

**A landmark data processing project:  
*the Commercial Union's Exeter Computer Centre, 1959 – 1966.***

Simon Lavington.  
March 2022. [lavis@essex.ac.uk](mailto:lavis@essex.ac.uk)

**1. Introduction.**

By the end of the 1950s the facilities offered by the UK's computer manufacturers had developed to the point where even the largest business organisations could feel reasonably confident in transferring their data and working procedures to electronic digital equipment. That is to say, the ability to store huge amounts of alphanumeric information on-line and to perform calculations on this information reliably and accurately had matured. Insurance companies were amongst the most demanding applications for this evolving technology. The Commercial Union Assurance Company, one of the UK's largest, was amongst the first to take the plunge and commit itself to the vision of a totally-integrated digital business model.

In this paper we describe the Commercial Union's progression from a manually-based, paper-dominated organisation spread amongst very many branches into an electronic network connected to a single large computer centre. Besides requiring powerful new computing equipment, the establishment of the Commercial Union's Computer Centre at Exeter involved ground-breaking innovations in trans-regional data-communications and high-speed document printing. The challenges were considerable.

After some scene-setting, sections 4 and 5 of the paper describe the Commercial Union's computing requirements and the products available in 1960 to meet the company's needs. The installation in Exeter of a novel system in a specially-designed building is presented in section 6, followed by an account of the manner in which the company's computing processes evolved. The benefits are evaluated and conclusions drawn. References and notes are given at the end.

**2. The anatomy of the Commercial Union's business.**

By 1960, when the Commercial Union Assurance Company was poised to enter the electronic computer age, it was an amalgam of several smaller companies as a result of previous mergers and acquisitions. Founded in London in 1861 in an era when British business was booming, the Commercial Union expanded quickly in its coverage of risk. At the same time it enlarged its geographic scope by appointing agents in many of the overseas ports used by British merchants. By the end of the 1800s the Commercial Union was amongst the top two or three of several hundred UK insurance companies whose businesses involved both Life Assurance and more general coverage of Fire, Accident, Motor and Marine Insurance. The

history of the company's first hundred years is covered in some detail in [reference 1a].

The Commercial Union (CU) Group comprised the CU itself plus 13 other UK insurance companies, together with eight US companies and 14 companies in other parts of the world. In 1960 it had "many millions of policy holders world-wide" and was described as "one of the largest and, internationally, most widespread organisations in British insurance". Within the UK the CU had a total of 117 branches and sub-branches, distributed thus:

London (City = 8; suburbs = 13)	21
England and Wales	76
Scotland	15
Northern Ireland	5

The CU had about 350,000 insurance agents [ref. 23], each reporting in to one of the above offices. Each branch office undertook the processing many hundreds of policy documents, each of which required annual renewal and periodic adjustment. The smallest CU offices employed fewer than ten people. Medium branch offices employed several tens of people and the principle regional offices could number well in excess of a hundred staff.

As has been said, the CU Group was an amalgamation of businesses. One particular merger in 1959 impacted significantly. This was the CU's merger with the North British & Mercantile Insurance Co., an event described at the time as "one of the largest single events of its kind in the whole history of British insurance". The CU's assets stood at about £191 million and the North British assets at about £127 million. Furthermore, the North British Group included the Ocean Marine Insurance Co. The 1959 merger consolidated the CU's position as a leader in all four types of composite insurance: fire, life, accident and marine. At the end of 1959 the CU's Chairman could report that the Group's annual income from all premiums amounted to about £160 million, "a figure which truly reflects our position as one of the foremost groups of insurance companies in the world" [ref. 1a].

We should now go back to 1950, to trace the start of the Commercial Union's move from manual working to machine-assisted working and the progression from electro-mechanics to electronics.

### **3. Prelude to computerisation: punched cards.**

Before 1953, all Commercial Union data processing was carried out manually by clerks. The various tasks of clerks in the days before electro-mechanical aids are vividly described in [ref. 2], which points out the advantages of clustering all insurance businesses within walking distance of one another (typically in London). From the 1930s onwards, some clerks could have been assisted by electro-mechanical desk calculators for basic arithmetical calculations but in all other respects the insurance business was based on paper documents handled manually. Although some commercial sectors had begun to use electro-mechanical equipment based on punched cards, much of the insurance sector – and in particular the Commercial Union – did not make significant use of punched cards before the 1950s. Company records indicate that the CU approved purchase of five

experimental mechanical accounting machines in January 1949. In contrast, Sun Life and Norwich Union insurance companies were both using Powers Samas punched card systems for their valuation and bonus work in the 1930s

