Tales from the life of a formidable lady.

Dina St Johnston, founder of the UK's first Software House.

Simon Lavington

February 2025.

Agenda.

- Intro to Dina and Elliott-Automation where she first programmed.
- Two key projects at E-A for which Dina was the lead programmer.
- Why did Dina leave E-A to form her own company, VPS?
- VPS: its development and some landmark VPS achievements.
- Diversity: Dina's life in the context of other women pioneers who started work within the first ten years of general-purpose, stored-program digital computers – say 1949 to 1959.

Aldrina St Johnston (neé Vaughan)

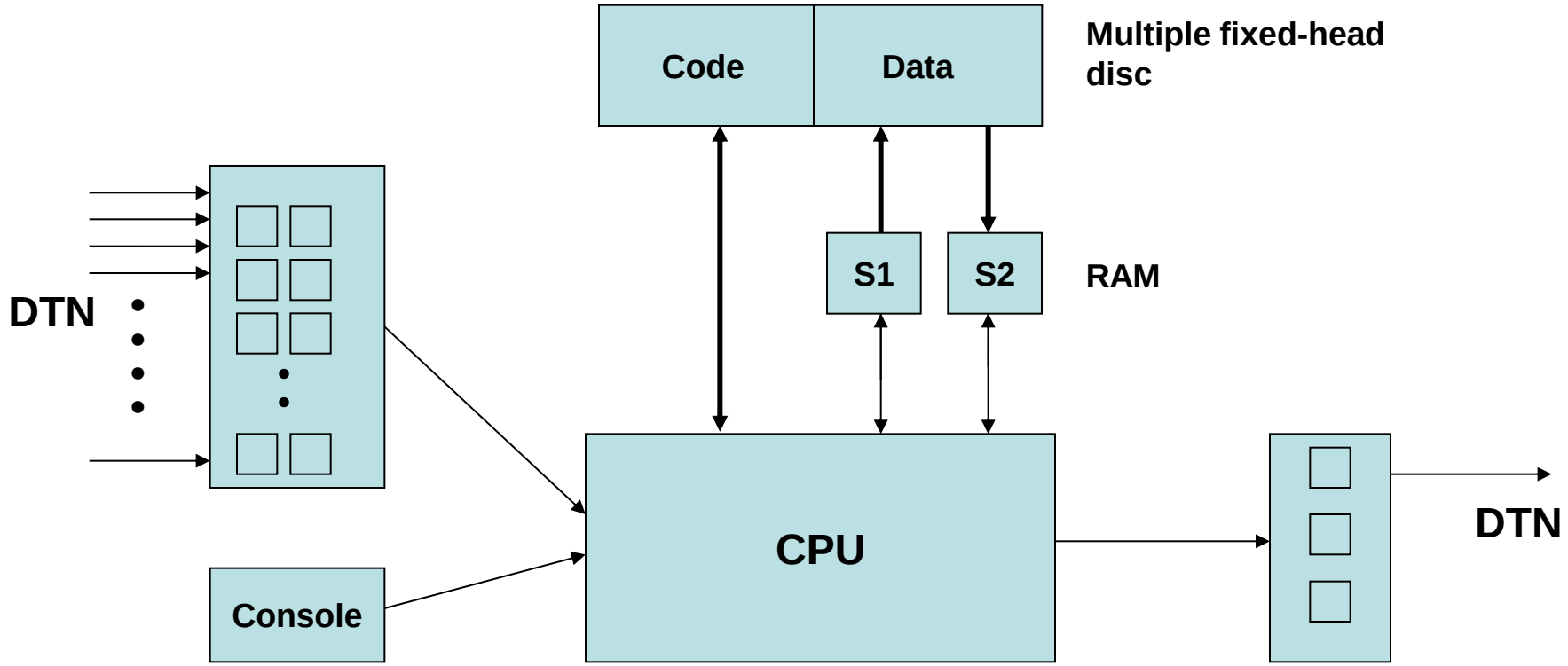
Dina born London 1930. Left school aged 16; studied part-time for Maths degree at London University.
Joined **Elliott's Borehamwood Labs** in 1953, as one of three women in a team of seven programmers.

Samples of Dina's tasks whilst at Elliotts:
Software for the **Elliott 153** GCHQ computer (1954).
Software for the **Elliott 405** business computer (1956).

Talents and ambitions: Dina leaves Elliotts (1958).

The UK's first independent software house,
Vaughan Programming Services (VPS) (1959).
VPS flourishes, eventually employing 100 people.
Dina retired in 1999. She died in 2007, aged 77.

