# Early Use of Computers in Swiss Banks

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What caused large, conservative Swiss banks to venture into using computers barely 10 years after computers were first available? Swiss banks proved to be early technology users. This article will explain why, and how, Swiss banks invested in computers. Case studies of two major Swiss banks provide interesting insights into their business patterns in the years after World War II and their early use of commercial computers.

The computer age began in 1956 for two large Swiss banks, Schweizerische Bankgesellschaft (SBG) and Schweizerische Kreditanstalt (SKA), when both banks purchased their first electronic calculators to support and improve their punched card operations. SBG purchased a Univac 120 calculator; and SKA, a Bull Gamma 3B calculator. The growing business volume in banking in Switzerland required this first step into computerization so banks could continue processing all banking transactions in a timely manner. *Timely manner* means that all banking transactions of a business day must be fully processed within 24 hours. Certain urgent transactions, such as stock exchange transactions, must be processed even faster: by the beginning of the next business day at the latest.

This article describes the business situation of the two banks in the mid-1950s. At that time, banks still manually calculated interest and commissions for bank and securities accounts. This led to the introduction of a first generation of bank computers in the late 1950s, which permitted automation of simple calculations. Data storage was still based on punched cards as the storage medium. By the early 1960s, punched card volume became a problem, and the banks turned to a new generation of computers using magnetic tape as storage to replace the punched card files.

Banks' two major application areas were securities processing, and customer and bank accounts processing. All applications were home grown because the computer vendors did not yet sell software, and an independent software industry had yet to be born, at least in Switzerland. IBM's announcement of the System/360 series of computers in 1964 was a major turning point for Swiss banks. They started to migrate to this new generation of computers in the second half of the 1960s, which let them begin using online disk storage in addition to magnetic tapes.

No records remain to shed light on the internal decision processes in the two banks—SBG and SKA—and the bank management's expectations concerning the purchase of their first, expensive computers. All that remains is information on the kind of equipment that was purchased and what use they made of it.

## Technical environment in 1950s Switzerland

The first computer in Switzerland was used by the Federal Institute of Technology (ETH) in Zürich. In 1950, Eduard Stiefel of the ETH rented a Z4 electromechanical computer from Konrad Zuse, the German computer inventor.[1] At the same time, Stiefel and his team developed their own electronic computer called ERMETH, short for Elektronische Rechenmaschine der Eidgenössischen Technischen Hochschule [Electronic Calculation Machine of the Federal Institute of Technology]. ERMETH went into operation in 1956 and became the centerpiece of ETH's computing center until 1963, when it was replaced by a Control Data Corporation (CDC) computer.[2]

The mid-1950s also witnessed the emergence of commercial computers in Switzerland. Automation reached into factories in heavy industry as well as into offices in the administrative sector. The daily press published numerous articles concerning automation, often citing US case studies.[3] On 6 December 1956, the Swiss Society for Automation was founded,[4] another indication of how important automation had become by that time in Switzerland. Automation caused hope and anxiety—hope for improved productivity in all areas, and anxiety about the social consequences and potential layoffs.[5] Banks also began to consider the issue. They studied the use of computers to improve their business processes and published articles in their customer magazines to demonstrate how up-to-date they were.[6]

In 1957, articles about the installation of the first computers in Switzerland began to appear. The first two commercial computers, apart from electronic calculators, were two IBM 650 magnetic drum computers that IBM Switzerland sold in 1957 to the Swiss Post, Telephone and Telegraph Office (PTT)[7,8] to automate its payment services and to A.C. Nielsen[9] to automate its market research activities. In the same year, the parliament of the Canton of Bern approved a credit[10] to lease a Bull Gamma 3B computer with a magnetic drum extension AET (*AET* stands for Armoire Extension Tambour, the French name for drum extension cabinet),[11] which went into operation in October 1958 for the University of Bern and the Administration of the Canton of Bern.[12]

An article in October 1957[10] claims that there were 250 punched card operations in Switzerland, of which about 20 also operated electronic calculators, but only two used computers—the Swiss PTT and A.C. Nielsen. Until 1961, the number of computers in Switzerland slowly grew to between 26 and 30, depending on the source of the statistic.[13,14]