From 1952 onwards, the Commercial Union (CU) began to plan a comprehensive mechanisation system based on punched card equipment to handle most aspects of its central business. F C (Frank) Knight conceived and oversaw the whole project [ref. 3]. It is of passing interest to note that Frank Knight became Chairman of the London Insurance Institute's Electronics Study Group in 1957. His [vision](#) for the CU was to unify the company's entire operation into a flow of information that went from the branch offices to one of three (later extended to four) *Mechanisation Service Centres* where the punching and physical storage of the cards took place. The branches remained the control points as far as the many insurance agents were concerned. The work from a particular branch always went to the same unit within the same Mechanisation Service Centre. Although all digitised data was stored and processed centrally, there was not one vast anonymous factory but a network of partnerships between branches and their individual mechanisation units. Based entirely on punched card equipment provided by the British Tabulating Machine Co. Ltd. (BTM), the general scheme formed an excellent organisational basis for the Commercial Union's eventual introduction of a large electronic stored-program computer in 1962 – as covered in section 6.

At each *Mechanisation Service Centre* there were from one to four units, each unit responsible for about six CU branches. Figures 1 to 3 give some indication of the activity within one of the units at the Croydon Centre in the mid-1950s.



**Fig. 1: Croydon Centre, a unit office.**



**Fig. 2: a section of a punch room.**



**Fig. 3: a Tabulator printing a report.**

The four *Mechanisation Service Centres* were introduced gradually. In 1954 only Croydon and Exeter Northernhay were operating. A centre at Rickmansworth opened in 1955/6. By the end of the 1950s the Commercial Union's 'mechanised' system performed all punching and physical storage of cards centrally, at either of four centres located respectively at Rickmansworth, Croydon, Exeter Northernhay Street and Exeter Sidwell Street. (The Rickmansworth Centre was closed in about 1958/9 and its business transferred to Northernhay Street [ref. 22]). Commercial Union Branch Offices throughout the UK sent batches of typed-up paper documents by post daily to their assigned Mechanisation Service Centre. Punched cards were created and the tabulated printed results were returned to branches by post. The huge numbers of punched cards themselves were held centrally. To give some idea of physical size, data on one million Life policies might need nearly six million punched cards; these six million cards would require about 1,600 cubic feet of storage space [ref. 4].

The Commercial Union's punched-card system was gradually expanded and improved from 1954 onwards, until the company's Fire, Life & Accident businesses were all finally integrated in 1959 [ref. 3]. Meanwhile, all the punched card equipment manufacturers had added to their basic range of tabulators, sorters, collators, reproducers and interpreters by introducing such things as electronic multipliers and calculators. Perhaps the high point in this trend, as far as British manufacturers were concerned, was the introduction of the Powers-Samas Programme Controlled Computer (PCC). This was announced in 1954 and came fully onto the market in 1956 at a cost of about £18,000. The PCC lay in the gap between computers without, and with, the essential stored-program attribute.

A somewhat comparable product lying in this gap was the Hollerith 550 electronic calculator, first available on the market in about 1957. This had a magnetic drum which could hold 105 registers and a large double plugboard which could hold up to 150 program steps. One such calculator is shown in Figure 4. The Sun Life Insurance Company installed a PCC in May 1959 [ref. 5] for "valuation and statistical work and for administration". The CU installed a Hollerith 550 calculator (at Head Office) in about 1962/3, for "extensive use within the Life Department's punch card unit for calculations of new surrender values but it has become apparent that its resources are strained and that its functions must be extended either by the acquisition of additional machinery or by other means" [ref. 24]. More generally, the

CU decided to bypass equipment such as the Powers-Samas PCC and the Hollerith 550 and go straight on towards general-purpose *stored-program* computers.



**Fig. 4. A Hollerith 555 calculator as installed at the UK's Atomic Energy Authority's establishment at Harwell in 1958.**

Meanwhile in the wider world, the gradual take-up of these general-purpose computers had been advancing inexorably. The modern digital age had dawned. Before describing the CU's first computer installation in section 6 below, it is helpful to rehearse the main reason why choosing a computer was difficult for the CU in the late 1950s.

The CU, in common with all large insurance companies, had particular needs for bulk storage, fast data transmission and massive amounts of document printing but it was the bulk on-line storage requirement that was the most crucial. The number of policies (in excess of several million) determined the total size of storage required.

