THE FERRANTI SIRIUS COMPUTER AT MONASH UNIVERSITY

The Monash Museum of Computing History was established in 2000 to preserve the early computing equipment distributed around the different campus that now forms Monash University. Amongst these early pieces was a Ferranti Sirius computer which was stored under a stairwell in Building 28 on Clayton Camp. This computer has now been transferred to the Monash Museum of Computing History and is on permanent exhibition as part of the museum’s display at Caulfield campus. The provenance of this computer is an on-going research project of the MMOCH. Research has revealed that about 20 Sirius computers were produced by the English company Ferranti Ltd. and 4 were sent to Melbourne.

In 1962 there were four Ferranti Sirius located in Melbourne. There were two at the Melbourne Computer Centre operated by Ferranti Ltd., one at Monash University-Clayton campus and one at a commercial research operation run by ICIA, now called ORICA, at Ascot Vale. The basic Sirius had a 1000 word CPU and each additional cabinet of memory provided an extra 3000 word capacity. The Monash University machine had 1 extra memory cabinet. The computer used by ICIA had 2 memory cabinets by 1967. Both of the units from Monash University and ICIA had a similar control button panel. The Ferranti Melbourne Computer Centre had a basic 1000 word machine and
another 7000 word machine with two extra memory cabinets. The smaller unit at the Bureau was later sold to Caulfield Institute of Technology.

The Ferranti Sirius now housed at Caulfield campus in the museum was the first computer actually purchased by Monash University. This computer is significant to the development of Monash University and the general movement towards using computer resources in Australia. The Ferranti Sirius was ordered by the University in 1961. Monash University was a new educational institution with the University receiving its charter in 1958 and enrolling its first students in 1961. The University decided to establish a computer centre to provide administrative support as well as academic research. Access to computers was quite limited in the 1950s but a number of commercial installations were becoming available in the early 1960s. The purchase of a Ferranti Sirius in 1961 signaled the intention of Monash University to be part of the new world of computing.

THE BEGINNINGS OF COMPUTING IN ASUALTRALIA

The exciting work on the history of stored program computers is mainly described from the perspective of the English and American scientists of the 1930s and 1940s. Much of this work was stimulated by the needs of military requirements during World War Two. The post-war years saw the development of the first stored-program computer at Manchester University in 1948. There was considerable interest in computing in Australia through the 1940s and researchers were aware of some of the international work at this time however they were isolated from many overseas developments through distance and the secrecy of the work. Australian physicists saw the potential of this research and gained government support for the CSIR Division of Radiophysics to build a stored program computer between 1947 to 1949 under the leadership of Trevor Pearcey and Maston Beard. The computer was the fourth operational stored program digital computer built anywhere in the world. At this stage, it was known as CSIR Mark I. It operated successfully from 1950 to 1955 on the campus of Sydney University.1

In 1954 Sydney University started a research program to build its own computer and this machine, known as SILLIAC, became operational in 1956. The creation of this newer computer signaled the end of CSIR Mark I’s role at Sydney University. Eventually it was transferred to Melbourne University and was re-commissioned on 14 June 1956 under the new acronym CSIRAC.2 Another computer was designed in 1956 for use at the Weapons Research Establishment at Salisbury in South Australia and was known as WREDAC. A number of smaller installations were developed at Sydney University with SNOCOM, ATROPOS and ACTURUS going into operation in 1960. These were produced for specific purposes. SNOCOM was designed for the needs of the Snowy Mountains Hydro-Electric Authority and the others were used for educational purposes. Pearcey, working at Adelaide University, delivered CIRRUS in 1962.3

Australia had entered the age of computer technology with these early installations however the cost of computing limited its use. Commercial installations were on the market in the 1950s but many companies were satisfied with the punch card accounting machines. Developed since the late 1890s, this equipment was seen as reliable, efficient machines for controlling office data. While these
machines could compute numerical activities and be connected to machines to print out results, they had no stored memory. More advanced calculations, such as engineering requirements, were still done manually with basic calculators and slide rules. The established business machine suppliers had to make a choice between trying to improve the punch card machines or try developing computers for the business world. Many British companies did start producing computers for the commercial market as well as their American counterparts. Unfortunately the English business structure and managerial decisions hindered the development of their products. Some of the American companies perceived the potential in the future market of computer and were supported by lucrative government contracts that helped with research and development costs.

The major foreign companies expanded their computer sales operations into the Australian market and established outlets in Sydney and Melbourne. By 1962 there were about 80 computer installations installed or on order around Australia. IBM dominated the installations at this time. The early Australian computers were still operating at this time. About a third of the computer installations were located in private commercial operations. Eight universities had installations; this included Monash University. A small number of government departments had their own computer. As an alternative, the computer companies operated service bureaux with 7 in Sydney, 7 in Melbourne and 1 in Brisbane. By August 1963 the number of installations had increased by about 50% with 84 commercial data processing computers, 12 service bureaux and 7 computers in government departments. There were 14 computers in university centres by this time. While Australia had started well in the development of first generation computers, the newer developments were dominated by American and English designers. IBM had obviously made in-roads into the local market but English companies were trying to make sales in Australia as well.

Ferranti Ltd. was a successful British company that moved into computer production in the 1950s after its initial successes with working with computer specialists at Manchester University. They opened up branches in Australia, initially in Adelaide and later in Melbourne. Their Australian operations had opened in 1956 for the company to work on guided weapons trials. Their keen staff in Melbourne, led by Barry Z. de Ferranti, managed to sell 2 new Ferranti Sirius computers as well as use two in their own service bureau. Monash University ordered a Ferranti Sirius computer for the new Clayton campus from the Ferranti Computer Centre, Melbourne in December 1961. The Melbourne office passed on the purchase order to their parent company in England. The company was based in Manchester with office, works and research laboratories at West Gorton, Manchester and a research laboratory at Lily Hill, Bracknell, Berkshire. The company had a London Computer Centre in Newman Street, London and an office in Portland Place, London. The Ferranti Company had been very involved in the development of the new commercial computer industry that developed in the 1950s and by 1960 Ferranti represented just over 25% of the British computer market.

