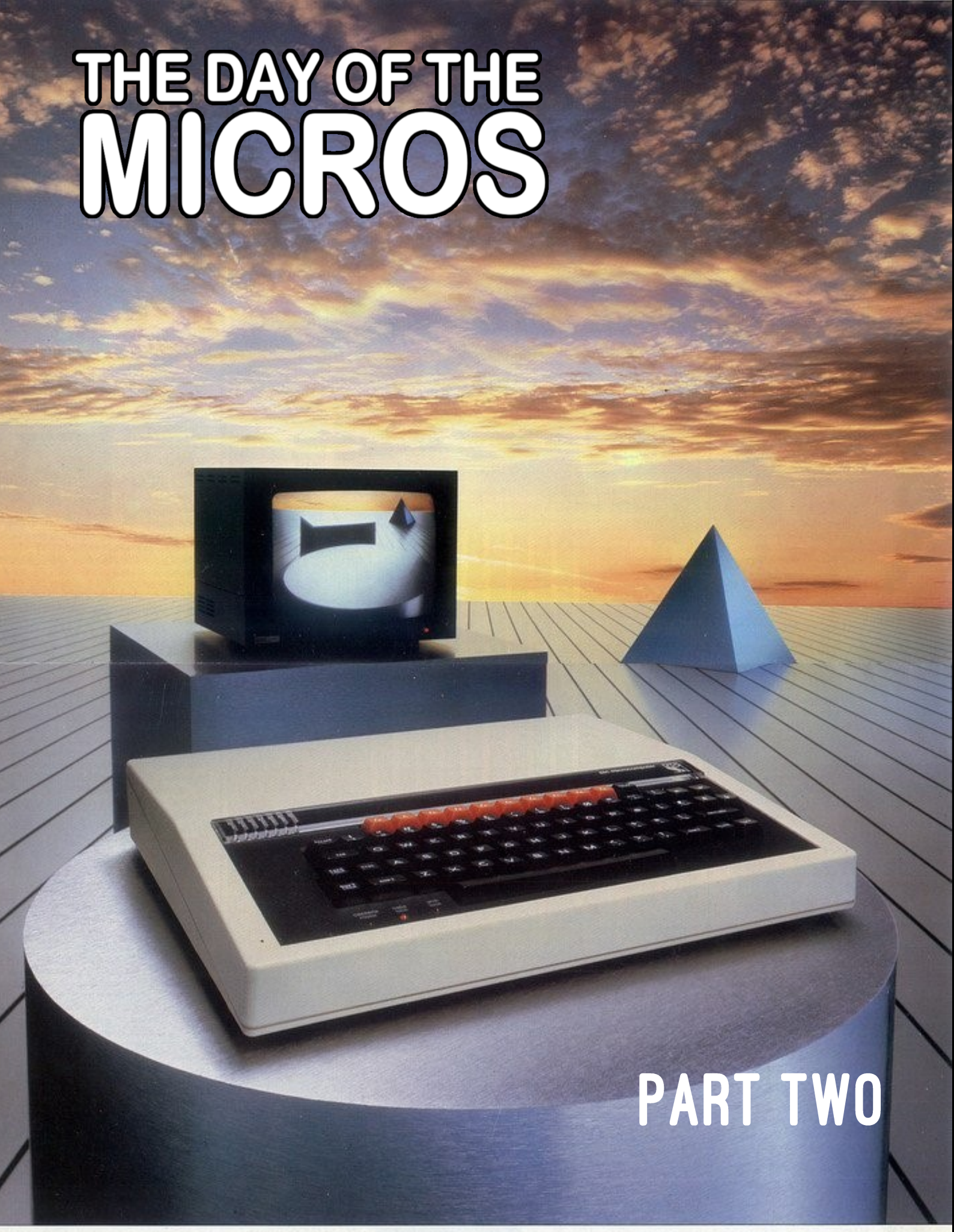
There was some frustration in this approach. Something that was so close to being ready to go, was about to be removed as an option. Julia felt that some of the issues were in UK culture. A place that could be frequently brilliant at creative innovation, was frequently poor at turning these ideas into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

THE DAY OF THE MICROS



PART TWO

The shape of things to come

GEEKERY GLOSSARY

AAC – Augmentative and Alternative Communication.

Allwins – A wall-mounted mechanical coin-operated game where the aim is to flick a ball bearing around a spiral track towards winning and loosing receptacles.

Battleships – a pen and pencil guessing game for two players using a grid.