#### **4. Bulk on-line storage: what was available in the 1950s?**

By 1955 four British manufacturers had started to deliver production computers: Ferranti Ltd., Elliott Brothers Ltd., English Electric Ltd. and British Tabulating Machine Company (BTM). In addition, the Lyons catering company had built its own computer, LEO for in-house data-processing. Upgraded copies known as LEO II were produced by Leo Computers Ltd. for sale on the open market from 1958.

In 1955 not one of the above British manufacturers could supply a computer equipped with on-line facilities such as magnetic tape devices for storing the huge volumes of information being held as millions of punched cards by organisations such as Commercial Union. All the above computer manufacturers lagged behind their American counterparts. But for strategic and economic reasons American computer manufacturers at first had little interest in pursuing European markets,

where post-war currency restrictions in any case rendered European customers less likely to buy American products. The first foreign-built computer (an IBM 650) did not arrive in the UK until October 1956 [ref. 6] but the IBM 650 had no bulk storage facilities. More on the American scene, in respect of insurance companies, is given in [ref. 7].

Throughout the 1950s UK computer manufacturers sought to develop suitable bulk storage technologies. By the end of the 1950s emerging industry standards tended to follow IBM's lead, whose half-inch magnetic tape systems gave a transfer rate of 15K characters/second, with each reel holding up to 5 million characters of data. In contrast, the British company Elliott, which initially led the UK field, was using 35mm magnetic *Film* systems for its Elliott 405 computers. Each reel of magnetic film held about 1.4 million characters with a transfer rate of only 0.3 K characters/sec. The first installation of an Elliott 405 computer equipped with this form of bulk storage was in February 1957, delivered to the City Treasurer's Department, Norwich [ref. 8]. The Legal & General Group installed an Elliott 405 computer in October 1958 for "payroll, maintaining and processing policy records of group life and pension schemes" [ref. 8]. It should be born in mind that the sizes and requirements of insurance companies varied widely. At the basic end, a computer might be used by a small company just for fund valuation and risk modelling. At the top end, for companies like the CU and Prudential, large scale data processing of all policyholder records and associated activities was demanded.

The Elliott 405 was based on thermionic valve technology. More cost-effective machines, based on transistor technology and with higher-performance magnetic tape systems, were on the horizon. The Commercial Union watched and waited.

## **5. Selecting the Commercial Union's first computer system.**

### **5.1. Candidate computers.**

Frank Knight, who oversaw the choice and installation of the Commercial Union's first general-purpose computer, assessed tenders from six computer manufacturers during the period spring 1959 to spring 1960 [ref. 9]. The identity of the firms is not revealed but it is stated that they were all British companies. Frank Knight reported that "each of the six set up a study team to work intensively and closely with us" – evidently hoping to attract such a large and important client as the CU. Each manufacturer "was able to supply machines adequate for all the operations but prices, speeds, potential for expansion and the extent of built-in accuracy standards all varied".

Frank Knight's evaluation was carried out during 1959 and 1960, when computer manufacturers were transitioning between processors based on thermionic valve technologies and those based on transistor technologies. Table 1 shows that, by the early 1960s, about seven British computer companies had announced their intention to supply machines suitable for (large) business data processing applications. All the computers in Table 1 were based on transistor technology. The information in Table 1 comes from [refs 8, 10, 11 and 12].

Two points should be born in mind when interpreting Table 1. Firstly, as mentioned earlier, insurance companies came in different shapes and sizes so entries in the

right-hand column need to be interpreted in context. Even the largest companies had specialist tasks that might suggest the use of small computers for part of their business. For example, the Commercial Union installed an English Electric KDF6 computer in about 1964 in its Head Office at 66 Cheapside, central London, “to address the triennial Life Valuation task” [ref. 20]. Secondly, price depended on two factors: (a) equipment configuration and hardware options; (b) system software facilities, degree of customer programmer training and support, etc. Customer requirements varied widely. To put the prices in context, in 1962 a four-door family saloon car typically cost about £700. The motoring extremes in 1962 were represented by an Austin Mini at £496 and a Rolls-Royce Silver Cloud II at £6,272.

