

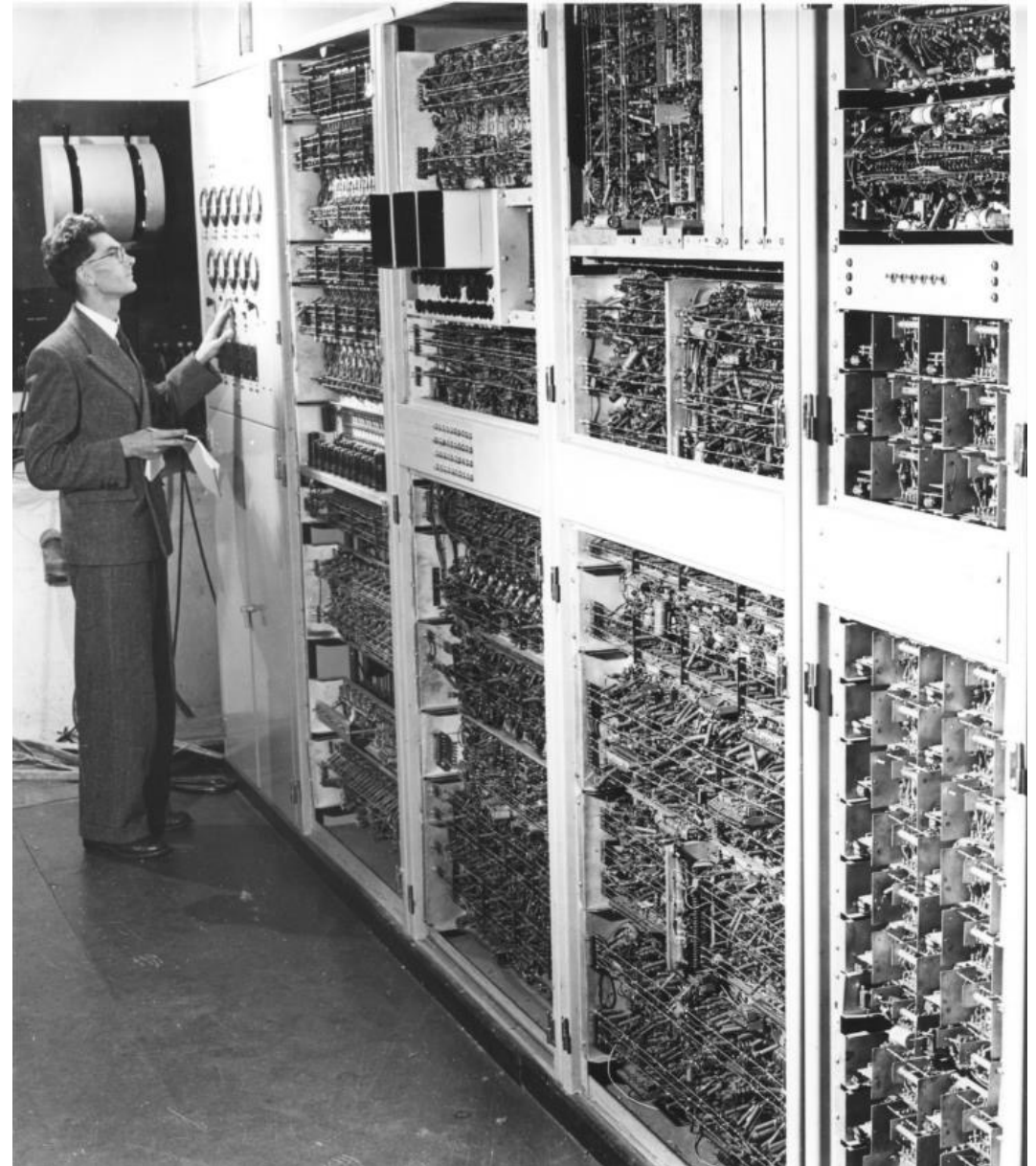


The early development of CSIR Mk 1 in the CSIRO Division of Radiophysics

75th anniversary of Australia's first computer

Ron Ekers | Canberra, 13 Nov 2024

Australia's National Science Agency





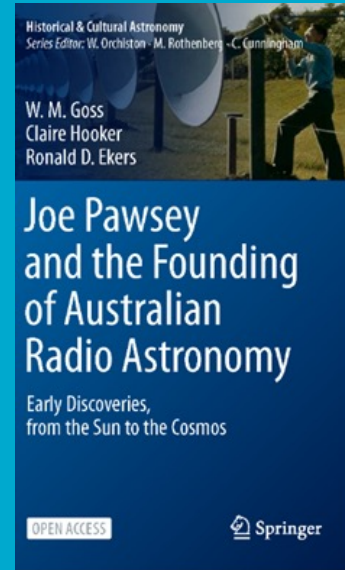
I would like to begin by acknowledging the Gadigal people of the Eora Nation as the Traditional Owners of the land where CSIRAC was built and pay my respect to their Elders past and present.





Resources

- 1947-1956 - Sally Atkinson files
 - Copies of all CSIRAC documents
 - CSIRO Division of Radiophysics