### Swiss banks before computers

Large European banks, and particularly large Swiss banks, differ dramatically from large US banks. This is due to two factors: the legal environment and the payment patterns of the country. The legal environment in Switzerland always allowed banks to operate in all financial sectors—customer accounts and payments as well as funds management and securities trading. Consequently, most Swiss banks are universal banks active in all segments of the financial industry. Payment patterns in Switzerland were cash based to a large extent. Checks never gained any significance in Switzerland. Salaries and wages were paid in cash as a matter of normal practice until the 1960s when banks began introducing special accounts for salary payments. Smaller noncash payments were almost exclusively made through the *giro* system[15] run by the Swiss PTT, which was used by small and medium-sized businesses, insurances, utilities, and so on, to collect their payments. Banks focused on serving large corporations and wealthy individuals. Services included stock exchange transactions, securities administration and management, and foreign exchange for international payments. In brief, Swiss banks processed a small volume of complicated high-value transactions, which did not easily lend themselves to automation.

Both SBG and SKA began using conventional punched card equipment after World War II.

SBG decided in 1947 to go with Powers punched card machines from Remington Rand,[16] while SKA chose one year later in 1948 to use equipment from Bull.[17] Punched card operations in both banks reached considerable size by the mid-1950s with both banks having multiple operation centers across Switzerland. A SKA publication of 1959[18] mentions "current account business" and "securities business" as major applications that SKA processed with punched card equipment.

As for SBG, that bank noted in a book of 1962[19] that it first used punched card equipment for internal bank transactions between the main office and its branches. The bank used its experience in this operation to carefully plan the extension of automated operations to customer transactions, because, as SBG pointed out,

… it is a peculiarity of bank operations, in contrast to industry operations, that the large majority of the results of data processing—such as customer reports, account listings, payment documents—is targeted towards customers and therefore needs to be very carefully presented.[19]

The volume of bank transactions began to grow considerably after 1959. SKA's balance sheets between 1950 and 1970 (see Figure 1, next page) show that the first doubling of the total balance sheet value took 10 years from 1950 to 1960. The second doubling occurred in six years from 1960 to 1966, and the third doubling took only two years from 1966 to 1968.

A similar pattern is displayed by SBG's growth of employees between 1945 and 1960.[19] Total staff increased from about 2,000 in 1945 to about 4,000 in 1960. The major increase occurred in the last three years of that period, between 1957 and 1960, with about 1,000 additional staff, or half of the total increase over the entire 15 years.

This growth began to create a problem for the banks because the growing number of transactions meant that manual processing could not be done on time, supported only by punched card equipment. Even if the required number of additional staff could have been hired, staff costs would have gone through the roof. Although punched card operations helped banks cope with simple transactions, complicated transactions were not suited for simple punched card equipment. Examples of complicated transactions included the periodic closing of customer accounts, administration of securities, and processing of stock exchange transactions containing mathematical operations—multiplication and division.
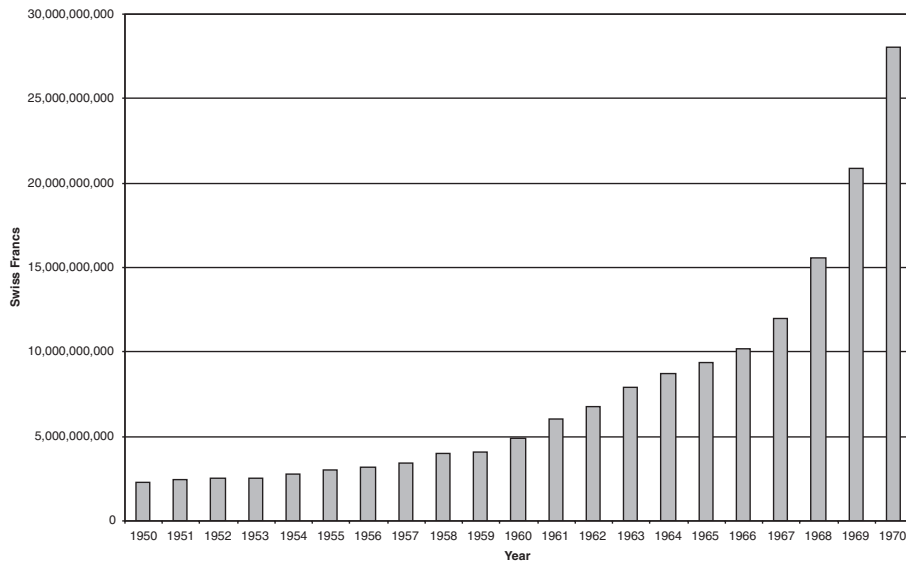
Figure 1. Development of balance sheet volume of Schweizerische Kreditanstalt (SKA), from 1950 to 1970. (Source: Annual reports of SKA, 1950 to 1970.)