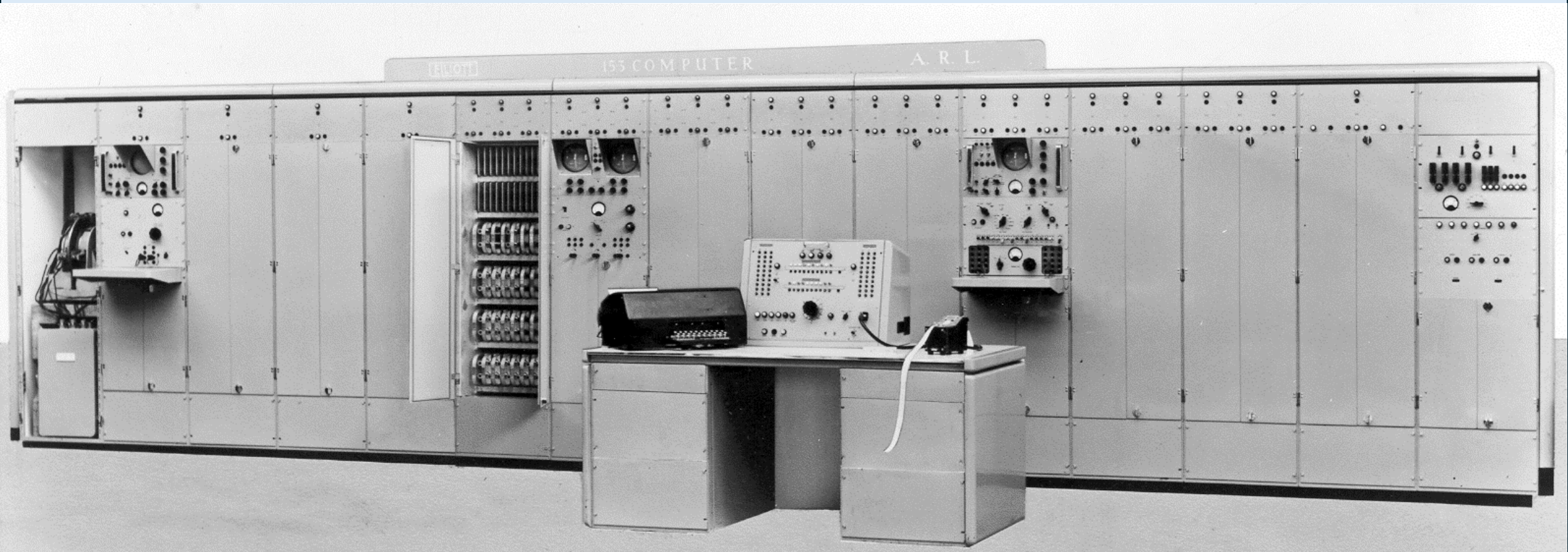
The wider diversity context in the 1950s.



DTN = Defence Teleprinter Network

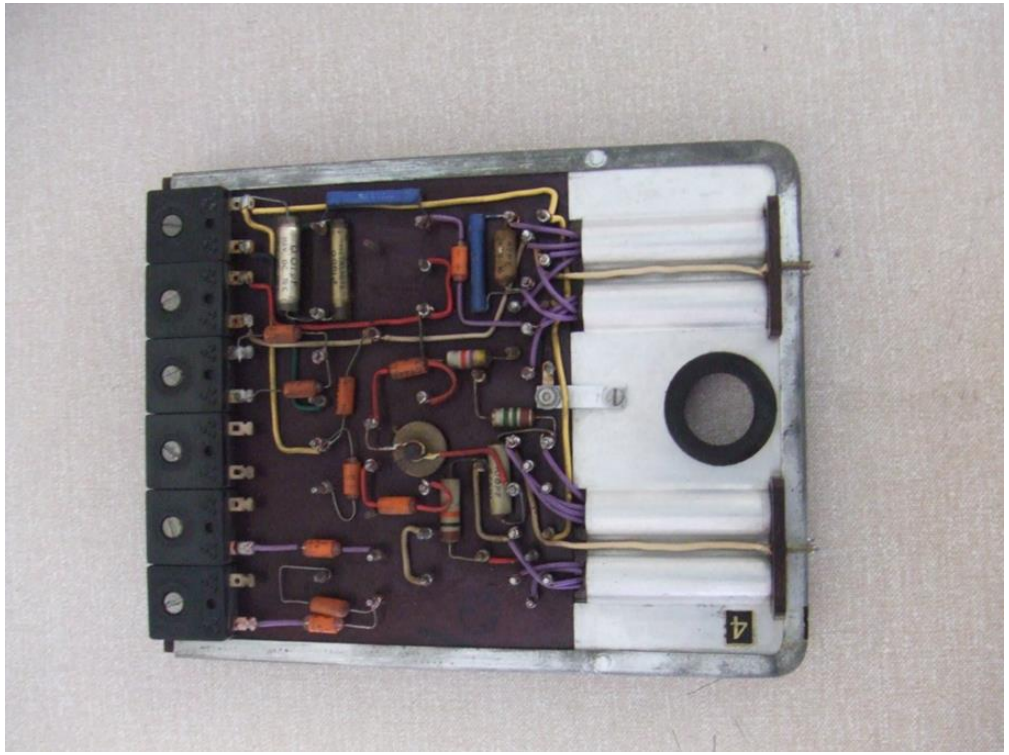
Elliott 153 *(the 'DF, Direction-Finding computer')*: overall system diagram

The Elliott 153: installed in 1954 at GCHQ Scarborough.



Purpose: to get a best 'fix' (eg by triangulation) asap from DF data coming in via DTN from several listening stations world-wide. Typically about 230 DF fixes were processed per 24 hours. Each fix: formerly 20 mins.; the 153 took 10 secs.

The 153 used a packaged pcb technology, with sub-miniature pentodes. It operated ‘continually’, with good reliability, until about 1967.