- 1986 Report on CSIRAC
 - Cathy Read to Fred White (Chairman CSIRO)
 - Atkinson questions the completeness of report
- 2023 *Joe Pawsey and the Founding of Australian Radio Astronomy*
 - Goss, Hooker and Ekers, see Chapter 37
- 2000 *The Last of the First*
 - CSIRAC: Australia's First Computer
 - McCann and Thorne



<https://link.springer.com/book/10.1007/978-3-031-07916-0>



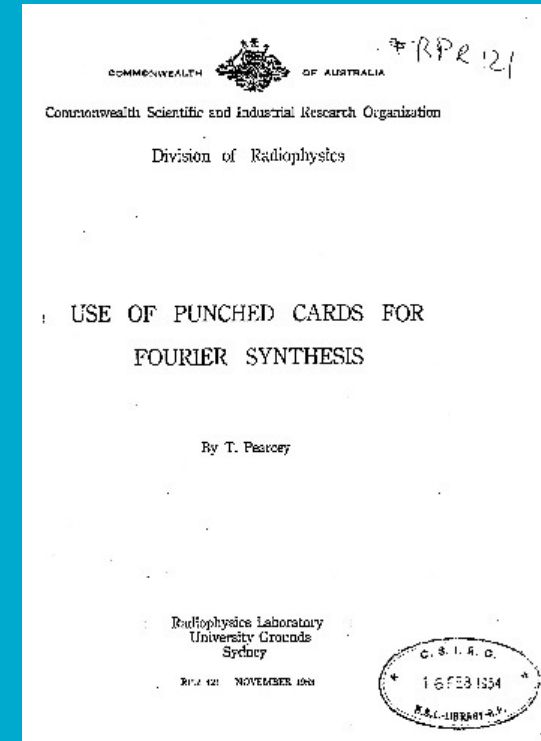
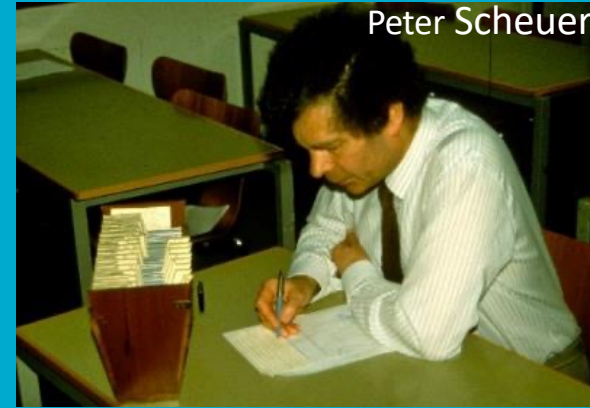
https://www.pearcey.org.au/media/website_pages/initiatives/csirac/Last-of-the-First-CSIRAC-Australias-First-Computer.pdf