**Figure 2. Univac 120 at SBG, opened to show programming plugboards. (Source and copyright: Historical Archives Union Bank of Switzerland, Zürich.)**

To provide good customer service to corporations and individuals by processing transactions within 24 hours, the banks realized that they would require more automation to cope with growing volume and transaction complexity.

## First generation: Electronic calculators

The first step to increased bank automation was the introduction of electronic calculators. This, combined with conventional punched card equipment, allowed automating a class of operations that included not only additions and subtractions but also multiplications and divisions. The calculators had to be compatible and operate with existing punched card machines, so the banks turned to their respective vendors. SBG purchased a Univac 120[20] calculator from Remington Rand in 1956[21] (see Figure 2). SKA,[22] in the same year, purchased a Gamma 3B calculator from Bull[11] (see Figure 3). Both calculators were designed to work with conventional punched card equipment and fitted well into the banks' existing environments. Because the calculators needed instructions on what to calculate, both banks required the new "programming" discipline. (Both the Univac 120 and the Bull Gamma 3B were programmed using wire plugboards.)

In SKA, the most complicated operation was securities accounts administration.[23] Each bank customer, who owned securities and had them deposited at SKA for safekeeping, had a physical file for each type of securities owned. If securities were sold or bought through the stock exchange, they were physically delivered from the seller's bank to the buyer's bank. This meant that the physical securities—shares and bonds—had to be extracted from the seller's file at the seller's bank, transported from the seller's bank to the buyer's bank, and deposited in the buyer's file at the buyer's bank. One of the bank's major jobs was to keep track of such transactions and make sure that all the customer files contained the right number of securities certificates. Punched cards stored all movements of securities, which allowed the printing of peri-
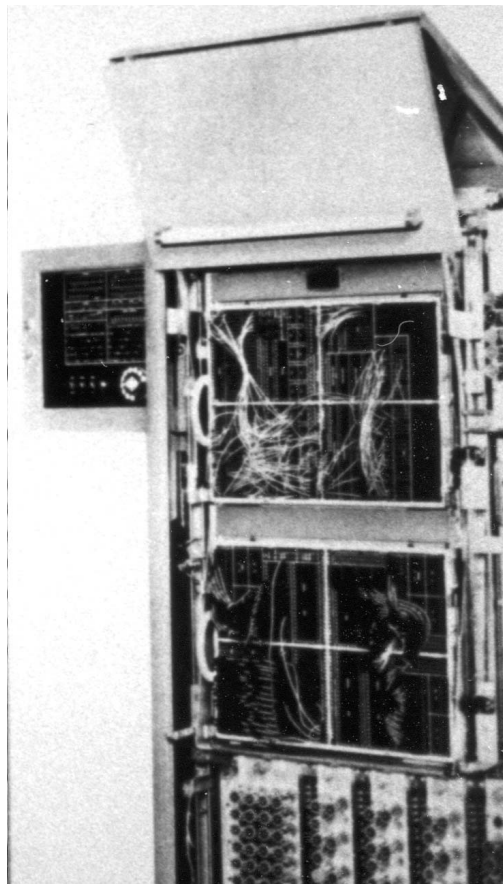
odic securities accounts listings. Other operations still necessitated manual work and conventional accounting machines.