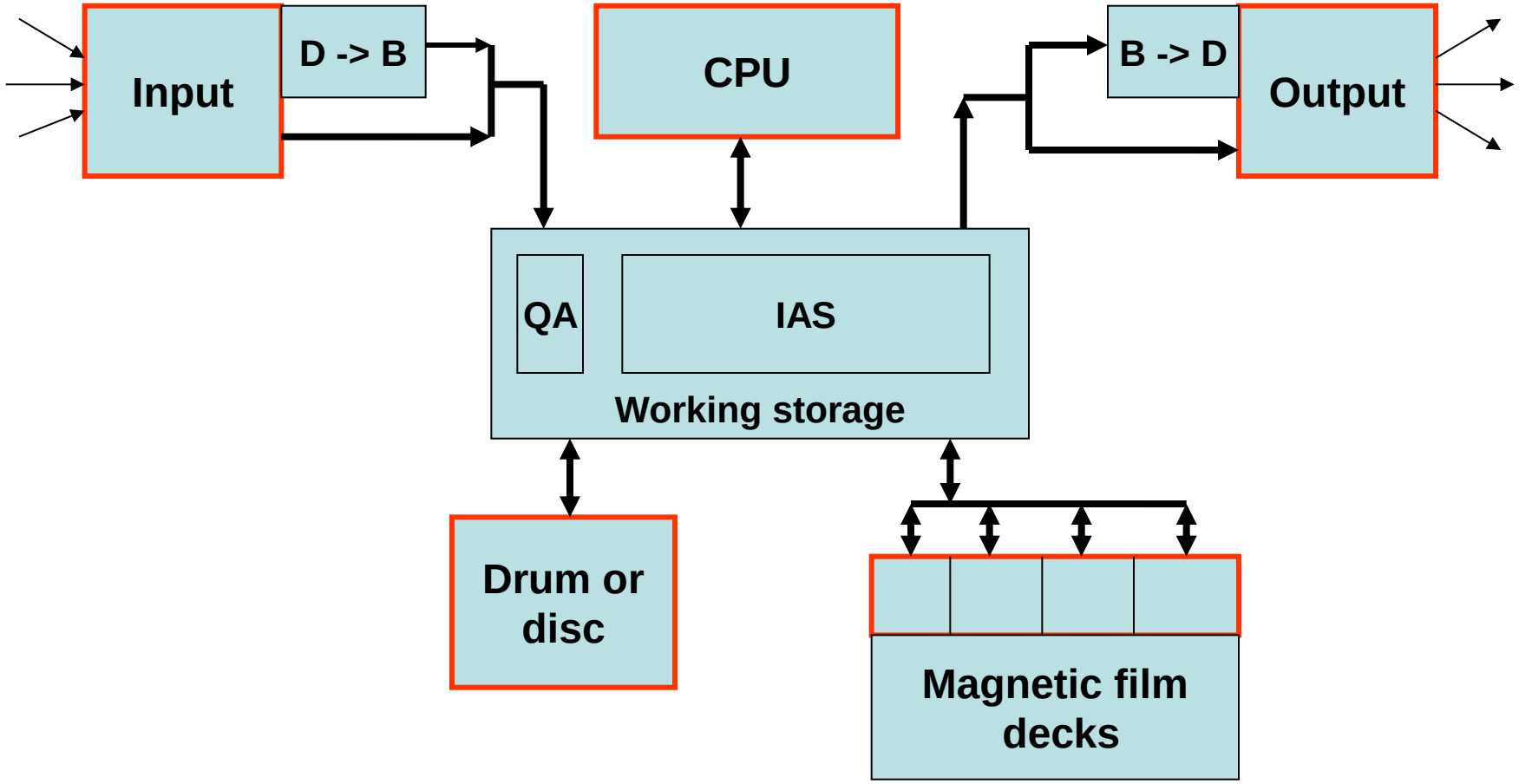
The 153 had 64-bit instructions and seven multiplexed internal highways. This allowed functional parallelism within one instruction. Typically, one 153 instruction could do the work of about four conventional machine instructions.

Dina had other tasks at E-A in the 1950s, for example helping to implement control software for small computers for industrial automation in steel mills.

But the next project in which Dina took a major role was in writing software for the Elliott 405 computer, oriented towards business data-processing in large commercial organisations.

The Elliott 405 computer

Elliott's first system specifically for commercial data-processing. It had autonomous units performing a range of I/O operations on bulk data, including character conversion & currency (£-s-d) conversion.



Each 405 installation was configurable according to options. In large systems, there could be up to 16 magnetic tape (film) decks.

An Elliott 405 computer at Norwich City Council Treasurer's Dept. in 1956.

By 1958, what made Dina stand out?

“She was a formidable lady, in temperament more of an engineer than a mathematician”.

“She was happy to go round a steel works in a hard hat”.

“As a programmer, Dina was unique. Not only was she inventive and structured, she was very accurate. She wrote with a Parker pen with permanent black ink and if there ever was a mistake it had to be corrected with a razor blade. Whereas the rest of us tested programs to find the faults, she tested them to demonstrate that they worked”.

In the late 1950s, Dina foresaw a need:

- **Computer manufacturers were not supplying any applications software.**
- **Many companies were purchasing their first computer and were exploring novel applications areas – usually with difficulty!**
- **There was a shortage of skilled programmers.**

The solution:

Create an independent ‘Software House’:

VPS: Vaughan Programming Services.

VPS company history.

VPS began on 9th Feb. 1959 in Dina's home in Brickendon, Herts.