Earlier computing work had been confined to creating large first generation computers usually in academic institutions and developed under government auspices. In the 1950s there was a move to produce computers for commercial purposes at a relatively competitive price. Ferranti had been at the forefront of this move with their collaboration with Manchester University to produce the Ferranti Mark 1. The company continued to work on computer technology in the 1950s although the British industry did not receive the same government support as the US based companies.
Ferranti was an established company. A large part of its production focused on electric meters and transformers. During World War Two the company produced military technology and continued in research and development of computer technology after the end of World War Two. Research into radar technology for defence purposes during the war had stimulated advances in stored program computing. The University of Manchester created their computer “Baby” in 1948 and collaborated with Ferranti to produce the Ferranti Mark 1. By 1955 Ferranti had two commercial computers for sale with the Mark 1 and the Pegasus. The Mark I was extremely expensive but became commercially available in February 1951. The following year Shell ordered a Mark I for 95,000 pounds. The Pegasus was a more saleable computer and the company made 38 installations.

Incidentally, the Pegasus had a strong Australian connection. The design was initiated by Queensland-born J.M. Bennett while he was a computer specialist at Ferranti Ltd. from 1950-1955 in Manchester and London before returning to work at Sydney University in 1956.

By 1963 Ferranti Ltd. was capitalised at 22 million pounds and had a workforce of about 20,000 people. The company was interested in computer technology and continued to develop different computers. They had produced a range of computers, each named after astronomical features, including Perseus, Pegasus, Sirius and Orion by the early 1960s. The largest in the range was the Atlas. Ferranti developed its own transistorized circuit under Gordon Scarrott during the late 1950s which incorporated neuron circuits into a test-bed computer under the code name NEWT. This technology was later used in the development of the new Ferranti computer, the Sirius. The company’s efforts in computer production resulted in over 25 million pounds in sales for 99 computers however the cost of research and development exceeded their income and they made a loss of 4 million pounds.

During the 1960s there was a rationalisation of the computing industry in Britain with Government intervention to reduce the less profitable companies out of the computing industry and supposedly centralization of development to meet the challenge of US companies. There is much debate about why the British industry, which had arguably started the age of commercial computerization with the Ferranti Mark I, lost out to the US based computer companies. US businesses seem to embrace the concept of computerization far quicker than their English counterparts. The number of installations in the US far outnumbered English computers in the early 1960s. Companies, such as IBM, were given government contracts to develop specific applications for government use. This basically financed their research and development while British companies received little assistance for R and D. There was often some delay in the commercial production of new computer technology developed in Britain, giving their competitors time to study, copy and improve their latest developments. The British Government could see that there were problems in the British computer industry and encouraged centralization as the way to reduce costs and make the industry more competitive. This centralization was a gradual process with the amalgamation of many established punch-card manufacturers, such as Power-Samas and British Tabulating Machine Co. into International Computers and Tabulators or ICT in 1959. English Electric and Leo Computers combined in 1963 to form English Electric-Leo. The Ferranti Company sold off its mainframe computer division in 1963 to ICT but other parts of the company continued until the early 1990s. The company ICT later changed its name to International Computers Limited or ICL after amalgamating with English Electric-Leo in 1968; later this was then bought out by Fujitsu.
The Ferranti Melbourne Computer Centre was established in 1960 with Barry de Ferranti as Sales Manager. Although previously employed by Ferranti Ltd. in England, Barry de Ferranti moved from IBM to take up this position. Richard Cross and Richard Levington had already moved from England to work at the Melbourne Ferranti office. Brian Parker was the engineer sent out from England to work on the Monash Sirius installation as well as work on a Sirius at ICIANZ. Brian Parker recalled that Peter Lunt and Eddie Rubins were ICL engineers who maintained the Sirius at Monash University. Robin Goodchild was the bureau programmer and started with Ferranti in 1962. He had come from CSIRO which was a bureau customer. The Ferranti Melbourne office operated from Queens Road; initially they were located at Suite 34, 65 Queens Road in 1960 but by 1962 the office was moved to “Stanhill” 34 Queens Road. Brian Parker’s film shows a glimpse inside the office and the exterior during his visit in 1962. The building is on a corner site and located on the west side of the cricket ground. The name “Stanhill” is still on the building. It is a building of architectural significance and noted for its innovative presentation and building techniques.

This busy Computer Centre housed initially a 1000 word Sirius computer and then later a 7000 word Sirius computer. Barry de Ferranti recalled that these machines were in great demand.

“The team I assembled, to establish the Melbourne Computer Centre in Stanhill, Queens Road, in 1960, helped promote technical computing in Victoria. Before long Melbourne-based government departments, manufacturers, universities and utilities were loading our little Sirius beyond expectation; even a motor journal ran a survey, with extraordinary response, causing us to work shifts to cope.”

THE FERRANTI SIRIUS COMPUTER

Ferranti Ltd. initiated a new computer, the Ferranti Sirius in the late 1950s. The Ferranti Sirius was developed to test new logic elements created for a bigger machine called “Orion”. It was announced to the public in a press release on May 19, 1959. It offered the Sirius as a transistorized desk-sized electronic digital computer. The release claimed that it would be the smallest and most economically priced computer in the European market. At this point, the Sirius was marketed in England for 20,000 pounds as compared to its competitors, the Elliott 803 at 35,000 pounds and the ICT 1301 at 120,000 pounds.
The Sirius was manufactured at the West Gorton factory from 1960 to 1963 and, in all, the company produced probably 22 installations according to Wilson although only 16 were actually recorded as sold; this included one at Ferranti’s Bureau in London and one at Ferranti’s Melbourne Bureau. Poulton records 15 being sold to real customers and about 5 used by Ferranti as demonstration models and in bureau services. Only 7 were exported. Strangely 4 of these 7 were located in Melbourne, Australia. (See Appendix I, for Wilson’s table on computer production at West Gorton.)