The Era of Hollerith Computing

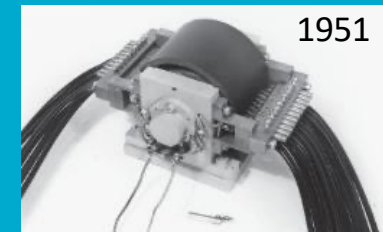
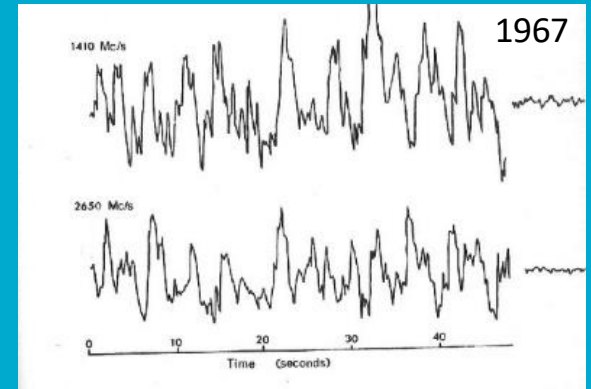
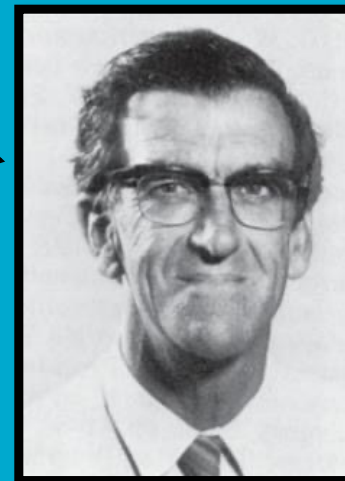
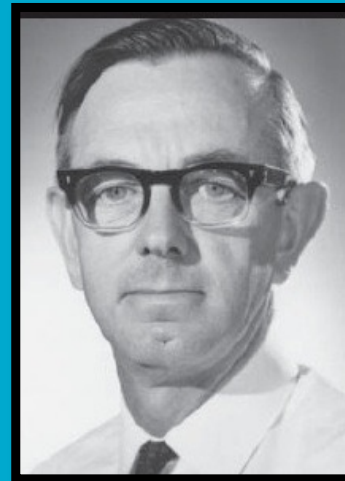
- Lipson-Beevers strips
 - A 2D Fourier transform of a 25×25 array with two-digit accuracy
 - could be calculated by one person in 24 hours
- Pearcey Radiophysics 1945-1953
 - Led development of punched card computing
- Computing Fourier Transforms
 - Punched card tabulator, sorter, collator
 - 2D Fourier transform of a 25×25 array to three digits
 - 14 hours with four operators
- Applications
 - X-ray crystallography
 - Tomographic imaging in radio astronomy and medicine
 - A better solution was needed – the electronic computer