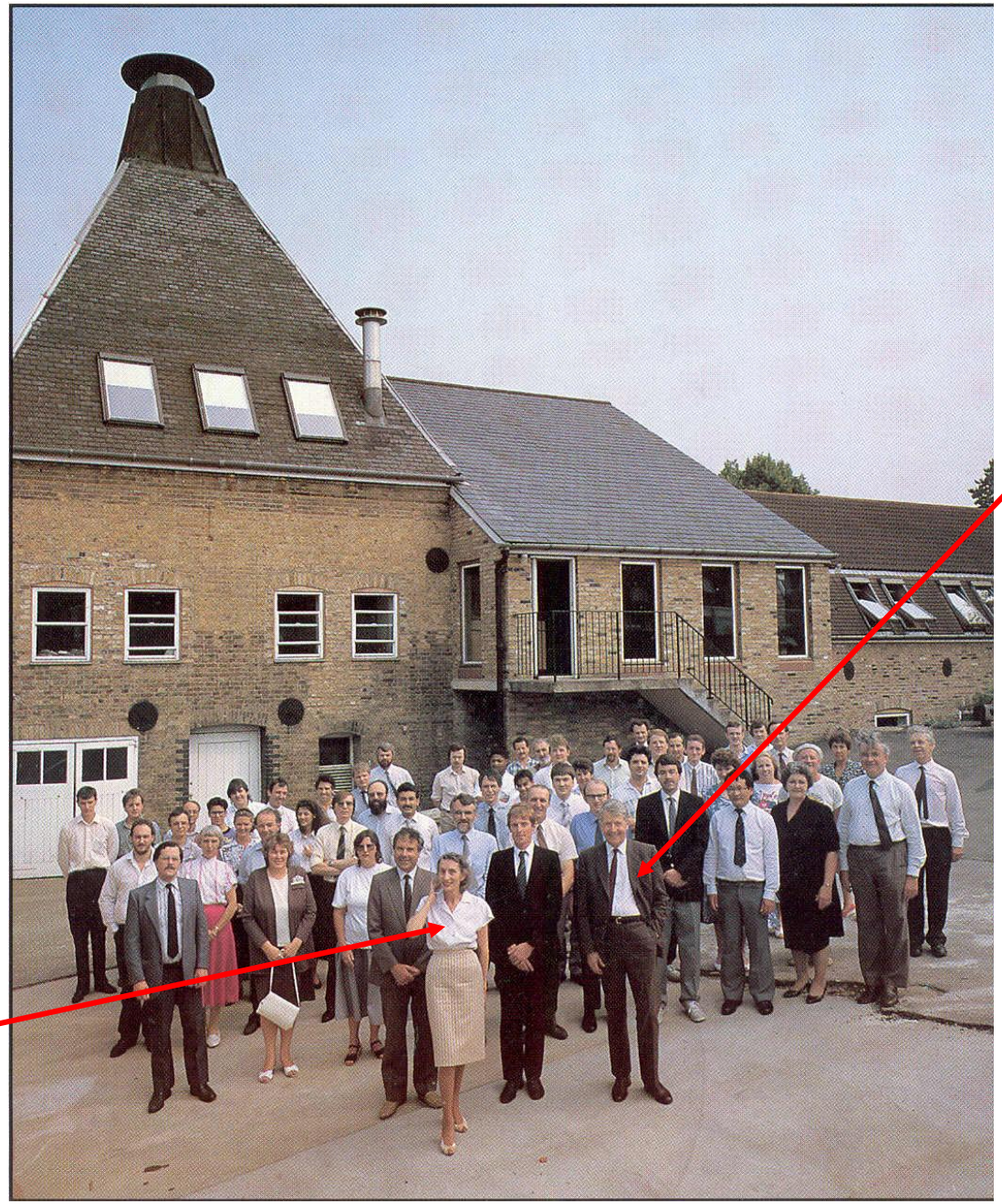
NB – Steve Shirley founded Freelance Programmers in 1962.

1966: VPS in larger premises, employing 30 people, mostly programmers.

1977: VPS became a limited company. Stated activity: "Designers, specifiers, advisors on, experts in, manufacturers & suppliers of computer based systems software & hardware in the field of Control and Automation for industry, communications, government and defence".

1979: VPS bought & converted an old Maltings in Ware. By 1992 payroll = 100.

1996: VPS sold to Harmon Industries & traded as Vaughan Harmon Systems.



Andrew St Johnston, who left Elliotts in 1968 and joined VPS as Managing Director.

Dina St Johnston, Software Director.