Sirius was not the most powerful of computers. Its serial architecture kept the cost and size down but this meant it was not particularly fast. It had only 1000 words of store (which could be increased to a maximum of 10,000 words). Input and output was entirely by punched paper tape.

However, it had some very attractive features. It was one of the earliest computers to use transistors rather than valves (vacuum tubes). Thus it was relatively small (small enough to stand behind an office desk), had low power requirements (it ran off a standard 230 volt 13 amp socket) and had no need for special air conditioning. A full system consumed about 2kW. It had a decimal display and a facility to slow the processor for demonstration and educational purposes. All in all, it was a good, general purpose and relatively inexpensive machine for its time, ideally suited to educational establishments.

There were several different variations in development of the Sirius. There was at least one form of prototype and a Sirius I and Sirius II. The most obvious differences were seen in the variations in the external control keys. The prototype machine had the same basic CPU cabinet but had a different control pad with three sections for switches and a large array of keys. Brian Parker located two views of the prototype from another Ferranti employee. These were probably taken about 1960-1961. The keyboard is quite different from the later models sold in Australia.

Photograph of this Sirius prototype dated c.1961 MMoCH Collection 2007.0488.1

The later models had a single keyboard unit with switches and display lamps on the wall of the CPU. There seems to be a variation in the display lamps on these models. There is a green panel on the
front of the CPU of the models after the prototype and it contains a silver real-time clock and inset black panel with two 2 rows of illuminated numeric digits on left side and, in the model in the MMoCH collection, a set of 2 x 3 status lamps on the right hand side. Two lower lamps indicate power on. On the left side of the panel, as seen in publicity photos and the installation at Monash, there were two 10-digit decimal number displays made by KGM Electronics Ltd The top row of illuminated numeric digits on the left side are entitled “current instructions’ and lower row entitled ‘selected accumulator’.

There seems to be design changes in the layout of status lamps on the right side of the panel on the CPU. The first style, Sirius I, was possibly the model seen in the publicity photographs that appear in the advertising display brochures. This style shows the panel with the status lamps as being small round lights. Two brochures from 1961 are reproduced as pdfs on www.computerhistory.org. The panel on the CPU is reproduced in colour in both brochures and shows the same illuminated digits as the later model but the there are 5 rows of round status lamps unlike the rectangular ones in the Monash model. It is difficult to see the exact pattern of status lamps on some of the publicity B/W photos. The photos used in the ICANZ newspaper were probably supplied by the company and came from England. These images and other examples of publicity photographs used by Ferranti show a configuration of 3 x 5 set of status lamps. Although there appear to be more lamps, they are rectangular like the shape of lamps as used on the Monash Sirius panel lamps. (It can also be seen in the photo in the reprint of an article from THE FERRANTI JOURNAL article in 1960 reproduced as Wilde 1961) The exact development of the panel array and a definite chronology is still being investigated but there seems to be two patterns after the initial prototype.

The Ferranti Sirius had the unusual capacity to allow the operator to slow down the processor which allowed the programmer to follow the execution of the program instructions. This was noted as a feature by users of the 1000 word machine used at Caulfield Technical College.25 There is a thumbwheel on the front-edge of the desk control unit to vary the speed.
Photographs of keyboard and panel switches on the Ferranti Sirius 4000 word machine in the MMoCH and details of the components that comprise the editing equipment to support the CPU. Photos January 2008 taken by Chris Avram

Detail of panel inserted into wall of the CPU with a set of momentary switches primarily used as status indicator lamps on the right and 2 rows of illuminated digits on the left

Sirius keyboard from the front showing thumbwheel and clear button to reset keys
Simplified tape editing suite showing the Creed paper tape reader and Creed teletype on the editing table.

Ferranti paper tape reader with sample white tape.
Ferranti Sirius Westrex paper tape punch interior mechanism.

The memory of the Ferranti Sirius was stored on acoustic delay lines set into vertical shelving. This section is part of the 3000 word memory cabinet that was connected to the 1000 CPU to increase the memory capacity of the computer.
Detail of the acoustic delay line memory panel, top cover removed to show mechanism.

The Ferranti publicity photographs of the Sirius feature a programmer seated at the desk of the Sirius I. She appears in two versions of publicity photographs. The often-used view has her wearing a checked shirt. Her face is not visible. She was Mrs. Elizabeth (Betty) Broadbent.

Source: CP Burton Collection, private collection held in England; Ferranti Ltd. company publicity photo c.1961
The Sirius had its own autocode which was similar to the autocode developed for the Ferranti Pegasus. Ponton gives a brief description of the autocode protocols for the Sirius in his article “The Autocodes: Sirius to IMP, a User’s Perspective”. Ponton used the Sirius in 1964 in Edinburgh and gives an example of a program written at that time.26

The Museum has two copies of the autocode manual, one printed in 1960 and the other printed in 1963. The collection also has a Pegasus code book while the Monash University Archives have a copy of “Autocode programming exercises for Pegasus and Sirius computers” ICT Sept. 1963. A small piece of handwritten coding and tape are also included in the Sirius Programme file in the Monash University Archives. It was a program for Bandwidth depolarization calculations and had been returned for corrections.