At the center of securities administration was the stock exchange, where traders from member banks met daily and traded securities based on customer orders received by the banks. Traders kept a manual transaction journal of what they sold and bought, which was the basis for all further processing and also initiated the securities' physical delivery. Back-office staff transferred the handwritten trader journals to punched cards in the bank's stock exchange administration department, one card for each transaction.

Punched card operations staff used these cards to produce the stock exchange transaction reports, which were exchanged between the member banks. It was vital that banks exchange these reports at 9 a.m. on the following morning so that the banks could detect any processing errors and avoid any delays in delivering the securities to the customers. Punched card operations staff also used the same punched cards to produce the printed transaction journal for the stock exchange itself, on which the stock exchange based its own fees collected from the member banks.

Securities accounts was the first area that SKA further automated in 1956. The bank wanted to keep up with the growing volume of stock exchange transactions and still deliver the transaction reports at 9 a.m. each day to its fellow banks. It became clear that soon this would no longer be possible with existing processes and equipment.

SKA's solution lay with Bull, the French vendor of punched card equipment, which had actively developed electronic calculators to support conventional punched card equipment.[24] Bull delivered the first Gamma 3 calculator to the French bank Crédit Lyonnais in 1953.[11] It worked in combination with Bull's conventional card tabulator, equipment that SKA already used. Consequently, SKA management decided to take this approach to further automate transaction processing and, in 1956, installed a Gamma 3B, an improved version of the original Gamma 3.[22] The 3B automatically calculated a number of figures for each transaction, such as transaction amount (number of securities times price), exchange fees, and bank commissions (a percentage of the transaction amount). These calculations, in turn, enabled the tabulator to automatically print the customer reports.

One bottleneck remained, however: the manual transfer of the handwritten trader jour-
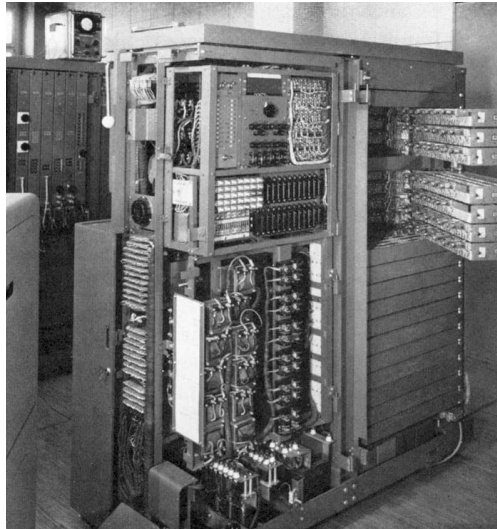


**Figure 3. Bull Gamma 3B at SKA with covers removed to show internal arrangement of electronic components. (Source:** *Elektronische Daten-Verarbeitung im Dienste unserer Kunden,* **p. 17, SKA, 1959. Copyright: Credit Suisse Group, Zürich.)**

nal to punched cards. SKA's first attempt to automate the journal transfer involved an optical card reader from Bull[11] that read pencil marks from cards and punched corresponding codes into the same card.[23] SKA asked traders to mark the most important details of their trades onto such cards so that manual data entry could be avoided. However, traders refused to do this after some time, forcing SKA to end the exercise.

A second attempt had more success because it did not involve the traders. To speed up the manual data entry from trader journals, SKA installed four IBM 357 data entry stations (see Figure 4, next page) in the administration department.[25] Punched card operations staff prepared master cards for all types of securities in advance so that only variable transaction data, such as number of securities and price, had to be entered manually. To extend the automation, SKA implemented an IBM-developed data transmission technique using indoor cables, which connected the four data entry stations with a card punch in the punched card operations department. Data read from master cards plus the manually entered data were automatically transmitted to the card punch where a punched card was produced containing all data. This setup enabled four data entry clerks to work continuously in parallel so that punched cards for all transactions were produced in a continuous stream in the operations

Figure 4. IBM 357 data entry stations at SKA. (Source: *Technische und organisatorische Fortschritte im Dientse unserer Kunden*, p. 27, SKA, 1963. Copyright: Credit Suisse Group, Zürich.)