VPS innovations

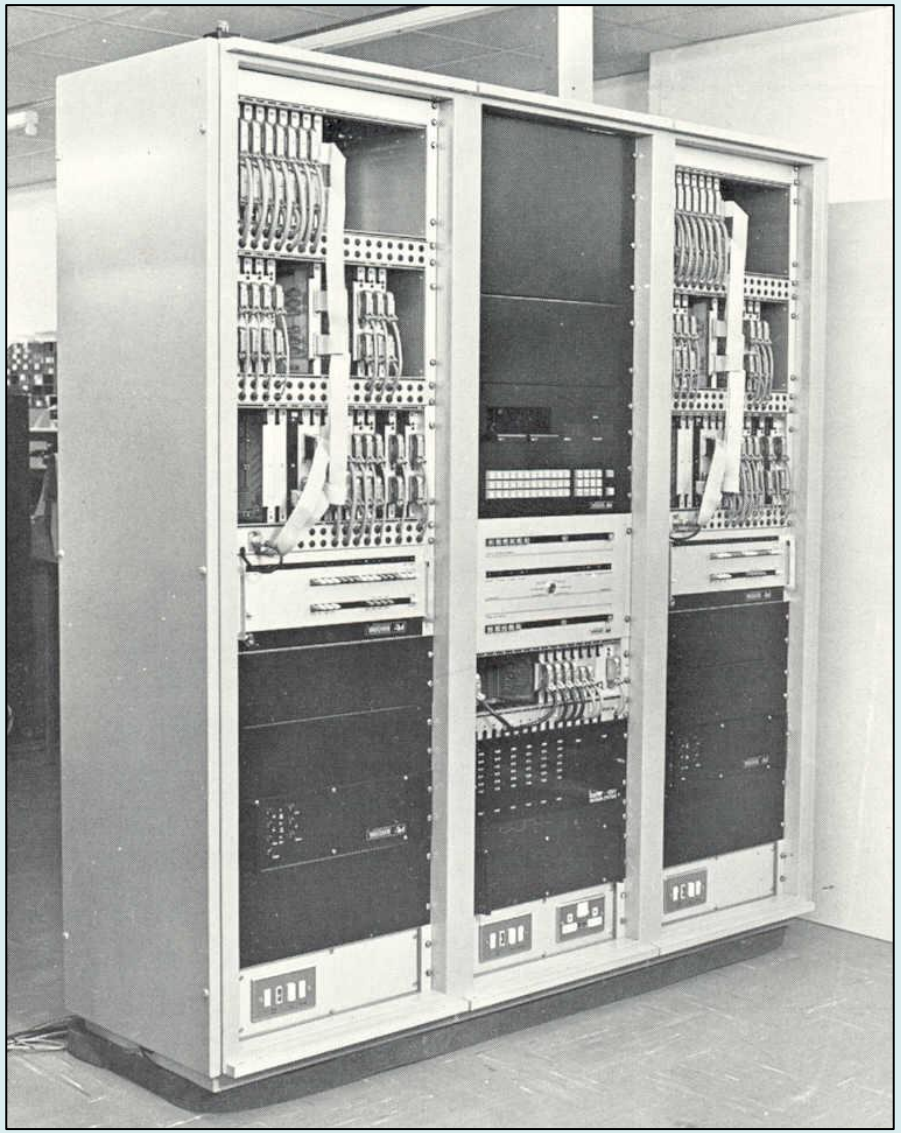
VPS's Master Control Executive (MACE), 1960 onwards.

A robust timesharing mini operating system with predictable, precise response times (*as required for Windscale/Sellafield*)**. MACE ported to many hardware platforms, including the Vaughan 4M.**

Vaughan 4M: VPS's own minicomputer, 1977 onwards.

Based on the 16-bit Texas 9900 microprocessor chip-set and pcbs with plated-through holes. The CPU had a multi-level interrupt facility and hardware multiply & divide. A wide range of analogue and digital Input/Output modules was available, each optically-isolated from the main system. The 4M ran MACE.

The Vaughan 4M minicomputer. *TNMOC has one of these.*



The breadth of VPS projects

Applications: industrial process control, stock control, data logging, survey analysis, compiler writing, operating systems, railway signalling & control, motorway control, passenger information systems, etc.

Clients: Elliott, Ferranti, IBM, AEI, Boulton & Paul, GEC, Texaco, Kelloggs, MOD, UKAEA, BAA, COI, CEGB, Dept of Transport, British Rail, County Councils, utility companies, etc.

Platforms: computers from Elliott-Automation, Ferranti, IBM, NCR, LEO, Honeywell, DEC, Arcturus, Digico, etc. …. and the Vaughan 4M.

In summary, Dina St Johnston was an exceptional female operating in a largely male-dominated field.

Was she, in any sense, unique? How many other British women programmers started work in the first decade of general-purpose stored-program electronic computers – say 1949 to 1959?

Diversity in the UK's computer industry in the early days

There were likely to have been at least 60 women programmers who started programming between 1949 and 1959. So far, 58 have been clearly identified. Here's where they started work:

(a). Government establishments and academia: 17
(b). Computer manufacturers: 39
(c). End-user organisations other than (a): 2

A snapshot of the UK's computer industry in 1953

Company	S/W team in 1953 *total,*	*of which women*	Commercial product *date first delivered*	
Elliott	7	3	402	1955
Ferranti	14	8	Mark I	1951
English Electric	6	0	DEUCE	1955
BTM (later ICT)	4	4	HEC2M	1955
Lyons (Leo)	9	1	LEO II	1958

Of the 58 women, here are four examples.