A short b/w film, entitled “Instant Arithmetic!”, was produced for the British Railways by Mr. S.E. Fargher in 1963 to demonstrate the workings of the Sirius and its advantages over the slide rule. Mr. Fargher managed the Department’s Sirius but was also an amateur film maker. The narrator, Mr. Fargher himself, takes the viewer through the various steps to do some calculations on the computer and explains the different associated apparatus. The film was made to show the staff the great advantages of a computer over manual calculations and make them comfortable with the new computer technology.27 This film has been reproduced and placed on display with the MMoCH Ferranti Sirius at Caulfield campus.
EARLY COMPUTING AT MONASH UNIVERSITY

Today Monash University is composed of a number of campus sites distributed around Victoria. The first campus under this university title was located at Clayton, a suburb of Melbourne. Clayton campus was chosen as the site for a new university which was instigated to increase tertiary education opportunities in Victoria. The charter for the new university was signed in 1958 and staff went into major planning to create a modern institution. An Interim Council was established to guide this new project. The new university was seen as vital for the development of the Australian economy. It was to develop a focus on science and technology rather than the traditional academic model. This created a university open to the needs of commerce and industry.28

The Interim Council developed a major plan to create a new university. Part of their direction included the acquisition of a computer for the new campus. The use of computers in universities was becoming increasingly common in the early 1960s. However much of this growth was directed towards administration rather than academic purposes. The Interim Council was interested in establishing computer resources at the new university but saw it as useful for student records. An extract from their minutes dated 21 March 1960 notes:

“The Council strongly supported proposals that students’ records and accounting be mechanized, as far as practicable, from the outset.”29

While this suggests that the Council did not quite appreciate the full potential of computers, it did initiate investigations into the installation of a computer on campus. The computer was to be placed in a new Computer Centre which was separate from any particular faculty but operated closely with the Department of Mathematics, Faculty of Science. The Centre had both administrative and academic activities. The role of the Computer Centre became quite confused as the University developed a separate computing department for teaching computer science however it continued to be the site for major computer installations.

A new committee was instituted under the title of Computer Facilities Committee led by Professor Westfold, Chairman of Mathematics. This committee investigated the different models available and compared their prices and capabilities. Amongst their communications, they contacted The University of Leeds to discuss their use of a Ferranti Pegasus for record keeping. The Registrar, J.V. Loach, responded in 9 Nov. 1961 and commented that the rise in student numbers in post-war England had generated a need for the ability to process large amounts of data relating to their students. They had turned to Pegasus for their new record management.30 It may have been significant that the Committee were aware of successful Ferranti installations in British universities when coming to their final choice. By August 1960 the Vice-Chancellor had quotes on three different possible computers. The Computer Facilities Committee had trimmed their report to consideration of two different computer models by 29 September 1961. The two frontrunners were the IBM 1620 and the Ferranti Sirius. The 1960 quoted prices for these were 34,000 pounds for the IBM 1620 and about 30,000 pounds for the Ferranti Sirius.31 As with all computer sales, it is unlikely that these prices were fixed but open to negotiation and “educational discounts”. Ferranti Ltd. offered the use of their 7000 word Ferranti Sirius, which was available from delivery in February 1962, until a new computer could be ordered and set up. This loan Sirius would be located on campus with shared access between Ferranti Ltd. and the Computer Centre.
In September 1961 the Computer Facilities Committee delivered a report comparing the IBM 1620 to the Ferranti Sirius. Its final conclusion was to purchase the IBM computer. However two months later, on 18 December 1961, Dr. Westfold reversed this decision and wrote to the Vice-Chancellor recommending the Ferranti Sirius over the IBM 1620. Professor Matheson officially ordered the Ferranti Sirius on 20 December 1961. The offer of a loan machine must have made the Ferranti offer more appealing although the Committee cited performance issues.

The original tender document from Ferranti offered Monash University:
- one basic Ferranti Sirius computer comprising 1000 word storage,
- one TR5 Tape Reader
- one Teletype punch,
- one extra TR5 tape reader,
- one extra 3000 word storage unit
- one desk-mounted, simplified set of tape editing equipment.

This offer was put at a cost of 33,137 Australian pounds. The tender gave a delivery period of 9 months from the confirmation of a definite order. The price was later discounted down to about 30,000 Australian pounds. (Note the cost of a Sirius in England was 20,000 English pounds.) Originally Professor Matheson had received a quote by telegram from Ferranti in Manchester on 17 August 1960 which gave an itemized quote detailing the equipment and also the delivery and erection costs with two to three months maintenance and a fee for holding spares for overseas supply.

As part of the contract, Ferranti offered to provide the loan of their new 7000 word Ferranti Sirius which was already being built in Manchester. This would be placed on site at the Clayton campus until the installation of the 4000 word computer ordered by the University. The 7000 word machine arrived on board ship in Melbourne in early 1962. Dr. Cliff Bellamy, then employed by Ferranti, worked with Professor Westfold and Dr. Sinclair to create a proposal for a joint computer installation at the University. The University would provide space for the temporary loan of the 7000 word Sirius, with two sets of Ferranti/Creed model 75 tape editing equipment in a room fitted with office furniture and telephones. Ferranti would supply a fully trained programmer during office hours. The University needed to employ a computer operator (referred to as ‘she’ in the proposal) to be trained by the Ferranti programmer. The University would be able to book 2 hours a day free of charge and up to 3 hours extra if the machine was not booked. Any extra time if required could be made up on the 1000 word Sirius at the Computer Centre in Queens Road. A map of the proposed layout of the room is attached to the proposal. To this purpose, the University allocated space in Building 19 (2008 university numbering system) on the first floor for the new computer centre.

