

From differential analysers to mainframe computers

Computing and atmospheric research have a long association. In England during the First World War, Lewis Fry Richardson provided the first numerical weather prediction, and had a vision of operational use. In 1946 John von Neumann, one of the pioneers of modern computing, started a project in the USA to develop weather forecasting techniques. The first successful prediction was achieved in 1950 using an electronic digital computer.

In Australia in the early 1950s, the CSIRO Division of Radiophysics developed CSIRAC (originally called 'CSIR Mark1'), one of the earliest electronic computers, but a British team recommended no further work, on the grounds that Australia could buy all the computers it needed from overseas! In fact, during the 1950s, Australia was a world leader in computing. Veterans of the CSIRAC days have claimed that had we persevered with computing work, Australia in the 1990s would possess a highly sophisticated computing industry. In 1956 CSIRAC was transferred to Melbourne University, but with CSIRO continuing to have access. It is now part of the collections held by Scienceworks, Museum of Victoria in Melbourne.

At Aspendale, analysis of data from micrometeorological instruments was exceedingly tedious. Eric Webb, after consultation with the CSIRO Section of Mathematical Statistics, recommended construction of a differential analyser, the forerunner of computers at Aspendale. The device was able to add, subtract, multiply and integrate. The key components came largely from war surplus anti-aircraft gun predictors.

In 1961, Neil Bacon and Graham Rutter built equipment to convert the Division's chart output to paper tape, which was taken to the university to be read into CSIRAC for analysis. In 1964, they used the small Elliott 803 at the CSIRO Divisions at Fisherman's Bend. Several years after Reg Clarke joined the Division, the first local attempts were made to use computers to model the atmosphere, starting with sea-breeze models.

CSIRO established a Division of Computing Research in 1963, and set up its own CSIRO network. In 1964, CSIRO acquired a Control Data Corporation 3600 in Canberra and smaller CDC 3200s. Courier services carried punched cards, paper tape and line printer listings between Aspendale and Canberra.

In late 1967, Robert Bell spent the summer at the Division as a vacation student, working for Reg Clarke transforming Wangara pibal observations to wind speed and direction. He vividly recalls spending the first hour of each day punching cards for the computer. For the rest of the day, he laboriously calculated wind components using log tables and a primitive calculating machine that had little storage capacity. The approach was very error prone, and often required fresh computations to be made when winds were questioned by Reg. Fortunately, more advanced computing facilities were soon to be become available.

In 1969, CSIRO started to develop facilities for remote terminal and batch access and, by 1973, Aspendale was connected to CSIRONET, using a local PDP-11 computer. By modern standards, the PDP-11 was a humble machine, being only the equivalent of an 'XT' personal computer of the early 1980s. Jill Walker (née Campbell) in the 'maths laboratory' had the job of transferring written coding sheets from Divisional staff onto cards that were fed into the PDP-11. The computer transferred data to Canberra for processing. Results of calculations returned via phone lines to Aspendale, where they were printed on continuous computer paper.

The next advance in computing occurred in the late 1970s with the advent of visual display units. From the comfort of their own laboratory, staff were then able to log directly on to the Division's new Hewlett-Packard central computer and run Fortran programs.