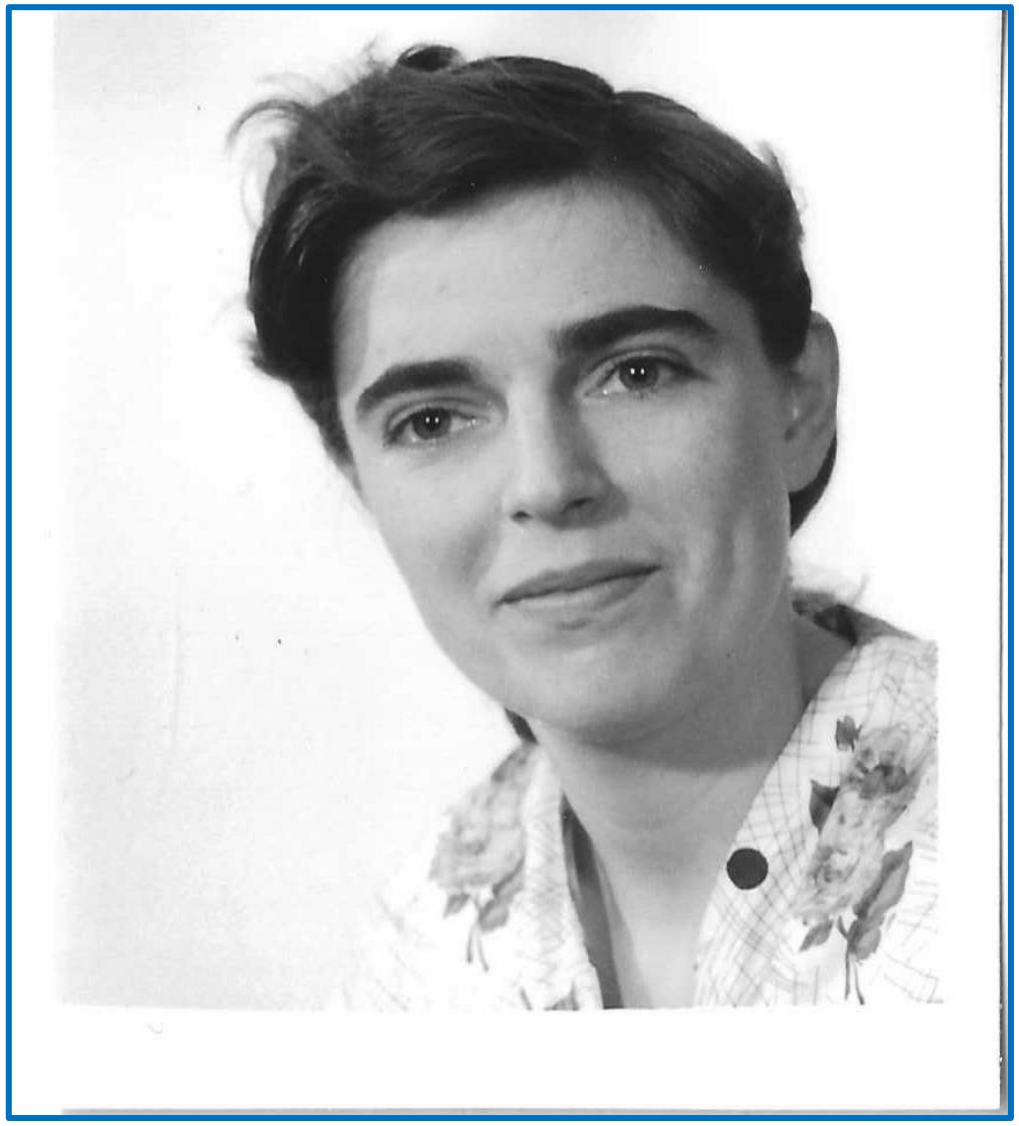
From (a): Mavis K Hinds. Born 1929, died 2009.
Career: Met Office

From (b): Joan Travis (neé Kaye). Born 1933.
Career: Ferranti/ICT/ICL

From (c): Ann Moffatt. Born 1939
Career: Kodak/F2/Scicon/CTL/AMP/ASE/

From (a) then (b) then (c): M Audrey Clayton (neé Bates). 1928 -> 2014.
Career: M.Sc./Ferranti/Toronto/Alwac/NCR/USGAO

Mavis Hinds in 1956, programming a Ferranti Mark I computer at Manchester University.



Joan Travis in her 20s, at the start of her long career with Ferranti/ICT/ICL.

Ann Moffatt in a posed cover photo for her autobiography, as she worked part time whilst effectively a single parent.

Audrey Clayton at the University of Toronto Computing Centre in about 1954.

Conclusions about Dina St Johnston

Compared with most other women pioneers, Dina was unique in founding a successful computer company (in 1959).

But Dame Stephanie (Steve) Shirley also founded a successful company (in 1962).

Steve was essentially women-oriented, making “jobs suit people”.

Dina was business- orientated, eventually focussing on the particular market of automation and real-time control.

This resulted in two quite different sorts of company.
Both women were leaders in their chosen fields.

References for Dina St Johnston.

VPS source documents are now in the Bodleian Library, Oxford.
They are also catalogued here:
https://www.ourcomputerheritage.org/Catalogs/CatH.pdf

***An Appreciation of Dina St Johnston (1930–2007) Founder of the UK's First Software House*. Simon Lavington. The Computer Journal, Vol 52, Issue 3, May 2009, pages 378–387.**

***Moving Targets - Elliott-Automation and the dawn of the computer age in Britain, 1947 – 67*. Simon Lavington. Published in 2011 by Springer.**