This shared arrangement was apparently quite successful. The Ferranti machine was returned in November 1962 but Ferranti helped to run the University machine. Cliff Bellamy transferred from Ferranti to Monash University in early 1963 although he would have been on campus regularly most of the previous year. It was the start of Bellamy’s career at Monash which spanned more than thirty years of supervising and developing computer facilities at Monash University.
Ferranti Ltd. completed the production of a new Sirius for Monash University and it was sent to Australia in late 1962. It was operating after acceptance tests by late November. Brian Parker, an engineer with Ferranti Ltd. traveled from England to help with the installation at Monash University. He shot about 30 seconds of 8mm film on his own camera showing the arrival of the truck to the building on Clayton campus. The MMoCH has copies of this footage. Although very brief, the film gives a glimpse of a new campus under construction. The Sirius was wheeled in its crate to the walkway entrance of the first floor in Building 19 (passing under the first walkway connecting the building to the Hargreaves Library) and hoisted by small crane up to the doorway.

The 4000 word Sirius was installed at Monash University and was apparently used both by students and for administrative work. In its quarterly report for January to March 1963, the Computer Centre gave some details on the operations of the Sirius. They were using the 4000 word Sirius with two paper tape readers and one tape punch. There were two Creed teleprinters. Students were using the computer for elementary data processing and technical computations. Interestingly, these early courses were for third year Economic students. These first users of the Sirius probably never had any physical contact with the computer. Their work would be encoded on punch tape via teletype machine and these tapes were then delivered to the Computer Centre. The tapes would be run in batches and the student’s work would be returned either completed or marked with any errors that needed correcting.

The Computer Centre was also actively encouraging staff to learn Autocode and machine code programming. The largest single user of the computer, in terms of hours, was the Administration Department with 91 hours in the first quarter. Other major users were the Physics Department, Engineering Faculty, Chemistry Department and the Computer Centre. The Maths Department only used 3 hours. The Administration Department was using the computer to process Matriculation (Year 12) and Leaving (Year 11) results for student selection. The report details specific projects run by other departments. The Centre was also building up a reference library of programs as well as some reference print material. The volume of Library Specifications with pages dating between 1960 and 1962 is now stored in the Matheson Library collection, Monash University. (Ferranti Ltd. – Ferranti Sirius Computer Library Specifications Vol.1)

The Sirius was in high demand and Bellamy reported in May 1963 that he expected the machine to be running two 8-hour shifts daily to meet user demand. Different departments also wanted greater access to the facilities. The Department of Chemical Engineering realized that the use of real-time computing was a growing area in chemical plants in Europe and the US. They wanted to offer students the opportunity to work on computers with direct applications for chemical processing. Alan Cowley worked on the Monash Sirius in 1963 and he converted it to a real-time, interrupt-driven machine. Ron Murtagh undertook a PhD thesis on direct digital control and optimization processes from 1963 to 1967. He developed a test program CHEOPS I and later improved this as CHEOPS II. This was tested on the Sirius after it was modified by Alan Cowley. These modifications were non-permanent. The analog/digital selection unit and the wet chemical process were located in the Chemical Engineering Department and the computer was in the Computer Centre. The two areas were connected by 2 15-pair telephone cables which were laid in a shielded duct. The line was 120 yards in length and carried a + or – 9 volt digital signal.
The use of the computer was not always appreciated by older teaching staff at the University. Richard Brent recalls doing some work in the Maths Department in the mid-1960s. He had already gained a certain amount of computer skills after working on an IBM 1620 on a vacation scholarship at Mount Stromlo Observatory. He returned to Monash and used the Ferranti Sirius.

“I was able to perform some rudimentary computational group theory for Prof. Janko’s PhD students on a Ferranti Sirius computer. The results had to be written out by hand before Janko saw them, since he did not trust computers!”

It is an interesting reflection on the distrust felt by older teaching staff who may have regarded the computers as a ‘novelty’. There was still some suspicion of the accuracy of these new machines and older staff would have retained a preference for human computing power.

The Monash University Archives hold a photo of the Ferranti Sirius in operation at Clayton camp when it was the only computer in the Computer Centre. The colour photograph is dated to about 1963. It shows a female operator seated at the desk control unit. On her left are two Westrex paper tape punch units and on her right are three Ferranti paper tape readers. Both are set on grey table units. There are two plastic laundry hampers behind the paper tape readers. The CPU appears to be located in a central position in the room. This would allow access to the back panel for calibration of the acoustic delay lines. This was a regular event in the maintenance schedule.

Monash University Archives Image 6378

There was a greater understanding by both teaching and administration of the value of computing after its first year and this was reflected in an increased need for facilities. The Computer Centre at Clayton campus was expanded with the purchase of a CDC 3200 about April 1964. By 1969 the Computer Centre also had a Burroughs B5500 mainframe with a DEC PDP-8 to control the remote terminals for the Burroughs.

This was in addition to the delivery of the ICIANZ 7000 word Sirius
in May 1967. The Centre continued to update facilities on a regular basis making older installations redundant.

The Sirius was not considered particularly useful by 1967. It was probably only used about 2 hours a day on an irregular basis as most work was run on the CDC 3200. However in 1967 the University was offered the donation of a 7000 word Ferranti Sirius from the private company ICIANZ. The company ICIANZ had also purchased a Ferranti Sirius in 1962 but it was delivered much earlier than Monash’s computer. ICIANZ now operates under their new name, ORICA. Their Ferranti machine had been installed at ICIANZ Central Research Laboratory at Ascot Vale in late February 1962. It was purchased for 40,000 pounds. From publicity photos, it appears to have the same configuration of control buttons as the first Monash computer. Brian Parker commented that this machine had reliability problems and had the processor backplanes resoldered to remove possible dry joints. He was sent to check these problems as well as install Monash’s Ferranti.

The Sirius was ICIANZ’s first computer. They had earlier installed a punch card machine for administrative purposes but the Sirius was a computer with stored memory and could be used for scientific calculations. It is interesting to note that ICI U.K. was already a Ferranti customer in England and this may have influenced the Australian part of the company to purchase a Ferranti computer. The company newspaper ICIANZ CIRCLE holds several articles noting the arrival of the new computer. There is also a quite detailed article on how the Sirius actually processed information including a strip of coded tape reproduced down the side of the page. Recently run on a simulator by Steve Poulton in the UK, this tape is indeed the relevant code to the hypothetical problem described in the text!