CSIRAC timeline and some people

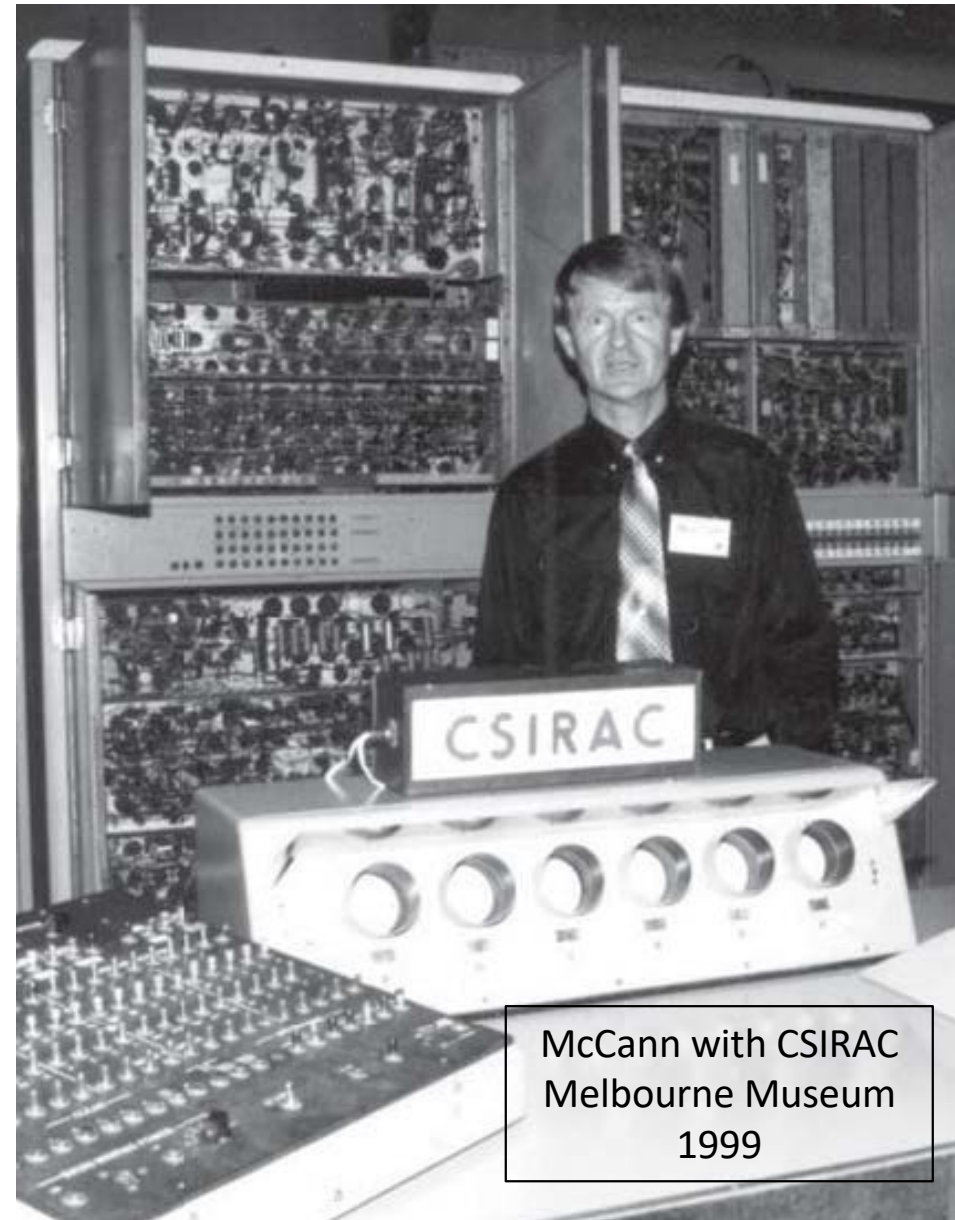
- 1946 – CSIR Division of Radiophysics
 - Rain making. Radioastronomy, Electronic computing
- 1948 – begin construction of Mk 1
 - Maston Beard engineering
 - Trevor Pearcey logical design
- 1949 Nov 14 – first test program
- 1951 – drum based storage unit (4096 words)
 - Brian Cooper – later head of radio astronomy engineering
- 1955 – CSIR Mk1 moved to Melbourne
- 1956 - renamed CSIRAC
 - Melbourne University Computation Laboratory
- 1964 – decommissioned
 - RDE starts PhD in radio astronomy





CSIRO's decision to cease work on the Electronic Computer

- 1946 – Bowen (Chief) and Pawsey prioritise post WWII research
 - i. Rain making
 - ii. Radioastronomy
 - iii. Electronic computing
- 1952 letter from Bowen
 - *Should such machines be manufactured in Australia?...it comes down to simply a question of relative cost and time scales.*
- 1954 – Radiophysics Division
 - Pawsey “*computer could be made work effectively with a further year's work*”
 - Bowen “*not a bit in favour of further development*”
- 1955, Pawsey reference for Pearcey
 - *The [CSIR] machine was in due course completed and, because this Division does not itself have an adequate requirement for such a machine, it is being sent to Melbourne to continue work.*
 - But he wrote a strong reference for Pearcey
- 1955 – CSIR Mk1 moved to Melbourne and renamed CSIRAC
 - U. Melbourne v ARL
- 1983 - Barry Jones (then Minister for Science)
 - **Another example of Australia missing an opportunity**