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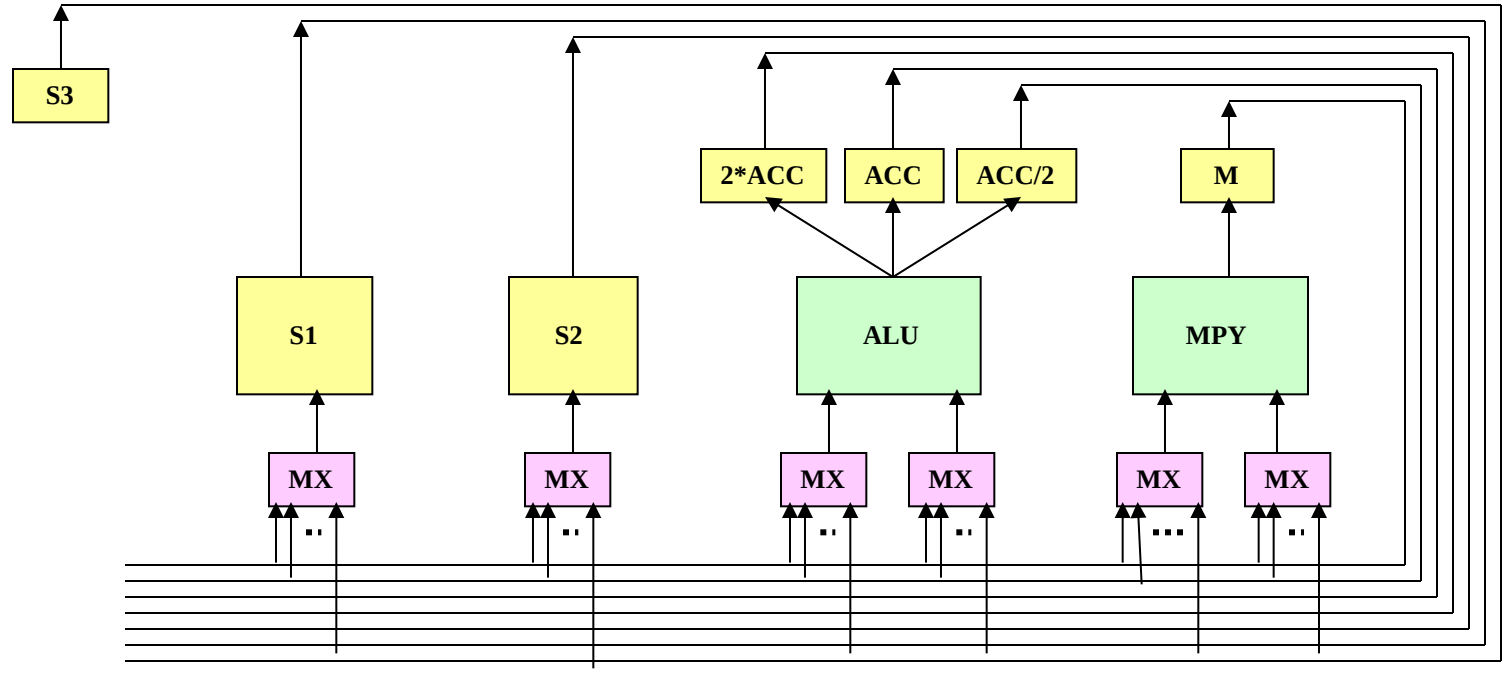
Simplified view of the data paths internal to the CPU of the Elliott 153. Input/output paths have been omitted.



Digit period = 3μsec., serial 16-bit words (2's comp fractions).
Seven multiplexed highways.