The newspaper article describing the delivery of the new Ferranti to ICIANZ in February 1962 shows part of it being raised by crane to its office on the first floor and refers to it being lifted in two main sections. It details the Sirius’ capacity as “Sirius has more than 3000 tiny transistors with which it can store and use 4000 10-figure numbers.” This text and reference to two main sections suggests that ICIANZ received a CPU with 1000 words and one extra memory cabinet of 3000 words storage in February 1962.

The company continued to update their computing facilities. When they purchased an IBM System 360 in 1966, it was decided that this was adequate for all their computing needs. In 1967 ICIANZ offered to give their Sirius to Monash University. It was donated in return for some credit in hours on the computer in its new location.

The Sirius at ICIANZ had been expanded with another memory cabinet after its installation in 1962. This was possibly about 12 months later. The formal agreement between ICIANZ and Monash University records the transfer of a 4000 word central processor, a 3000 word memory storage module, 2 paper tape readers, 2 paper tape punches with associated cabling and a Frieden Sirius coded flexowriter (Serial number 27379). (This is somewhat confusing as there could not be a 4000 word central processor but presumably together the system had 7000 word capacity.) The donation was a gift to the University provided they undertook to pay for the transfer of the computer and maintain it. The University also had to provide access to the Sirius for up to 40 hours a month free of charge from 1 May 1967. This access had to be provided until 1 May 1969.
The University accepted the donation of the ICIANZ Ferranti Sirius but, in the Annual Report for 1967, the Sirius machines were described as Other Equipment. The original 4000 word is described with the statement, “...is maintained by, but has little other active support from, the Computer Centre.” The ICIANZ machine is dismissed as well as with the sentence, “The original intention was to use it as spare parts but later it was installed in the Chemistry Dept., for special duties.”

The Ferranti Sirius in the Computer Centre was still operational but the CDC 3200 was the main source of work. Staff had created a program to translate programs in Sirius Autocode to FORTRAN which could then be run on the CDC 2300. This was seen as a measure to relieve some of the workload off the CDC 3200 and programs could be tested on the Sirius before use on the CDC 3200.

The Sirius installations were finally decommissioned in 1972. It was noted in the 1972 Annual Report:

“A notable event during 1972 was the retiring from active service of both Sirius computers. One of these machines was the first computer operated by the Centre, however small demand coupled with significant maintenance effort involved, made it uneconomic to keep them in service.”

There is some confusion as to the location of the Sirius after this. Presumably the 4000 word machine was moved from the Computer Centre and put into storage. The Computer Centre was moved from Building 19 to Building 28 about this time. During the 1990s the Sirius was stored under the stairwell in the main entrance of Building 28. Ultimately the Sirius now in the Monash Museum of Computing History was removed from Building 28 at the Clayton Campus and moved to the Caulfield campus museum site in 2005. The ICIANZ 7000 word Sirius, located in the Chemistry Dept., was donated to Museum Victoria in 1975 along with a large set of paperwork including the original sales agreement for the purchase of the 4000 word machine in 1962.

The story of the Ferranti Sirius continues at Monash University with the amalgamation of several established educational institutions at other locations with the Clayton campus in 1990. The Chisholm Institute, Dandenong Road, Caulfield joined with Clayton under one administration. Chisholm Institute had developed its own computing school during the 1960s. Initially staff used off-campus facilities but they needed their own machine. The 1000 word Sirius computer at the Ferranti Melbourne Computer Centre was leased and then purchased by the Caulfield Technical College from 1963/1964 for EDP classes. The Caulfield Technical College changed to the Caulfield Institute of Technology in 1968. This name was then changed to Chisholm Institute of Technology in 1982 after a merger with the State College of Victoria at Frankston. Chisholm IT was then amalgamated with Monash University in 1990.

During the 1960s Caulfield was still a technical college and under the jurisdiction of the Victorian State Education Department. In 1963 the Department gave Caulfield Technical College a special equipment grant of 57,850 pounds to hire and later purchase a Ferranti Sirius. The computer was placed in the Department of Electronic Data Processing.
The 1000 word Ferranti was an interesting example, a prototype model, and was originally exhibited in Turin by Ferranti in 1961 in the British Pavilion at the Italian Centenary Exhibition as a demonstration model before being sent back to be used at the Newman Street bureau in London. Brian Parker looked after the machine while in Turin. In Wilson’s book a photo is reproduced showing a Ferranti Sirius being dispatched to Turin and may possibly be the one later sent to Melbourne. The Sirius in Turin was returned to England and then it was later sent to the Melbourne Ferranti Computer Centre. It may have been a prototype with a different set of switches on the control unit from the models purchased by Clayton campus and ICIANZ. This 1000 word machine was initially set up in the Ferranti Bureau in Queens Road but then leased to Caulfield Technical College about 1963. The College was able to purchase it in 1964 with the Special Equipment grant. The Department also acquired a CDC 160A with 8K memory in 1965. Richard Cross, an engineer employed in Melbourne by Ferranti/ICT/ICL had a direct connection to the College and taught night classes at the time. He arranged to sell the 1000 word Sirius to Caulfield. Incidentally Cliff Bellamy also taught a class “Computers in Engineering” at Caulfield while working for Ferranti Ltd. and presumably had access to the Ferranti Sirius at this campus.