McCann with CSIRAC
Melbourne Museum
1999

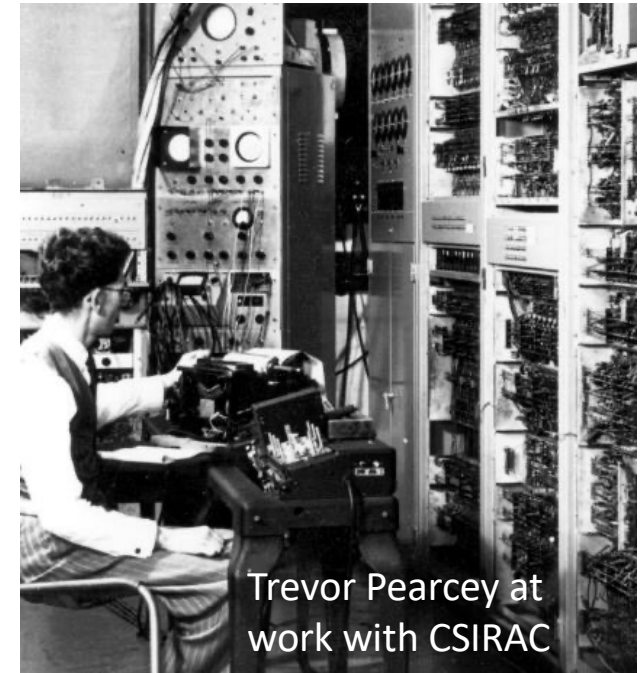


Reason for CSIRO's decision

- Bowen played the key role, supported by CSIRO exec
 - Easy to get Government support for “rain making”
 - *Electronic computers are just glorified toys*
 - Only Trevor Pearcey understood the future potential
 - His vision was to build CSIR MkII
 - No interest from Australian industry to build copies of CSIRAC even though some requests to purchase had been received
 - No use identified within CSIRO
 - Even though Fourier transforms were being hand calculated!
 - Bracewell *too big a jump*
- CSIRO obtained advice from UK expert Douglas Hartree
 - Radiophysics was not the right home for CSIRAC
 - CSIRO should have a Division of Mathematics to address computational use instead of just developing MkII hardware
 - CSIRO Division of Information technology wasn't started until 1985
 - Merged with Maths and Stats in 1997.
 - Merged again in 2009 and 2013



Taffy Bowen
entrepreneur



Trevor Pearcey at
work with CSIRAC



Retrospective analysis

- 1984 CSIRO chairman Fred White responding to Barry Jones speech
 - Rainmaking was not a complete disaster
 - The money also went into radio astronomy and the Parkes (Murriang) radio telescope with huge grants from the US
 - Carnegie and Rockefeller Foundations
 - No Australian company was prepared to make and sell CSIRACs
 - Vacuum tube technology was replaced by transistors and since Australia had no technology developments in this area a computer industry would have failed.