Cause and Effect – press your switch and something very clear happens.

EM – Electro-Mechanical machines that mix electric and mechanical components.

General Post Office – Ran between 1660-1969 as the GPO with responsibility for the British postal system and latterly telecommunications.

MAVIS – Microprocessor Audio Visual Information System. A 1970s tailor made portable computer designed from the ground up with accessibility in mind.

Morse Code – A method of communicating across great distances using a mix of short or long bursts of sound or light.

National-Elliott 405 – A British valve computer from the 1950s

NHS – The National Health Service, which provides healthcare for all UK citizens based on their need for healthcare rather than their ability to pay for it. It is funded by taxes.

Noughts and Crosses – aka OXO and Tic Tac Toe. One if not the earliest electronic versions of noughts and crosses was by computing and internet pioneer Donald Davies at the National Physical Laboratory in 1949.

ROM – Read Only Memory microchips relating to interchangeable cartridge games.

POSM – Patient Operated Selector Mechanism created to bring greater independence to spinal injury patients. Pronounced as Possum, Latin for ‘I can’.

PRESTEL – The UK Post Office's interactive video text system. A precursor to the World Wide Web.

Scan and Select – A method of scanning, either manually or automatically through a list of options, then using an accessibility switch to select a choice. Pioneered in the early 1960s by Reginald Maling and Derek Clarkson at Stoke Mandeville Hospital.

Southern Rhodesia – A South African British colony, known as Zimbabwe since 1980.

Strowger Uniselector – A mechanism conceived in 1888 by Funeral Director Almon Strowger, to automate the job of telephone switchboard operators that he feared were misdirecting business deliberately. Later to be commonly found in mid-20th Century arcade games and in the prototype POSM.

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Sciatic nerve, Galvani via https://wellcomecollection.org/works/vnky7kj5. Attribution 4.0 International (CC BY 4.0)

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Illuminated "P" image from 2016 trip to Possum HQ in Aylesbury.

The Brave World of Hilary Pole" written by Dorothy Clarke Wilson

Text formed from various sources including my interviews with Dorothy Clarkson, Liz Cartwright (nee Beeston), Roger Jefcoate, David Crockford, Richard Adby, Julia Schofield, once neighbour "Mr. Appleton" and Andy Shelton (ex. Telemachus). Also from Geoff Webb Memories of Polio self-recorded (c.1975) British Library ref. C1383. A transcript from Mandeville Legacy with Dr. John Silver http://www.mandevillelegacy.org.uk/documents/silver.pdf and the Hilary Pole poem from her biography "The Brave World of Hilary Pole" written by Dorothy Clarke Wilson.

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Midway Tennis image from chopperthedog YouTube video https://www.youtube.com/watch?v=rmSG9fpl1Kc. Flyers from personal scans and The Arcade Flyer Arcade (TAFA): http://flyers.arcade-museum.com/

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FRED computer photo, Joe Weisbecker collection, AVD_246409_040_12, Hagley Museum and Library. https://digital.hagley.org/AVD_246409_040_12#page/1/mode/2up.

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Photos via Senad Palic at the Flipper- und Arcademuseum Seligenstadt, Germany: https://for-amusement-only.de/

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Some information via http://allincolorforaquarter.blogspot.com/2014/06/the-almost-untold-story-of-tv-powww.html

ADVERT: Don't watch TV tonight. Play it! Atari campaign (1978) scanned from Playboy magazine.

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The End of the 'Baby-Killer (1916)' via https://en.wikipedia.org/wiki/File:The_End_of_the_%27Baby-Killer%27.png

Control Pane photo via Fred Meijer of AtariMusuem.nl

11. Handheld One Button Gaming 1970-1980
The Pocket Calculator Game Book, book by Edwin Schlossberg and John Brockman (1975)

Seiko 0634 screenshots from ChromeFreeDisco YouTube channel: https://youtu.be/GWUuGqTUveo

Coleco New Dimensions 1978 catalogue scans from http://andeverythingelsetoo.blogspot.com/2013/01/coleco-new-dimensions-78-part-one.html

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Seiko 0634 from the Digital Watch Library: http://www.digitalwatchlibrary.com/DWL/1work/seiko_lc_0634-5019/. Auto Race information via Retro Thing: http://www.retrothing.com/2005/11/mattel_auto_rac.html

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15. Pre 1981 Electronic Assistive Technology
WORK IN PROGRESS

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 .

