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The First Computer in New Zealand

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Abstract

How quickly did the computer revolution reach the most remote Westernised country? Conventional history holds that the first modern computer in New Zealand – where ‘modern’ means electronic, and with stored programs – was an IBM 650 leased from IBM Australia by the New Zealand Treasury in November 1960, and officially inaugurated in March 1961. This paper discusses an alternative hypothesis – that the pioneer was in fact an ICT 1201 ordered in 1959 and installed by the New Zealand Department of Education a few months before the arrival of the IBM 650.

Keywords: History, Government, Computers, New Zealand

Introduction

The modern computer age was announced to New Zealand almost as soon as it began. For example, in September 1949 the Otago Daily Times published an article¹ describing the Cambridge EDSAC, the first full-scale electronic computer with an internally stored program ever to operate. At the same time, machinery for financial and other calculations was already widespread in New Zealand government and business. This machinery was largely based on punched cards, and was entirely electro-mechanical, without electronics. As a result it was very noisy, needed skilled operators, and required skilled mechanics to keep its delicate mechanisms in good running order. The New Zealand Treasury, for example, had a busy chief mechanic very appropriately named Mr

Dainty.² However, the workload for these machines was constantly increasing. When electronic computers capable of handling punched cards became commercially available in the late 1950s, they were of immediate interest to the Treasury in particular. Treasury installed its first computer, an IBM 650, in 1960 and this is normally recognized as the first modern computer in New Zealand. However, there is an alternative contender.

The Conventional History

The historical record for the IBM 650 is quite clear. According to A.C. Shailes, who was New Zealand’s Controller and Auditor-General from 1975 to 1983, but an ordinary Treasury official at the relevant time, IBM Australia proposed the lease of an IBM 650 to the New Zealand Treasury in 1957.³ This was a safe choice; well before 1960, the 650 was firmly established in the USA as the bridge from card processing to computing, for example in the insurance industry.⁴ At that time, it was still IBM’s policy in Australasia only to lease computers, not to sell them. A 650 went for about \$3,500 to \$4,000 per month in the USA^{5,6} but would cost £73,000 per year in New Zealand.⁷ The New Zealand pound was at parity with the British pound at that time, and this was an enormous mark-up by IBM, the exchange rate being fixed at 2.8 \$/£. The Treasury moved at normal government speed, so the 650 was finally installed and running at the end of November 1960, and was officially inaugurated on 23 March 1961.⁷ Its biggest single job was the fortnightly payroll for

‘some 34,000 public servants’, calculating payments due and deductions, and printing pay vouchers and punched-card format pay cheques for them³. This machine was phased out in 1968, when IBM donated it to the young Museum of Transport and Technology (MOTAT) in Auckland,⁷ although the only trace of it in MOTAT’s catalogue is a press photograph taken for the Auckland Star in March 1968.⁸ Government use of computers grew rapidly after 1960; for example the Department of Education is cited as having its own machine by 1962⁷. On the academic side, the New Zealand Computer Society was formed in 1960³, and universities were early adopters, with the University of Canterbury first in 1962.⁹

Thus runs the conventional history of the pioneering years of 1960-62, but it is incomplete.

The Department of Education Computer

The trigger for this article came from one of the first computer programmers in New Zealand outside government, Ruth Engleback.^{10, 11} Born Ruth Thomson, from 1954 she was trained and employed as a programmer in Stevenage, England by the British Tabulating Machine Co. Ltd. (BTM), leaving in July 1959 for personal reasons. Among other things, she recalls writing a payroll program for 30,000 education personnel (teachers and other school employees) at Middlesex County Council in 1958. By 1959, she was an expert programmer of the BTM 1201, colloquially known as a HEC4 (Hollerith Electronic Computer 4), the commercial derivative of the APE(R)C machine developed by Kathleen and Andrew Booth at Birkbeck College, London.¹² In 2012, Ruth recalled hearing before she left BTM that a HEC4 had been sold to a customer in New Zealand. That would place the sale at the latest in the middle of 1959, which does not of course indicate the delivery date.

In early 1959, BTM formally amalgamated with Powers-Samas, its main competitor in the British market for punched card equipment, to form International Computers and Tabulators Ltd. (ICT). This was not without repercussions at the other side of the world. In March 1959, Powers-Samas Accounting Machines (Sales) Ltd. of Cambridge Terrace, Wellington, New Zealand announced that it would trade as the Powers-Samas group of International Computers and Tabulators Ltd. from 30 June 1959.¹³ So the machine in question might be referred to as a HEC4, a BTM 1201, or an ICT 1201, and the local agent, even if officially ICT, might be referred to inaccurately as Powers-Samas, anachronistically as BTM, or colloquially as ‘Hollerith’, as we shall see below.