<b>Computer</b>	<b>first UK delivery</b>	<b>Av. price</b>	<b>Some example deliveries to insurance companies</b>
AEI 1010	1960	£170K	None known
Elliott/NCR 4100	1965	£ 60K	None known
EMIDEC 1100	1961	£190K	None known
EMIDEC 2400	1961	£600K	None known
English Electric KDP10	1962	£300K	Commercial Union, 1962
English Electric KDF9	1964	£350K	Sun Life Assurance, 1965
English Electric KDF6	1964	£ 60K	Equitable Life Assurance, approx. 1967.
Ferranti Orion 1	1963	£800K	Norwich Union, 1964
Ferranti Orion 2	1964	£800K	Prudential, 1964
ICT 1301	1961	£120K	United Friendly Insurance, date?
ICT 1900 series	1965	various	Reliance Mutual, 1966
Leo LEO III	1962	£250K	Phoenix Insurance Co, 1970

**Table 1. British computers with transistor/ferrite core technologies available in the early 1960s and considered suitable for business data processing applications. (For the interpretation of columns three and four, refer to notes in the text).**

The Commercial Union’s deliberations focused on the English Electric company which, to quote a former EE employee, “sold that which customers asked for, not that which existed in the catalogue. During this time all machines were built to contract: none were made for stock” [ref. 13]. In April 1960 the CU finally chose an English Electric KDP10 computer system (see Table 1), at a cost of £297,000 (or £87,000 per annum if rented). It was ‘the cheapest of the systems considered’ [ref. 9].

Frank Knight estimated that there would be cost savings in moving from the four *Mechanisation Centres* (based on punched cards, see section 3) to the single Computer Centre based on the KDP10. In 1960, the punched card machinery and consumables cost £131,000 pa, whereas the KDP10 system, including magnetic tape, consumables and Flexowriters at branches would cost slightly less at a total of £130,000 pa. There was an additional saving due to the use of Xeronic high-speed printers (see section 6.2 below), which would reduce the cost of policy forms from nine pence to two pence per form.

The total *Mechanization Centre* staff costs were £195,000 pa, whereas the planned staff costs with the KDP10 system were only £80,000 pa, consisting of salaries for:

- 15 programmers, planners & administrators;
- 15 computer & ancillary machine operators;
- 40 clerical & dispatch staff, including teams assisting branches adapting to the new data transmission techniques.

The above were acknowledged to be 'safe estimates', with average salaries "set far above current standards, to allow for the possible effects of a general rise in the market rate of pay for computer personnel" [ref. 9]. In any case, computer salaries in the Exeter region were much less liable to upwards pressure than would be the case had Commercial Union elected to build its new Computer Centre in the London region. The plan was to recruit new KDP10 staff from the ranks of those currently working in the CU's card-based *Mechanisation Centres* where possible.

The KDP10 computer was actually based on the American RCA501 machine, which had first been announced in 1958 and which, by 1960, had been purchased by two American insurance companies amongst several other organisations.

The CU's KDP10 was planned to come into operation in 1962 [ref. 14]. This was in fact the very first installation of a KDP10 and it is not surprising that a group of nine CU employees joined with six English Electric staff in a four-week intensive introductory course at English Electric's Kidsgrove factory [ref. 9].

The nine CU staff were seconded from several constituent companies within the Group, selected so that they would be able to supply detailed knowledge covering all aspects of the business. "First and foremost, they had to be good insurance people ... but at the same time they needed to possess an uncanny understanding of all the things which go to make up the job, a latent ability to absorb the immense complications of present-day electronics, and a dedicated determination to organise perfection in an impossibly short time" [ref. 25]. It is interesting that this core team were recruited as insurance experts (rather than as electronics experts) and then given the necessary technical expertise by English Electric staff.

Throughout 1960 and 1961 this group of 15 people worked hard to define every aspect of the CU's complete computer system, including hardware, software, company organisation, personnel training, etc. At first comprising all males, seven females from the Exeter Mechanisation Unit joined the team in October 1960 [ref. 22]. Some of the people involved in this exercise are shown in Figures 5a and 5b, though unfortunately names cannot be put to all the faces at the time of writing.



**Fig. 5a. Staff of the KDP10 team at EE's Kidsgrove factory before October 1960.** The figure in the foreground smoking the pipe is Ashley Havinden of CU. With him are (from the LHS): facing right is Cyril Taylor; next to him facing front wearing glasses is Tom Burkinshaw; next to the right of Ashley facing front is Dick Temple. The other two people are unidentified.

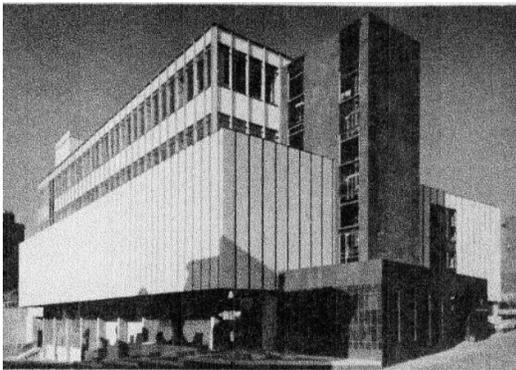


**Fig. 5b. Part of the Commercial Union's original KDP10 team in 1962.**  
*Top row:* Frank Banaghan, Peter Mimms, Peter Foster, George Spratt.  
*Middle row:* Dave Barwell, Ashley Havinden, Mike Fenn. *Bottom Row:*

Brian Crowe. Missing from the group are Joe Janus, chief programmer, and Ray Butcher. This photo celebrated a 'grow a beard' competition!