Figure 5. NCR accounting machines at SKA. (Source: *Elektronische Daten-Verarbeitung im Dienste unserer Kunden*, p. 25, SKA, 1959. Copyright: Credit Suisse Group, Zürich.)

department. According to IBM,[25] this was the first automatic data transmission system used commercially in Switzerland. With these efforts, the banks successfully kept up with the growing transaction volume. The Bull Gamma 3B calculator was in active operation for this application until 1967, when an IBM System/360 computer finally replaced it.[22]

The bank generally used the Gamma 3B calculator to process stock transactions in late afternoons and evenings. When not processing transactions, SKA used the machine for other applications such as securities transaction reports for customers and bank branches, calculation of interest payments of bonds, and dividend payments of shares. Moreover, corporations such as Néstle and Brown Boveri Company contracted with SKA to manage the issue and allocation of new shares, additional procedures that SKA also automated with the Gamma 3B equipment.[26]

## Second generation: Calculators to computers

Another important area of banking that badly needed automation was current account administration—customer as well as ledger accounts for the bank and its branches. After World War II, banks kept accounts by means of conventional accounting machines, such as those manufactured by NCR and other companies (see Figure 5). The problem with conventional machines, however, were the processes required at the end of each month and year, when the banks had to close all accounts, and had to calculate and credit—or debit—interests, fees, and commissions to the customers. This involved significant manual work and manual calculations, which were time-consuming and also error prone.

SKA began automating these processes through paper tape punches connected to accounting machines and teller equipment[27] (see Figure 6). All account entries and transactions were automatically punched on tape when clerks entered them into the accounting machines or teller equipment. The punched tapes could automatically be converted to punched cards, which in turn could be processed by punched card machines (see Figure 7). This helped SKA cope with daily accounting volume—except at month and year end, when many additional calculations were required.

In the meantime, Bull had further developed its calculators and had introduced its first computer, the Bull Gamma ET.[11] *ET* is the abbreviation for the French words "Extension
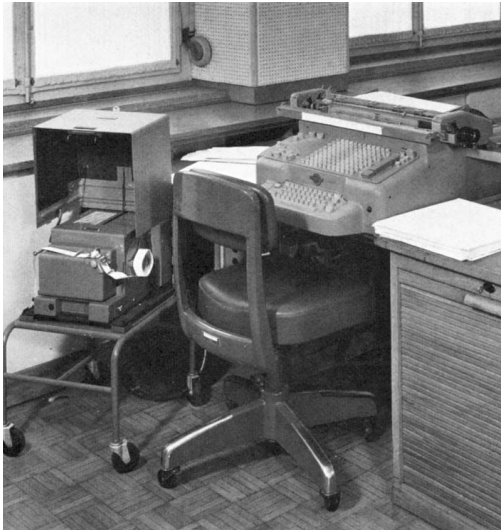
Figure 6. NCR accounting machine at SKA with paper tape punch attached. (Source: *Elektronische Daten-Verarbeitung im Dienste unserer Kunden,* p. 27, SKA, 1959. Copyright: Credit Suisse Group, Zürich.)



Figure 7. Conversion of paper tape to punched cards at SKA. (Source: *Technische und organisatorische Fortschritte im Dientse unserer Kunden,* p. 25, SKA, 1963. Copyright: Credit Suisse Group, Zürich.)

Tambour," which indicate that the Bull Gamma ET used a magnetic drum as internal storage (see Figure 8). Based on its satisfactory experience with the Gamma 3B calculator, SKA installed a Gamma ET computer in 1959 to automate its account processing.[22] The drum stored not only the program but also fixed data, such as interest and commission rates, fees, and so on that the program had to access for calculations. The drum was too small to store entire files, so punched cards remained the main storage media for all data.

The bank's main application was the closing of accounts run at the end of every month. It was a major step to automate all related calculations and likewise print out customer reports automatically. This computerization saved time, speeded up delivery of reports to customers, and also improved the reports' quality by eliminating human error.