The delivery records of the BTM/ICT 1201¹⁴ show two machines delivered to Middlesex County Council, London in 1958 and 1959 respectively, with the stated purpose ‘Payroll for 40,000’, closely corresponding to Ruth Engleback’s memory. They also show one machine delivered to the New Zealand Department of Education, Wellington, New Zealand for the purpose of ‘Teacher’s salaries.’ Unfortunately there is no date in this entry; its position in the list suggests 1960, which is consistent with an order placed in 1959.



Figure 1: HEC4 Computer (BTM advertising)

To take the story further, we must digress from Ruth’s story to look at the general history of punched card equipment in New Zealand

Government. New Zealand was far from being a technological backwater, even between the World Wars, although trailing a few years behind Britain. In 1920, New Zealand had chosen 'Powers' equipment for processing the 1921 census data, and rejected the 'Hollerith' alternative.¹⁵ Apparently this was because the 'British Tabulating (Hollerith) Machine Company' declined to sell its machines to New Zealand, insisting on a rental agreement.¹⁶ This was required until 1949 by BTM's licence to use IBM technology.¹⁷

A Treasury file 'Machines - Powers Samas and Hollerith' covering the period from the 1930s to 1954² shows much more Powers-Samas activity than 'Hollerith', apparently with no mention of BTM as the 'Hollerith' manufacturer. The following paragraphs rely on numerous documents in this file. The New Zealand Government commitment to Powers-Samas appears to have started early; a 1953 memo from the Director-General of the Post Office to Treasury refers to some 'Powers' equipment in continuous use since 1927. The names 'Powers' and 'Powers-Samas' were used interchangeably as the company's formal name evolved.¹⁸ An unsigned note dated 2 November 1938 and headed 'Office Machinery – Land and Income Tax Department', describes Tax officials being 'surprised to ascertain that there was any other make than Powers' and stating that 'prompt and complete servicing was in Treasury view absolutely essential, that this was available here for Powers but was not available and had seemed somewhat doubtful for Hollerith'. Little had changed by 2 June 1949, when a Treasury memo entitled 'Punch-card Accounting and other Installations - Powers versus Hollerith', signed by A. McGregor and sent to the Secretary of the Public Service Commission, said 'Hollerith machines have not so far been installed in any Government Department.' They were considered

expensive, could only be rented (although in 1949, this was about to change), and the makers 'have not been prepared to take a chance and set up an adequate organization in this country.' Even when Powers-Samas switched from 45 to 65 column cards in the 1950s, causing compatibility issues, this did not appear to change Treasury's preferences. 'Hollerith', following IBM, had used 80 columns from 1928 onwards.

Consistently with McGregor's memo, there is no trace of BTM itself having staff or offices in New Zealand prior to the merger with their competitor Powers-Samas, although both their products were imported because of their support for pounds, shillings and pence. There is ample proof that the term 'Hollerith' was familiar in New Zealand by the 1940s, but the name 'BTM' was not, although the latest BTM machines were imported, for example by the Reserve Bank.¹⁹ The company was well aware of the New Zealand market and appears to have supported it from Australia. For example, in a column headed 'Personal Items' in the Wellington *Evening Post* in June 1939,²⁰ we read that 'Mr. A. Stewart Laird, of the British Tabulating Machine Co., London, arrived by the Awatea today on a business visit to New Zealand.' The liner Awatea was on the Australia to New Zealand route from 1936 until she was requisitioned for war service. In fact Mr Laird of Sydney appears several times in newspaper lists of noteworthy hotel guests in 1938 and 1939. Thus, before the late 1950s when ICT was formed, it appears that BTM supported its New Zealand customers from its Australian subsidiary, the company still being known colloquially as 'Hollerith' on both sides of the Tasman Sea.²¹

By the end of World War II, government usage of punched card equipment was widespread. In 1945 and 1946, the Public Service Commissioner's Office advertised repeatedly for 'Accounting and Statistical Machine Operators (female)', stating

that ‘experience with “Powers-Samas” or “Hollerith” machines’ was unnecessary as training would be given.²² The starting weekly salary for a 16-year-old was £2/1/6, or NZ\$4.15. Various items in the Treasury file² make it clear that punched card operations were considered an exclusively female occupation and that the managers were men. These women have left little trace in the public record of their role in computerisation of their work. There is no reason to suppose that they were less able than the women of ENIAC²³ or any others involved in data processing at the time.^{24, 25}