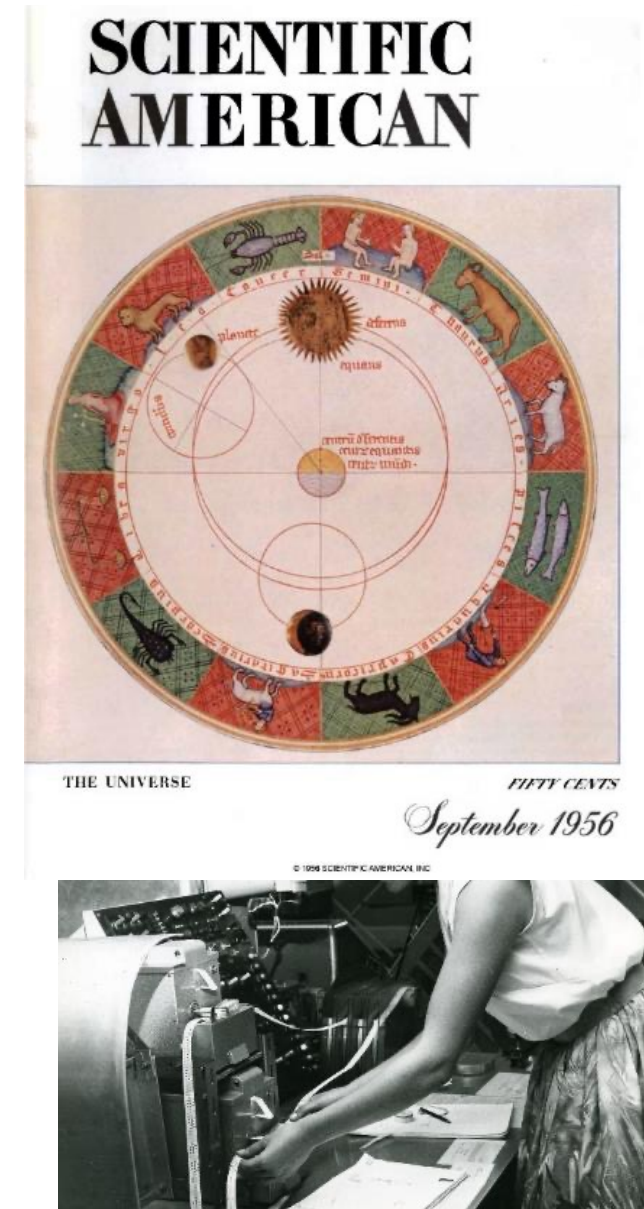


Image by Seth Shostak



The Sydney v Cambridge controversy

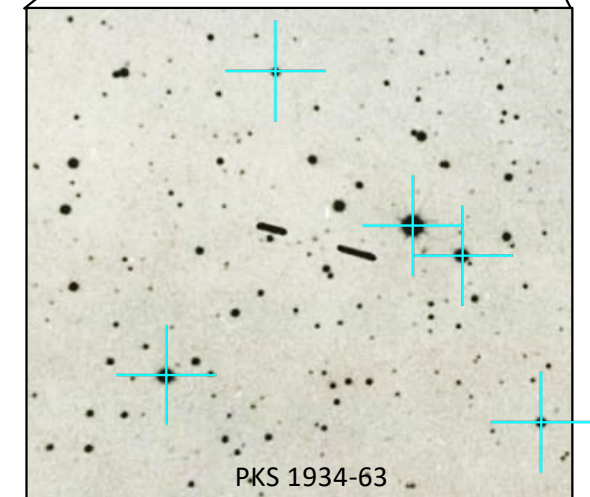
- 1956 CSIRAC ends the Cambridge v Sydney dispute
 - Simulated observation with CSIRAC resolved the confusions controversy
- Australia loses its way in computational image processing
 - 1955 Christiansen **hand calculates** the first aperture synthesis image
 - 1957 Cambridge use an electronic computer EDSAC
 - Following the X-ray crystallographers
 - 1974 Ryle Nobel prize
 - Importance of the Cambridge Mathematical Laboratory





Using CSIRO computing resources in the 1960's

- 1963 Quasars discovered
- 1964-67 Ekers PhD in radio astronomy
 - ANU PhD co-supervised by John Bolton
 - Based at the Parkes radiotelescope
 - Used CSIRO CDC computing network
- 1966 ABC TV *The Astronomers at Parkes*
 - John Bolton and Jay Ekers identifying quasars
 - PKS 1934-63 a black hole
 - Star positions plotted using CDC 3600 in Canberra and CDC 3200 in Sydney.
 - Transferred to transparent overlay



Thank you



CryoPAF been installed into the focus cabin during testing at Murriyang, our Parkes radio telescope
2023

Still world leading hardware after 63 years – CSIRAC could have succeeded!

Space and Astronomy

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Australia's National Science Agency