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INDEX

Atari, 36, 41
Auto Race, 45, 129
Fairchild, 37, 49
National-Elliott 405, 24
Nellie, 24
POSM, 17, 18, 22
RCA, 49
Reaction Tester, 24

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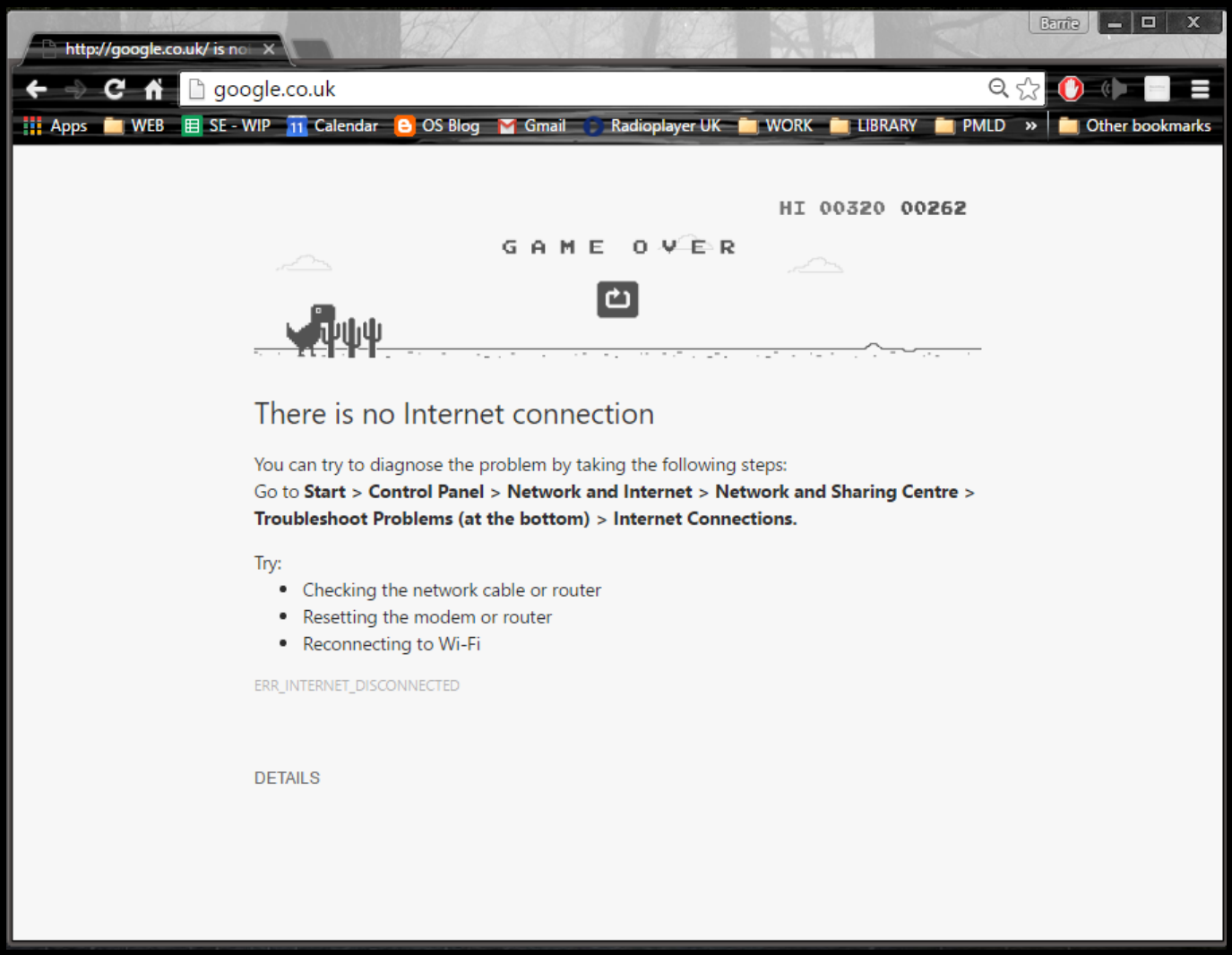
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Other bookmarks
HI 00320 00262
GAME OVER
There is no Internet connection
You can try to diagnose the problem by taking the following steps:
Go to Start > Control Panel > Network and Internet > Network and Sharing Centre > Troubleshoot Problems (at the bottom) > Internet Connections.
Try:
Checking the network cable or router
Resetting the modem or router
Reconnecting to Wi-Fi
ERR_INTERNET_DISCONNECTED
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