Returning to the needs of the Department of Education, it already had a Burroughs ledger machine for superannuation accounts before the end of World War II, according to a letter from G.V. Brooke in the Burroughs office in Wellington to the Director of Education, dated 27 June 1945.² From about 1950, the Department also borrowed time on punched card equipment from other Government Departments for statistical work. However, in 1954 the Department decided to obtain its own punched card equipment, because of expected changes in teachers’ salary payments. On 16 July 1954, the Director of Education wrote to the Treasury about a long-standing request from the teachers’ union for fortnightly, instead of monthly, pay. This had been deemed impossible ‘in view of the large cost that will be involved if the system is introduced under the present methods operating in each Education Board.’ The memo recommended a central punched card solution. Further, the memo stated:

Approaches were made, without any commitment, to the two leading firms in Wellington dealing with punched card installation and each has supplied a brochure setting out a system that could do the work we want and an estimate of the cost of installation.... The full installation is expected to cost approximately £20,000...

One of these firms was undoubtedly the Powers-Samas office in Wellington, and the other must have been whoever represented BTM locally in 1954.

A memo from the Secretary to the Treasury, D. Barker, to the Minister of Finance dated 4 August 1954 referred to the proposal to move teachers from monthly to fortnightly pay, requiring the ‘installation of additional punched card machinery costing up to £18,500’. It also noted that the scheme ‘could not be implemented before 1956’, an optimistic estimate as things turned out. The memo also observed that Treasury used punched card equipment to handle the payroll for 20,000 public servants in 26 departments, who were already paid fortnightly. On 13 August 1954, Barker sent a memo to the Director of Education approving a modest initial purchase of Powers-Samas punched card equipment by the Department of Education, to be ordered via the NZ High Commission in London. In the same memo, Barker referred to proposals from both Powers-Samas and ‘Hollerith’ for ‘the major scheme’ and agreed that ‘a central machine plant is likely to provide the most economical and efficient system’. Previously, teachers’ pay was administered by various Education Boards around the country; the new scheme envisaged ‘preparing all cheques at the central point’. Centralisation of the payroll was part of a long process of weakening of the regional Education Boards, which were finally abolished by the Education Act of 1989²⁶. However, there is no evidence that mechanisation of the payroll had any impact beyond the clerical staff directly affected.

After almost five years delay, in April 1959 teachers in New Zealand switched from monthly to fortnightly pay cheques. As their trade union’s journal editor wrote in May 1959²⁷:

Having now had the experience of two fortnightly salary payments, teachers are in

a position to realise the convenience of the new arrangement as compared with monthly payments.... To hold to the Department's intention of bringing in fortnightly pay in April meant far more work than was at first expected. It meant working back for long hours at night, sometimes well past midnight, and added to this was the mental strain of evolving a new system that included the use of unfamiliar and intricate machinery.

We can only speculate about what machinery this refers to. However, changing from monthly to fortnightly payments was not trivial, and the final decision to do so was taken only in August 1958²⁸ for implementation on 1 April 1959²⁹. Firstly, the payroll needed to be run 26 times a year instead of 12. Secondly, in the New Zealand currency of the time – pounds, shillings and pence – any annual salary or allowance that was a whole number of pounds and shillings could be divided by 12 without any rounding errors, so the exact calculation of monthly pay was straightforward. By contrast, the fortnightly calculation would rarely be exact and rounding errors would need to be reconciled. Thirdly, the payroll dates would slip back by one day a year, and by two days in 1960 (a leap year), again leading to tricky coding. It is easy to see why the Department of Education needed new equipment and skills in 1959.

In September 1960, the union journal wrote (for once, not complaining about salaries)³⁰:

It is anomalous that when teachers' pay and deductions are processed by electronic bookkeeping, the methods of recruiting teachers have not changed much since the horse-and-buggy days.

This implies that the Department of Education was then using an electronic machine of some kind to run the payroll every two weeks. Since we also know that they probably acquired their ICT 1201 at some time in 1960, the conclusion is tempting

that this was the provider of 'electronic bookkeeping' referred to, at least two months before the commissioning of the Treasury's IBM 650. But this is not quite a certainty.