The SBG bank followed a path similar to that of SKA. In June 1959, the bank installed its first computer, a Univac Card Tabulator (UCT; see Figure 9, next page), in its main operation center in Zürich. The first application to be implemented on the Univac UCT was the processing of payments between SBG and its foreign correspondent banks so that SBG could automatically produce transaction reports for the correspondent banks.[28] SBG followed up this success by ordering additional UCT computers for its regional operation centers in the following years.[29]
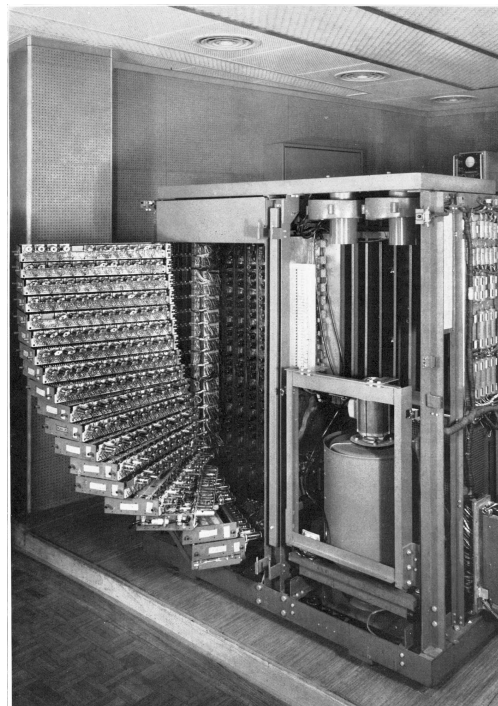


Figure 8. Bull Gamma ET at SKA, opened to show electronic racks. Drum at lower right. (Source: *Elektronische Daten-Verarbeitung im Dienste unserer Kunden,* p. 15, SKA, 1959. Copyright: Credit Suisse Group, Zürich.)
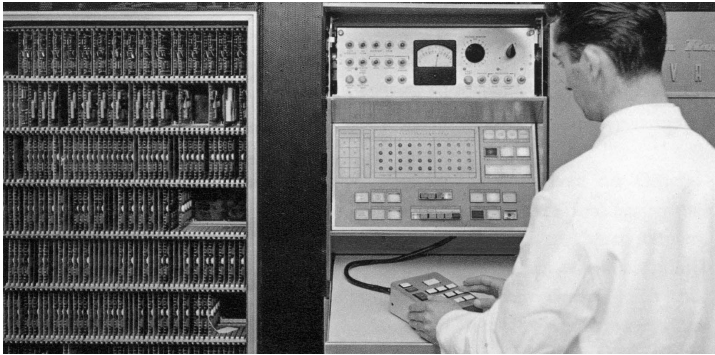
Figure 9. Univac UCT at SBG. (Source: *Schweizerische Bankgesellschaft 1862, 1912, 1962*; p. 166, SBG, 1962. Copyright: Union Bank of Switzerland, Zürich.)



Figure 10. Univac UCT at SBG with magnetic tape units. (Source: *SBG Blätter Juli* 1965, p. 17, SBG, 1965. Copyright: Union Bank of Switzerland, Zürich.)



Figure 11. Bull Gamma 30 at SKA with magnetic tape units. (Source and copyright: Historical Archives Credit Suisse Group, Zürich.)

## Third generation: From card to tape

Although the early calculators and computers had enabled the banks to automate most business processes, data storage was still bound to punched cards at the end of the 1950s. SKA had a total of about 900,000 punched cards stored in 10 large metal cabinets in its main operation center in Zürich.[26] Bank employees had to physically carry many of these cards around every day so they could be processed by the various machines and computers in the punched card operations center. Magnetic tape offered a solution for this data storage problem. Both SBG and SKA turned to magnetic tape in the early 1960s. SBG added Uniservo tape stations to its Univac UCT computers in 1961[30] (see Figure 10), and SKA replaced its Gamma ET and installed a Bull Gamma 30 computer with magnetic tape units in 1962[22] (see Figure 11). The Gamma 30 was actually an RCA 301 computer manufactured and sold by Bull in parts of Europe under license from RCA.[24] Both banks intended to transfer most of their punched card operation to computers and magnetic tape.