Exeter, a city with which the CU had a long association, was selected as the location for the company's new Computer Centre. The special position of the CU's Exeter offices dated back to 1894, when the CU had acquired the West of England Fire and Life Insurance Company [ref. 1b]. The West of England Company was established in 1807, with headquarters in Exeter. It "had built up connections with the Continent through an office in Paris, and for some period in its career was the sixth largest British insurance office despite the difficulties inherent in its rather remote [sic] location in Exeter" [ref. 1a].

Work started at Exeter in 1960 on a four-storey, 36,000 sq. ft floor area, custom-designed building – see Figure 6. Completion was planned for the end of 1961.



**Fig. 6 (a, b). Concorde House, the Commercial Union's new Computer Centre in South Street, Exeter, was officially opened in April 1962.**

## 5.2. Characteristics of the KDP10.

Which characteristics might have made the KDP10 stand out amongst the other five prospective candidate CU computers?

Firstly, the whole KDP10 system design emphasized magnetic tape as the main (long-term) operational medium. Up to 62 tape decks (called Tape Stations) could be directly addressed. In the overall KDP10 system diagram of Figure 7 (see page 12), eight Tape Stations could be connected to Tape Switching and Buffer Unit A. If more were required, a Tape switching Unit B could be substituted for each of the original eight Tape Stations. Each Tape Station had a unique octal address. Magnetic tape transfer rates were: 16K or 33 K characters/sec. when writing; 33K characters/sec. when reading. (By 1964, English Electric had increased the transfer rate to 66 K characters/sec. [ref. R15]). There were 16 channels across the tape, which was  $\frac{3}{4}$  inch wide. Each reel of magnetic tape was 2,400 feet in length. Duplicate (ie dual) recording was used, meaning that a single lost bit could be tolerated.

The second attractive characteristic of the KDP10 for business applications was that it was a true *variable item-length* system. Use of control symbols and the ability to address each character location individually permitted the length of any item in any

message to be in strict accordance with that item's actual character count. This allowed for total variability of item and message length. The KDP10 instruction set handled variable-length items and every 6-bit character was addressable. Decimal arithmetic as well as binary arithmetic was provided in hardware. Thus, two variable-length decimal items could be added, subtracted, multiplied or divided.

The third attractive characteristic of the KDP10 was its error-detection facilities. Arithmetical operations were checked by repeat operations using the complements of the operands. Information-transfers were checked by parity. Breakpoints were available to aid program debugging. Rollback was provided upon error-detection. Rollback activated a pre-stored subroutine which was automatically entered when a parity error was detected during magnetic tape operations. The interrupted instruction was then automatically repeated.

Finally, the English Electric KDP10 computer used printed circuits, transistors and a ferrite core store (called 'high-speed memory', HSM, in Figure 7). HSM was available in increments of 16K character locations, up to a maximum of 256K characters. Various types of peripheral equipment were available. 7-track paper tape was standard, the paper tape reader operating at 1,000 characters/sec. The paper tape punch operated at either 100 or 300 characters/sec. The Card Transcriber (see Figure 7) read in 80-column cards at up to 400 per minute and wrote the information to magnetic tape. There was a 600 lines/minute Lineprinter. Faster off-line Xeronic printers were available – see section 6.2.

A description of the instruction set and more technical details of the English Electric KDP10 computer will be found here [ref. 8]. There remain two additional areas of special KDP10 equipment relevant to the Commercial Union's installation: communications equipment connecting remote branches to Exeter; the high-speed printing of results. Details are given below, after the installation of the KDP10 in the Commercial Union's brand new Computer Centre in Exeter has been pictured.

## **6. Installing the KDP10 at Exeter.**

Figure 8 (see page 13) shows the convoy of four lorries and two vans on the outskirts of Exeter in January 1962, as the English Electric KDP10 computer was being delivered. The machine was nicknamed CUTIE, standing for *Commercial Union Totally Integrated Electronics* and the hopeful implication that from henceforth all (or most) of the company's business would be 'integrated' within a single system.