In 1965 staff member John McClelland wrote a student-oriented language called CAUTELLA which stood for “Caulfield Tech’s Language” to be used on the Ferranti Sirius. It required paper tape input and output with no diagnostics. This language was later updated to be used on the ICL 1900 series by John White and its name was changed to ECOLE. On open days staff would program the computer to make “music”. The processor had an audio device which sounded a different tone for each run-time error encountered when a program was executed. By making deliberately contrived errors, the computer could play several pieces. Peter Juliff remembers the computer playing a theme from Bach’s 4th Brandenburg Concerto and then ‘Cockles and Mussels’! The sound comes from a speaker in the base unit extending out from the CPU but usually hidden by the desktop.

The Ferranti Sirius and the EDP Department were located in the Junior School, Caulfield. (This building is now designated Building T) In 1969 the Computer Centre was separated from the EDP Department. The new Computer Centre purchased an ICL 1903A and was located on Level 5 in the F Block. The Sirius seems to disappear in the late 1960s.

The other 7000 word machine at the Ferranti Melbourne Computer Centre seems to have also disappeared. Brian Parker suggested it may have been cannabalised to maintain the two computers at Monash University, Clayton campus.

THE FERRANTI SIRIUS DISPLAY AT THE MMoCH

The MMoCH transferred the 4000 word machine stored at Clayton campus to the Caulfield campus in 2005. A special committee was formed to help the museum prepare the machine for display and it was relocated to Building B foyer. The committee members were volunteers including Peter Thorne, Judy Hughes, Jurij Semkin and John Spencer. They cleaned the various parts of the Sirius. These volunteers had experience with restoring CSIRAC for Museum Victoria. The clock was restored to working order by Chris Avram and Bruce Gilligan.
The museum decided to display the computer in a dedicated showcase in a recreated office environment. The material has been placed in position to demonstrate the probable layout of the equipment as used in the early 1960s. This was done prior to the discovery of the 1963 photograph of the Sirius in the Computer Centre.

The Central Processing Unit is a floor-standing unit which contains the computer circuits, power supplies and has a decimal digit display panel and a normal clock. A moveable control panel is placed in front of the Unit on a recreated desk/filing cabinet support. An additional 3000 word memory cabinet is set adjacent to the CPU.

The computer is supported by a range of input/output devices. There is a Ferranti Paper tape reader, located on desk in front of CPU. Red label on front “Ferranti tape reader. Type TR 5. Serial No. 477”. Adjacent to the CPU is a set of Simplified tape editing equipment in three pieces which includes a

(1) Table unit with switches on front face. Metal tag on reverse reads “Creed & Co. Model No. S4060. Serial No. 1457. Original Customers Marking GRP7 V706”. The table has a numbered internal tag “Table Serial No. 198579.

(2) Creed teletype set on table unit. Metal tag on reverse “Creed & Co. Model No. 75RPR K4M4. Serial No. 5897 Made in England”.

(3) Creed paper tape reader set on table unit. This set of equipment could read paper tape and print it, or copy paper tape while allowing it to be edited, or allow a programmer or data preparation person to type and punch a new program or data. It has no electrical connection to the computer. Paper tapes were usually torn off and carried across to the computer.

There is also another table unit with switches on front face and changeable setting switch on front right side which holds a Ferranti Westrex paper tape punch set. Label on reverse “Teletype Code BRPE11” This was the Computer’s only output device. BRPE-11 is a teletype model number. There is a paper tape spindle on the desk in front of the CPU; probably not the model used by Ferranti but used for display purposes.

The display includes a reproduction of the early film by S.E. Fargher showing the process of using a Sirius from the decision to solve a problem, putting it into the computer and finding the answer. Although it is quite naïve in style, it does explain the different processes quite simply. Photographs also show the delivery of the Sirius to Monash University in 1962 and parts of the West Gorton factory in Manchester.
CONCLUSION

The decision to purchase a Ferranti Sirius in 1961 started a long development of computer technology and education at Monash University. The Monash University Computer Centre established a pattern of collaborating with commercial interests to gain the best possible outcome in computing facilities for the University at the least amount of capital outlay. The Ferranti Bureau in Melbourne operated out of Monash University for nearly 10 months before the delivery of the University’s own Ferranti Sirius in November 1962. This was a mutually acceptable situation as the University gained access to the Bureau’s computer while waiting for their own delivery and Ferranti Ltd gained a definite cash order. Vice-Chancellor Matheson wrote to Barry Z. de Ferranti in April and commented “I am very pleased indeed that our negotiations are working out so satisfactorily – I gather that the temporary installation of your own machine is proving to be a very useful arrangement.”

This pattern of commercial and academic use of computer equipment was to appear again and again in the Computer Centre. Cliff Bellamy appreciated the value of allocating some time on the computer facilities to commercial users. This could generate income for the Centre to purchase and maintain new equipment. This approach continued with each new installation. Perhaps his best success was the acquisition of a Burroughs B-6700 with a complete set of support equipment, valued at 1.6 million dollars. This was installed in the Computer Centre by Burroughs Ltd. in 1972 as a back-up computer to the B-6700 installed for the Gas and Fuel Corporation in Melbourne. The Computer Centre had to install and operate the back-up computer and could use it free of charge for a specified time per day and had the right to purchase more time if required at “attractive rates”. If necessary, they had to give the Gas and Fuel Corporation access in the event that they had any problems on their equipment. The interaction between the University and outside computer users was part of the new approach in tertiary education to pull together the academic and commercial sectors. It generated income for the University but it also developed a relationship that underlined the relevance of tertiary education to the general economy.

The Ferranti Sirius was a small production computer but it was an economical installation that suited the needs of both academic and business operations in the early 1960s. The large number of installations in Melbourne, nearly 20% of all produced, reflects the sales abilities of the local Ferranti office. This small computer had a significant influence on Monash University with all four installations being associated with the University at some point during their working life in Australia. The 4000 word Sirius has survived on campus and is currently on display at Caulfield campus. The 7000 word Sirius, donated by ICIANZ, is now in storage at Museum Victoria. Unfortunately the other 7000 word Sirius, initially on campus and then at the Ferranti Bureau, has disappeared. The small 1000 word Sirius, moving from Turin to the Ferranti Bureau, Melbourne and then finally on to Caulfield campus, did not survive the changes to update equipment during the 1960s.

