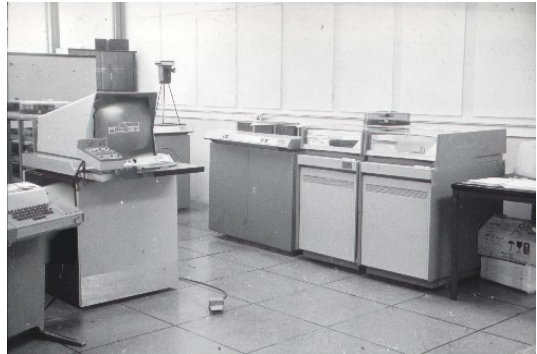


## Note on the Aberdeen University Elliott 4120 computer

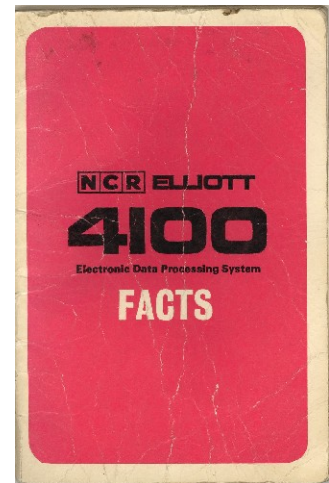
*John S. Reid*

*Honorary Curator of the Natural Philosophy Collection, University of Aberdeen*

A dozen slides in the collection donated by Wallace Bell (ABDNP:201981a) show the Elliott 4120 computer in its operations room in Marischal College (near the far end of the College from Broad Street). The 4120 was obtained in 1966 by E W Elcock (Ted Elcock), A M Murray (Sandy Murray) and J M Foster (Michael Foster) [The Science Research Council (SRC) Group for Computational Research, with Ted Elcock as director] on a research remit to explore AI possibilities in computing. This was a multidisciplinary initiative, for Ted Elcock was initially in the Department of Natural Philosophy, Sandy Murray Head of the Department of Electronic Computing and Michael Foster, who had come from the Royal Radar Establishment at Malvern, was attached to the Department of Engineering. They were later joined by P M D Gray (Peter Gray) in 1968 and J J McGregor (Jim Macgregor) in 1970. The group had strong links with Donald Michie's AI group in Edinburgh, who already had an Elliott 4120.



The 4120 had 32K of 6  $\mu$ S store with word length 24 bits that could represent 2 short instructions or 1 long instruction, or a signed integer. Floating point numbers were held in two words in the form of a 39 bit mantissa and a 9 bit exponent. The floating point accumulator operated with a 48 bit mantissa and a 12 bit exponent. Basic addition (and subtraction) took 12  $\mu$ S, multiplication 260  $\mu$ S, division about 210  $\mu$ S; floating point addition about 370  $\mu$ S and multiplication and division just over 600  $\mu$ S. All this information and much more was available to



users in Elliott's '4100 Facts' booklet. Compared with the Elliott 803 that the University had acquired at the end of 1961 for general use, the Elliott 4120 had four times the store and the



basic commands were almost fifty times faster. The construction technology was discrete component transistor circuitry on printed circuit boards. Peripherals included a teleprinter console, paper-tape station (punch up to 110 characters per second and reader up to 1000 characters per second). Two hard-disk units (with capacities 1.28 million characters each) replaced the 2 magnetic tape units that came with the machine in 1966 and a VDU console (see below) was also a later addition. Low level programming was done in NEAT (NCR Elliott Assembler Technique) and high level coding was available in Algol or Fortran IV.



Early work by the group involved developing a program that could play GO MOKU (a simplified version of the strategy game GO) and this work led on to developing ABSYS in 1968 and beyond, an equation solving and logic programming language, the first such language of its kind (“world leading” in today’s promotional speak). Peter Gray has commented *“The trouble was that we were too far ahead of the times. The small storage available [in computers at that time] and the tie-in to a manufacturers’ machine code didn’t allow ABSYS to run on other machines.”* Sandy Murray had written a small bespoke operating system, light on memory space, that allowed the language to be developed and run on the 4120. Ted Elcock and Peter Gray have written a retrospective technical article on ABSYS (“Absys, Equation Solving and Logic Programming” Department of Computer Science, The University of Western Ontario, Technical Report #213, July 1988 and see “Absys: the first logic programming language? A retrospective and a commentary” The Journal of Logic Programming 9(1) July 1990, pp1-17). The language pre-dated the much better known Prolog by several years and influenced the languages POP-2 and GOLUX. Some ABSYS features are described in the ‘Encyclopaedia of Computer Languages’ <http://hop1.murdoch.edu.au/showlanguage2.prx?exp=357> which references detail in papers by Michael Foster and Ted Elcock.