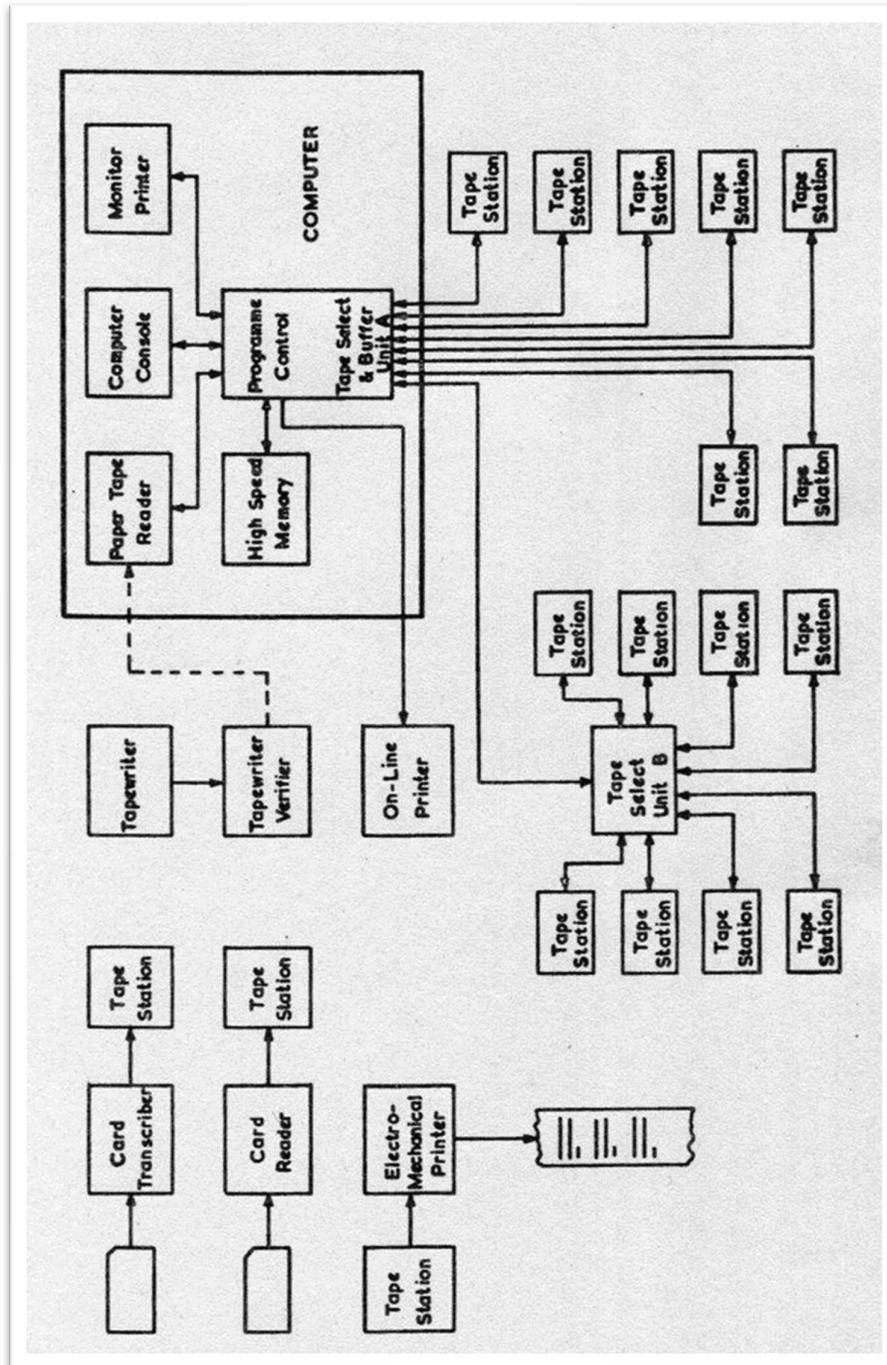
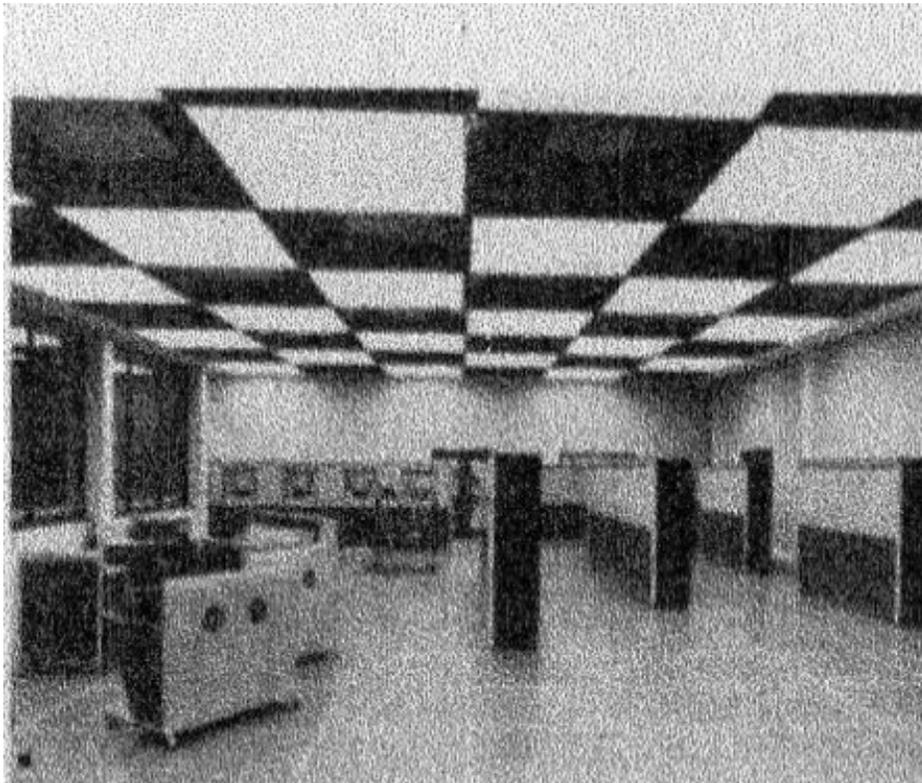