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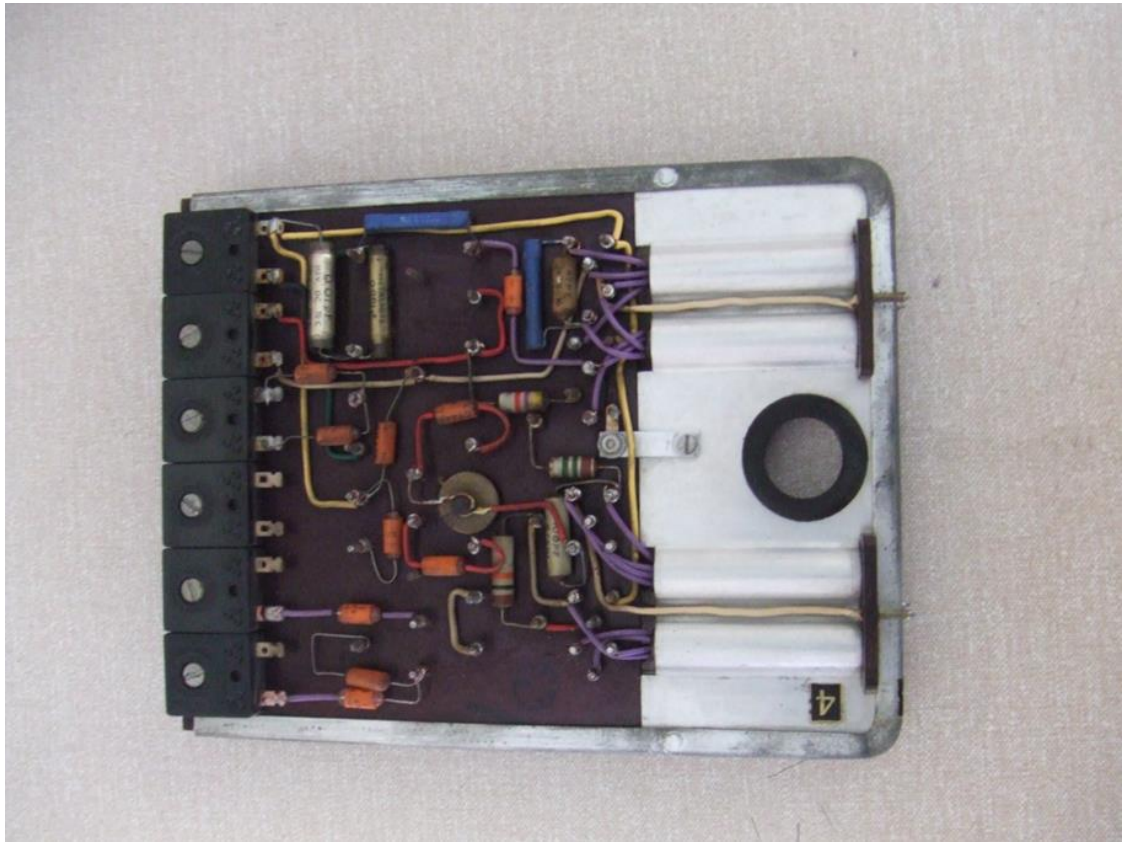
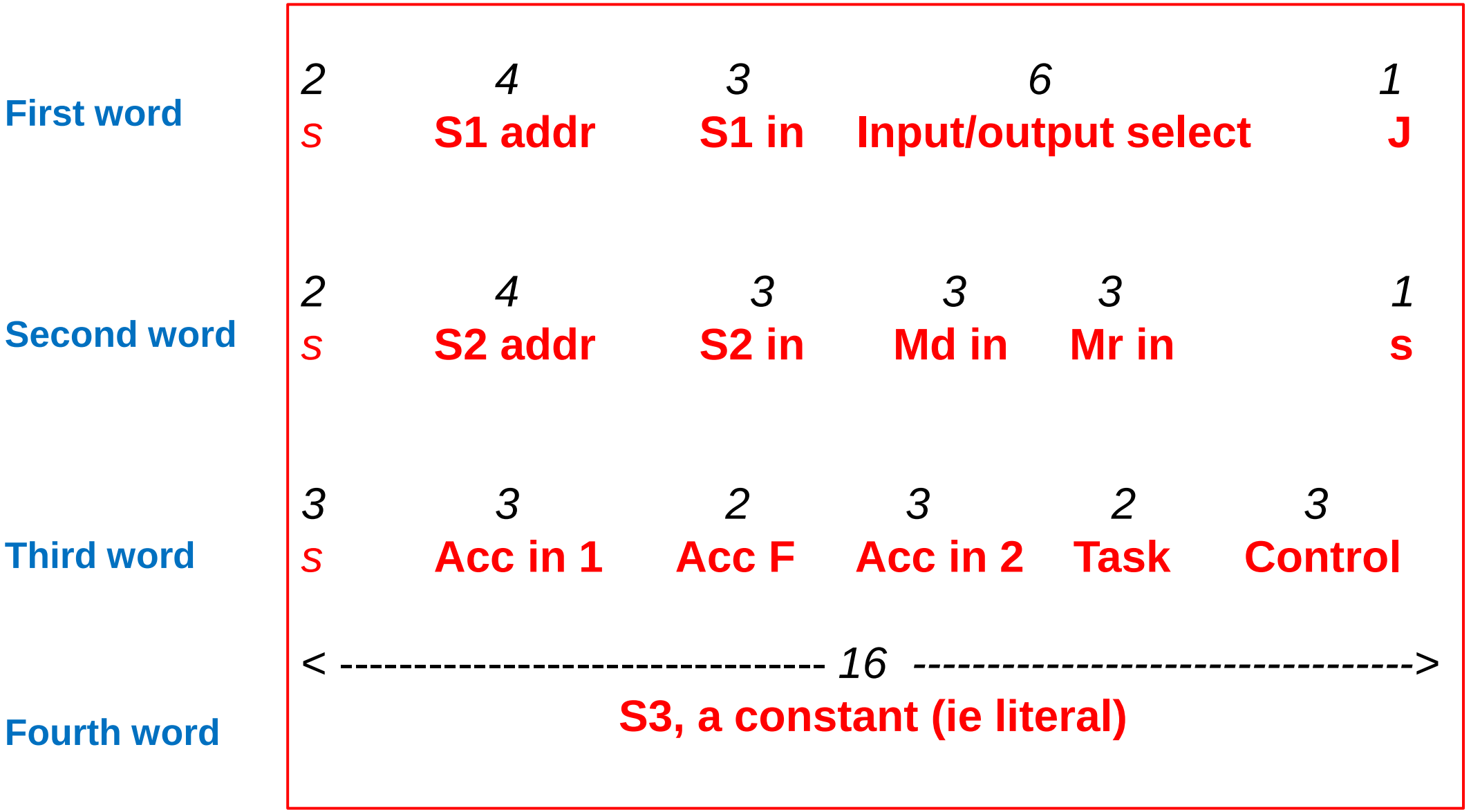


The 153 had 64-bit instructions, plus the seven multiplexed highways, which allowed functional parallelism within one instruction. Typically, one 153 instruction could do the work of about four conventional machine instructions.

For fixed-point arithmetic, the performance roughly equalled that of an English Electric DEUCE.


First word
2
s
4
S1 addr
3
S1 in
6
Input/output select
1
J
Second word
2
s
4
S2 addr
3
S2 in
3
Md in
3
Mr in
1
s
Third word
3
s
3
Acc in 1
2
Acc F
3
Acc in 2
2
Task
3
Control
< ---------- 16 ---------->
Fourth word
S3, a constant (ie literal)