Monash University developed an active academic program exploiting the new technology of computing. The Ferranti Sirius, now in the MMoCH collection, started the role of the Computer Centre as a vital part of the administrative information processing for the University as well as the beginning of the teaching of computing at Monash- Clayton campus. Cliff Bellamy noted in 1965 that “Monash is probably the most computer-conscious university in Australia” and he attributed this
to the low average age of the staff and their acceptance of new approaches to problems. He could have also cited the acquisition of the Ferranti Sirius in 1962. The reputation and output from the Computer Centre started on this early computer. It established the value of computer facilities both as a teaching and research tool and a data processing tool for administration purposes.

By 1963 Cliff Bellamy started making submissions to acquire a bigger computer. Although the Sirius was small, it had demonstrated the potential of computing in the work of the University. The installation of the Ferranti Sirius in 1962 started the strong tradition of innovative computing at Monash University.

ACKNOWLEDGMENTS

The MMoCH has received invaluable assistance from Brian Parker and Steve Poulton with many technical and historical details on the development, operation and installation of the Ferranti Sirius at Monash University. We have also received advice from John Feist, Chris Burton and a large number of staff and students who had experience with using the Sirius installations at Monash University – Clayton campus and Caulfield campus as well as ICINZ’s computer. Former employees of Ferranti Ltd. in Melbourne have also contributed their knowledge to this research project. Staff at Monash University Archives also provided access to the University’s early files on computing.
ENDNOTES


10 Australian Academy of Technological Sciences and Engineering 1988:589

11 Tweedale 1993 p.37


14 For more discussion see details in Kelly 1998 and Tweedale 1992

15 Kelly 1987 p.42

16 See Wilson 2000

17 Letter from Richard Cross to John Feist 19 February 2004 in MMoCH Research Sirius file

18 See letters in Monash University Archives Mon 1 file with changing addresses


20 Email to Judithe Sheard from Brian Parker 5 May 2002 in MMoCH Sirius Research file

21 Wilson 2000:383

22 Wilson 2000:383

Table 2.

Correspondence with S. Poulton who provided this technical description and the publicity article by Wilde 1960 p.4


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Report of Meeting of the Computer Facilities Committee held at Monash University on Friday September 29th 1961, Monash University Archives MON 1 BS/1 Records Systems-Ferranti Computer

Monash University Archives MON 1 BS/1 Records Systems-Ferranti Sirius

Part 2.1 and part 2.3, photocopy of document held by Max Burnet. Copy also held by Museum Victoria Registered HT 6616 This is signed by Barry de Ferranti and dated Sept. 1961

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Bellamy, C. *Computer Facilities at Monash* Gazette Vol. II No. 1 August 1965 pp.5-7. See p.5
IMAGE SOURCES

ICIANZ CIRCLE, source: ORICA Library and Archives
Note: ICIANZ CIRCLE, internal staff newspaper, located at ORICA Library and Archives, 1 Williams St, Melbourne.

Brian Parker, Family home movie 1962. Private collection.

MMoCH Collection Image 2007.0488.1 & .2 – prototype model

Computer Museum http://www.computer history.org. pdf of Ferranti Sirius brochures

Wilde, A.R. 1961 Reprint of article showing image of Sirius 1 with Mrs. E.D. Broadbent (Note photograph in original article possibly shows prototype model)

Monash University Archives, Monash University – Clayton campus


Wilson, J. 2000 Ferranti. A History – Building a Family Business 1882-1975 p.381 b/w photo reproduced showing Sirius being transported to Turin from Ferranti factory; original in Museum of Science and Industry, Manchester)
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**ARCHIVAL RESOURCES ON FERRANTI COMPANY**


ICL archive at the Science Museum, London; on-line catalogue [http://cedarsgw2.leeds.ac.uk/iclarch/index.html](http://cedarsgw2.leeds.ac.uk/iclarch/index.html)

## APPENDIX I

Table 9.1: The Number of Ferranti Computer Sales from the West Gorton computer department. 1951-63

<table>
<thead>
<tr>
<th>Type and period of production</th>
<th>Scientific Organisations</th>
<th>Aircraft Co.</th>
<th>Commercial</th>
<th>Total Sold/Exported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark 1(1951-2)</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>2 1</td>
</tr>
<tr>
<td>Mark* (1953-7)</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>7 2</td>
</tr>
<tr>
<td>Pegasus 1#(1956-61)</td>
<td>10</td>
<td>5</td>
<td>11</td>
<td>26 3</td>
</tr>
<tr>
<td>Pegasus II#(1959-62)</td>
<td>2</td>
<td>2</td>
<td>8</td>
<td>12 1</td>
</tr>
<tr>
<td>Mercury (1957-61)</td>
<td>14</td>
<td>-</td>
<td>5</td>
<td>19 6</td>
</tr>
<tr>
<td>Perseus (1959)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 2</td>
</tr>
<tr>
<td>Orion (1963-5)</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10 1</td>
</tr>
<tr>
<td>Sirius (1960-3)</td>
<td>4</td>
<td>-</td>
<td>12</td>
<td>16 6</td>
</tr>
<tr>
<td>Atlas (1963-4)</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3 -</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
<td><strong>8</strong></td>
<td><strong>48</strong></td>
<td><strong>97</strong></td>
</tr>
</tbody>
</table>

* This category includes universities, government research establishments (domestic and overseas), and atomic energy authorities.

# Hendry (1989, p. 183-5) claims that sales of twenty-five Pegasus I and thirteen Pegasus II computers were made, but no evidence is produced to say why Swann is incorrect.