Fig. 7. Overall system diagram of the English Electric KDP10 computer.



**Fig. 8. Transport containing the KDP10 arriving at Exeter in January 1962.**



**Fig. 9. The main computer area at Concorde House, during initial KDP10 set-up in 1962.** This room provided 100 ft x 40 ft of unbroken space. Power supply, air conditioning and off-line input/output equipment were located in other rooms.



**Fig. 10. The KDP10's console, with magnetic tape decks in the background. There were ten tape decks in all.**



**Fig. 11. The systems analysts' and programmers' area at Concorde House, Exeter.** In the early days CU 'programmers' were all male. They produced flow charts on large technical drawing sized sheets, on which each *box* was a (group of) pseudo-instructions. Then women 'coders' recruited from the CU's Mechanisation Centres produced the actual KDP10 coding sheets based on the Flow Charts. David Olphin [ref. 18] believes that "men were felt to be creative and women accurate!"

Amongst the special facilities installed at Concorde House to meet specific Commercial Union requirements were the data-transmission equipment and high-speed bulk printing devices, as now described.

### **6.1. Data transmission: the Swift system.**

In Britain in 1959, telex was the only practical data-transmission facility available nationally. Accordingly, the Commercial Union performed experiments in which 5-track paper tape was produced remotely, fed into a CU Branch's telex machine and the data sent by GPO line to a central telex receiving unit at Exeter. Here, 5-track tape was produced and fed to an ICT 1036 tape-to-card converter [ref. 17] for test purposes.

The 1959 experiments revealed two disadvantages of telex transmission: (i) the data transmission-rate, 50 baud, was slow; (ii) the telex system had no parity bit or other method for error-detection. By the late 1950s 7-track paper tape systems were coming into use. These clearly allowed a richer character set (64 instead of 32 possibilities) but, importantly, they included a parity bit for error-detection.

Accordingly in 1961 experiments were conducted between the Commercial Union's Brighton branch office and the Exeter Mechanisation Centre, using prototype PT750 transmission equipment designed by Automatic Telephone and Electric Co. A typist in Brighton prepared 7-track paper tape on a Friden Flexowriter, an advanced teletype-like device. This tape was fed via a Ferranti TR5 paper tape reader into the AT&E equipment and transmitted using phase modulation at 437 baud (or about 62 characters/second) to Exeter. These were the days before Subscriber Trunk Dialling so transmission over the public telephone network was arranged to be in *prolonged uninterrupted* (PUT) mode. Transmission over the public network did have some oddities. The Post Office 'pips' could under certain circumstances be interpreted as meaningful data so the Post Office was persuaded to drop the use of pips for CU transmissions. Experiments during 1961 indicated that the overall expected transmission error rate was under 1.5 errors in a million transmitted characters. A full analysis is given in [ref. 17]. Accuracies were acceptable enough for the CU to use the equipment in October 1962 for demonstration transmissions between CU offices in London and New York using the Telstar satellite. Successful live query-answering transmissions were also used between Paris and Exeter in the same month, at an international conference.