BTM did have electronic products prior to the HEC4 computer: electronic multipliers were included in some of its calculators, including the BTM 555 introduced in 1952.³¹ Powers-Samas failed to enter the stored-program computer market. In the mid-1950s, they did however produce an electronic device called the PCC (Programme Controlled Computer), which included a magnetic drum memory, but it was not a stored-program computer in the Turing or von Neumann sense: 'The programme instructions are not entered into the computing store, but are set up on switches preparatory to a computation taking place'³². Much of its electronics was concerned with calculations in pounds, shillings and pence. Although manually programmed, the PCC was quite successful. By 1958, some 25 had been delivered, with overseas orders including Australia.³³ Indeed, any machine that could multiply and divide pounds, shillings and pence could find a market in Australia and New Zealand in those days, as well as in the UK. New Zealand converted to decimal currency only in 1967, one year after Australia and four years before Britain and Ireland. South Africa had converted in 1961. (All were a century behind Canada.) Since Powers-Samas had a sales office in Wellington, and the PCC was sold from 1956 onwards, it is certainly not impossible that the Department of Education had a PCC as part of its card-processing facility by 1959. Equally, they could have had a BTM 555 as part of a 'Hollerith' installation. However, there is no evidence of either, whereas the ICT 1201 is a certainty.

Fortunately, we now know what the vendor thought about the race with IBM. Bruce McMillan joined Powers-Samas as a technician in Dunedin in

1958, automatically becoming an ICT employee in 1959. He attended courses at the Wellington office, and vividly recalls the annoyance of ‘the Powers/ICT/ICL people about IBM’s claim to be first.’³⁴

The balance of probability is thus that the Education machine was installed and running by August 1960, but that the Treasury and IBM either did not know this or preferred to ignore it when inaugurating the IBM 650 in March 1961.

Another uncertainty is how the Department of Education paid for its ICT 1201. The Department issued an annual report to Parliament in the name of the Minister of Education.³⁵ Surprisingly, the reports for the relevant years appear to ignore the change to fortnightly pay and the associated centralisation of payroll handling. The reports do include a reasonably detailed financial report until the fiscal year 1960-61, but there is no line item that could readily be interpreted as a computer purchase. However, starting in 1957 there are two relevant items: ‘Hire of punch card machines’ and ‘Duty & tax on accounting machines’; for details see the following table, which also shows a coincidental tendency to increase in ‘Office equipment’.

Budget year	Hire of punch card machines	Duty & tax on accounting machines	Office equipment
1955-56	£0	£0	£11432
1956-57	£0	£0	£14178
1957-58	£1560	£1170	£19600
1958-59	£4959	£1409	£15300
1959-60	£10510	£2813	£15764
1960-61	£15954	£7922	£24300
1961-62	n/a	n/a	n/a

A reasonable conclusion, considering the likely price of up to £40,000⁶ for an ICT 1201, is that the Department rented the machine from ‘Hollerith’ (by then formally known as ICT, and established

in the old Powers-Samas office in Wellington). Alternatively, perhaps they arranged some sort of lease-to-buy contract. It is tempting to assume that they embedded it in the designation ‘punch card machines’ to avoid any difficulty with the Treasury officials who had approved a punched card project in 1954. In any case, the increases in expenditure seem to match the installation of a large machine by 1960.

The Department of Education acquired its second computer, an ICT 1301, in 1962, although conventional history⁷ gives this as their first machine. The ICT deliveries list for the 1301³⁶ shows a machine delivered there for ‘Teachers’ salaries, school certificate examination results, stores control’. Despite its similar identifier, the 1301 was completely incompatible with the 1201, being a new design manufactured by GEC.⁶ It is unlikely that the Department would have wanted to keep both, after the new machine was running well, inevitably with completely rewritten software.

By late 1963, Ruth Engleback had emigrated to Auckland, New Zealand and was bringing up a young family. Through a contact of her husband’s, she was head-hunted by a local company called Motor Specialties (*sic*), which supplied components to the motor trade. The US spelling was intentional. (In 1987, Motor Specialties Ltd. changed its name to Repco Merchants Ltd³⁷. The Australian company Repco acquired its first New Zealand store in 1981, apparently by taking over Motor Specialties.³⁸) In 1963, Ruth’s job for Motor Specialties was setting up their newly acquired ICT 1201 and getting it operating. This took about a year.

Although not the nub of the present paper, it is worth observing that in 1963 Motor Specialties was, by New Zealand standards, a very early adopter of electronic computing for non-

governmental purposes. Probably the first commercial user was Griffin & Sons, the confectioner, in 1961.⁷ The Bank of New Zealand (a commercial bank, but state-owned at that time) first called for tenders for two computers in 1964, in anticipation of decimalisation three years later.³⁹ The Cadbury chocolate factory in Dunedin bought an ICT 1301, as did Electronic Data Processing Ltd. in Auckland.³⁶ The latter company is something of a phantom. According to the New Zealand Gazette⁴⁰ it was formed in 1961 and struck off the companies register in late 1963, but it had no entry in the 1962 Auckland telephone directory. Cadbury received their machine in November 1963; an earlier ICT 1301 was delivered to Cadbury in Tasmania during 1962.²¹ The Dunedin machine is now to be seen in the Toitu Otago Settlers Museum in Dunedin after being used, almost incredibly, until 1975.⁴¹ Components of a BTM 555 electronic calculator and various Powers-Samas machines are also displayed there.