The 4120 was housed within the Engineering Department. In 1966 the Engineering Mathematics Group had been formed consisting of Ted Elcock (transferred from Nat. Phil.) and Peter Lees. W W Bell (Wallace Bell) joined them later, also from Nat. Phil. The main remit of the group was to teach 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year engineering students. They also used the 4120 and when the Computational Research Group

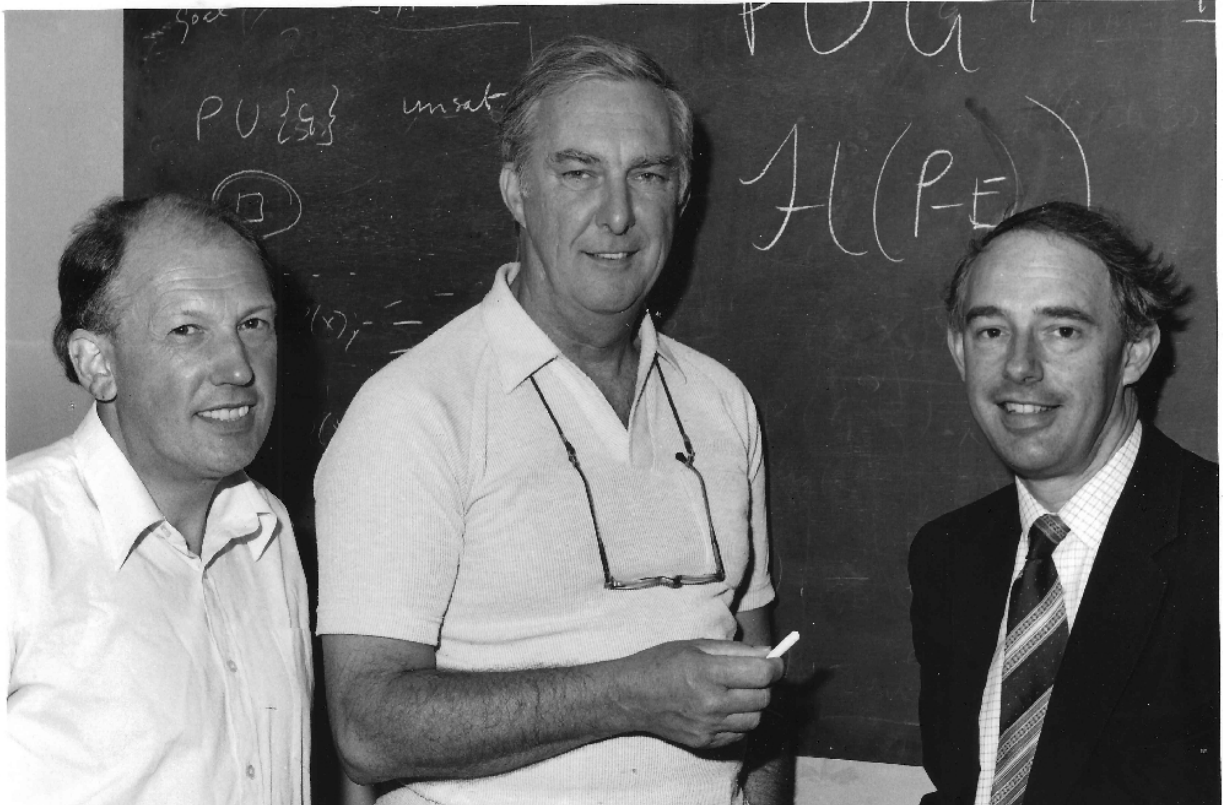


had done its major work the 4120 was opened up to the rest of the Engineering staff, post-graduates and Honours projects. As payment for use of the facility the Engineering Department contributed the VDU peripheral to the equipment, seen in the previous pictures. Their main interest was in using it for finite element analysis applied to building design. Peter Lees has commented that *“the VDU console (I think it was called an Elliott 4280) is rather interesting. It was one of the first British displays with interactive capability via a lightpen worked with a foot-pedal. You can see the lightpen and pedal in the photographs. Lightpens never really seemed to take off!*

The Elliott 4120 was kept going until the mid 1970s when Engineers transferred their computing to the University’s mainframe. The 4120 was dismantled by ‘Estates’ and dumped in pieces at the University property of Tillycorthie House. Examples of its ferrite core memory are in the Natural Philosophy collection (ABDNP:201920a and ABDNP:201920b) and a few example printed circuit boards from the 4120 are on display in the Department of Computing Science.

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**Dr. A.M.Murray, Dr. E.W. Elcock, Dr.P.M.Gray ABSYS Proj 1968-72**



*Sandy Murray, Ted Elcock and Peter Gray, three of the ABSYS developers, taken in July 1986 on a visit to Aberdeen of Ted Elcock from the University of Ontario.*

**JSR** with thanks to Wallace Bell, Peter Gray and Peter Lees.