The program to automate the closing of accounts—which included the calculation of interest, commissions, and fees—had about 5,000 program instructions, large at the time but miniscule compared to today's mammoth programs consisting of literally millions of instructions. SKA also estimated that, to handle the entire automation job, it would need 10 analysts and programmers, a large number at the time but a fraction of the staff in today's computer departments.[31]

SBG moved all of its major applications to its fleet of Univac UCT computers over roughly four years. By 1963, SBG operated a total of 12 UCT computers in seven computer centers across Switzerland.

## Fourth generation: Magnetic tape to disk

The strong growth in business volume in the mid-1960s presented banks with another problem. They could either spread out processing to additional computer centers and computers, or find ways to increase the speed of existing processing.

A transformational event in the computer industry was the 1964 announcement of IBM's System/360 computers, which included magnetic disk storage of considerable size and suitable for commercial operations. Both SBG and SKA would benefit by moving their files from tape to disk or drum, which would allow direct—rather than sequential—access to data and thereby speed up processing considerably.

SKA started to evaluate new computers at that time and found that Bull had fallen behind its competitors—they had no working disks yet—and that IBM would provide the best solution.[22]

During SKA's evaluation around 1965, IBM suggested that its smallest model, the IBM 360/20, would be sufficient to handle all SKA's calculations. SKA was at pains to explain to IBM that it was not the mathematical calculations that mattered, it was the large amount of data required that the bank had to store, read, update, and administer.[26] IBM eventually conceded that an IBM 360/30 would be needed. SKA, however, finally ordered an IBM 360/40 system in January 1966, which was delivered and installed in 1967.[32] But as SKA had feared, even the 360/40 could not cope with the bank's amount of work and volume of data, so SKA decided to concentrate on only moving all securities applications from the Gamma 3B calculator to the 360/40.

The Bull Gamma 3B was finally removed from operation in 1967. Despite the restricted workload, SKA had to replace the 360/40 with the larger 360/50 two years later in 1969. What's more, SKA kept the Bull Gamma 30 tape computer operating and purchased a new Bull Gamma 10 punched card–based computer to relieve the aging punched card equipment.[22] All of this equipment was replaced in 1972 when SKA installed IBM System/370 systems in a new computer center.

SBG, which had remained with its primary vendor, by that time called Sperry Remington, ordered two Univac 492 real-time computers and a number of smaller Univac 1050 batch systems in 1965.[33] The 492s were used in its Zürich computer center; the smaller 1050 systems became the standard equipment for its minor computer centers in Switzerland. Sperry initially concentrated on large and fast magnetic drums instead of disks and only later converted to magnetic disks. SBG replaced the two Univac 492 systems in 1969 and 1970 by several Univac 494 systems. Piece by piece, all applications were transferred from the old Univac UCT tape computers to the new systems. The last Univac UCT was taken out of operation in 1972.[34]

## Conclusions

The two banks' early use of computers is strikingly similar. Both SBG and SKA banks made the transition at around the same time from conventional punched card equipment to electronic calculators and, later, programmable computers. They both remained for a long time with their original vendors of punched card equipment and only changed to another vendor when their original vendors could no longer meet their business requirements. Both banks were among the early users of new technology in Switzerland; the installation of electronic calculators in 1956 was early for a Swiss enterprise. The two banks were among only 20 companies in Switzerland that had installed such equipment by the end of 1957. The move to magnetic-tape-based computers by the two banks five years later, in 1962, was another early move into yet another new technology. By the end of 1962, only 79 electronic data processing installations were in operation in Switzerland,[13] and the two banks were again among this number with their multiple installations across Switzerland.

What caused Swiss banks to play this role as early technology users? Why did they, temples of conservative and discrete Swiss business conduct, not wait and see how technology developed, and take a technology follower role? Initially, this was certainly caused by the urgent need to start automating to keep up with growing business volume. The growth period that began in the late 1950s continued well into the 1980s. There were periods in the 1970s and 1980s when IBM could scarcely meet SKA's demand to develop faster computers with ever larger disk storage. SKA installed every new system announced by IBM as soon as it became available.

In addition to volume growth, which was the primary motivator early on, extending automation to additional business processes to slow down staff growth and cut costs became another driving force. This, however, leads us to the next few generations of computer use by Swiss banks—introducing terminals, databases, and transaction systems, which might be another interesting topic for research.

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