In any case, in 1963 Motor Specialties became one of the first commercial users to install a computer in New Zealand, and the first one known to install a second-hand machine.



Figure 2: The Motor Specialties building (Auckland Museum)

John Robb, who worked for Motor Specialties in

the 1960s, recalls that first computer being installed in their premises at 80 Anzac Avenue in Auckland in 1963.⁴² The handsome building, designed in 1929 by the Dunedin Arts-and-Crafts architect Basil Hooper, still stands in 2020, unsympathetically modernised and home to two language schools. The intended application for the ICT 1201 was management of the company's large inventory of spare parts for motor vehicles. Robb recalls that the results were not very satisfactory and that the computer was replaced within a few years. The company eventually became highly dependent on a computerised inventory, as its business grew constantly throughout the 1960s – the number of licensed motor vehicles in the country grew by 39% during the decade.⁴³

Neither Motor Specialties, nor any other customer in Auckland, features in ICT's delivery list for the 1201. Ruth's recollection is that the computer was bought second-hand from a government department and moved up from Wellington, at a cost of about £15,000. Since the price for a new machine was up to £40,000,⁶ this is a plausible second-hand price for a machine that was presumably considered obsolete by the Department of Education, the only possible source in New Zealand of a used ICT 1201 in 1963. If, as conjectured above, the Department had actually rented the machine, Motor Specialties probably bought it directly from ICT. Even so, the available data make the machine seem like an excellent bargain for the taxpayers, compared to the exorbitant rental fee for the Treasury's IBM 650.

Ruth further recalled that the 1201 was eventually donated by Motor Specialties to the Auckland Technical Institute (ATI), which later became Auckland University of Technology (AUT). The formal donation is well documented and took place on 15 December 1966.^{44, 45} She was called in again to train ATI staff to program the 1201. She recalls that Motor Specialties had by then acquired an ICT

1301, which is not listed in the ICT records.³⁶ It is possible that this was the machine sold to the short-lived Electronic Data Processing Ltd. Motor Specialties remained loyal to ICT and ICL for almost 20 years, before finally becoming an IBM shop.

Ruth's final recollection is that ATI donated the ICT 1201 to MOTAT. Unfortunately, neither AUT nor MOTAT has found a record of this. It should be noted that MOTAT was founded only in 1964, by aeronautical and transport enthusiasts, who probably did not discern the importance of early computers such as the ICT 1201 and the IBM 650, and did not take cataloguing as seriously as today's professional staff, who diligently searched their archives in 2019.

Conclusion

We have shown that the New Zealand Department of Education ordered an ICT 1201 computer in 1959, that it was in all probability operational by August 1960, and that its supplier believed it to be first in the NZ market. There is thus a strong likelihood that the first operational stored-program electronic computer in the country was not an IBM 650, but an ICT 1201. This machine later became the first second-hand computer installed by a commercial user in New Zealand.

Why was the early acquisition of an ICT 1201 so little known? Even an oral history project covering 1960 to 2010 failed to dislodge the Treasury's claim to precedence.⁴⁶ We can only speculate, but it could be that, aware of the Treasury's slow-moving acquisition of the IBM device, the Department of Education considered it best to fly under the radar and simply acquire equipment that it desperately needed for its fortnightly payroll without publicity. Twenty-five years later, when the NZ Computer Society celebrated its jubilee, the machine was not even mentioned.

In the Treasury files² it is very noticeable that Treasury officials considered themselves to be in charge of all expenditure. Foreign exchange was tightly controlled by the Reserve Bank, import licences were needed for almost everything, import duty was high and the economy was highly regulated.⁴⁷ In short, computers were expensive. All these are possible reasons why the Department of Education avoided publicity that might alarm the Treasury.

This not only had a perverse effect on historians by effectively concealing the computer. Although universities were early adopters, computing was relatively slow to enter school curricula in New Zealand.⁴⁸ If the Department of Education had been a recognised leader, the schools might have taken notice much sooner.

Finally we should note the role of women in this story. Ruth Engleback was far from alone in the pioneering days, and she, her peers, and the many women who operated punched card equipment before and after computerisation deserve their place in history, from which they have largely been excluded until recently.^{24, 25}

The end of 1960 was a decisive moment: mechanical data processing was coming to an end, new suppliers and products were appearing, the programming of machines was changing from physical labour to desk work, and thousands of clerical jobs were about to be transformed. The New Zealand Department of Education should share the credit for leading the way.

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