As a result of these and the Brighton/Exeter experiments, it was decided to equip all of the Commercial Union's approximately 40 main branch offices with a data-communication set-up consisting of three sub-units: (i) a Friden Flexowriter, (ii) a Ferranti TR5 paper tape reader and (iii) an A T & E PT750 transmitter for sending data over the telephone network to the Commercial Union's new Computer Centre at Exeter. Connection between Exeter and all of the CU's 40 main branches was done office-by-office, taking many months following the KDP10 computer's installation. The first branch connection started with Dundee in 1964 [ref. 22], which marked the start of the next phase of operations known as "Branch Computer Services". Training branch staff and equipping branches was achieved "at the rate of one or two per month" [ref. 18].

Eventually this interconnection network, which became known as the Swift system, created a total traffic into Exeter of about 1.5 million characters per day over a period of two hours using four receivers [ref. 17].

At Exeter, data received from branches was first automatically punched onto 7-track paper tape. The reels of tape were then fed into the KDP10 computer via three fast (1,000 characters/second) paper tape readers at a pre-arranged time in the central computer's daily operating schedule (see section 7). This ensured that the KDP10 was not kept waiting for late-arriving data from a particular CU branch office. Of course, this was before the days when on-line communications equipment became the norm. However, as was observed in a contemporary comment on the Commercial Union's experiments [ref. 17], IBM in 1962 was "offering real-time channels which incorporated buffers for assembling messages at line speeds and transferring these into the main store, after checking, at memory speeds" [ref. 19]. The high cost of using such equipment to service all 40 of the Commercial Union's branches at speed is not mentioned.

## **6.2. Xeronic high-speed off-line printing.**

The Commercial Union issued several types of Insurance documents: policies, claims forms, etc., each with a particular layout. Furthermore, the required volume of document production was huge. For example, renewal documents for some 30,000 policies were required to be printed each day. Such volumes were well beyond the capacity of computer equipment of the 1950s.

Accordingly, the CU spent a year in discussions with Rank Xerox Ltd. from 1959 onwards, on the provision of novel printing facilities. The result was the Xeronic high-speed printer, whose first public demonstration in mid-1960 used CU documents as the examples. [ref. 9].

A Xeronic printer was rated at a speed of 3,000 lines/minute. Two images were simultaneously projected onto the paper: (i) a standard form layout; (ii) the particular characters to be inserted on this form. Since the printer could switch rapidly from one form-image to another, documents could be printed in the order in which they were to be despatched, ready and addressed for use with window envelopes. Each Xeronic printer used a 26" wide roll of paper and could print documents at the rate of 40 ft of paper a minute. Each roll of paper ran for about 50 minutes before a re-load was needed. Between 80 and 90 renewal forms could be printed per minute, equivalent to about 4,500 per hour. A Xeronic printer is shown in Figure 12.



**Fig. 12. One of the two Xerox high-speed printers installed in Concorde House.**

At Exeter, the CU installed two Xerox printers, working off-line from data provided on magnetic tape by the KDP10 processor. One magnetic tape deck could feed both printers. Each printer had to be stopped for about five minutes every hour for off-loading the printed output and inserting a new roll of blank paper. David Olphin remembers that “the Xerox machines had a habit of catching fire. The paper roller sometimes stopped and the electric fuser, like an open electric fire element, would set fire to the paper. The fire alarm would be triggered and Exeter’s valiant firemen would then burst into the computer room area several minutes later, by which time the fuser had been removed. No major damage was ever done!” [ref. 18]. Actually, automatic fire-extinguishing equipment was always ready in the background to take prompt action.

### **7. Computing processes and business development in the 1960s.**

The overall purpose of the new Exeter Computer Centre’s facilities was to absorb from Branch Offices the issuing of policies and endorsements; to relieve branch offices of records maintenance work and of all renewal processes; to facilitate all work in connection with accounts and statistics. The computer system would be fully integrated with all office activities. It would eventually also provide for internal Commercial Union administrative servicing, such as payroll, budget forecasting, name and address indexes, etc. A detailed description of computer-based procedures, together with example layout of all necessary forms and documents, is given in [ref. 3]. It was acknowledged in passing that “cash matching is the most difficult problem for the computer”.

It is appropriate, at this point, to add a note of realism to the Exeter story. Whilst Frank Knight’s vision may have been to absorb as much as possible of the CU’s total

business onto the KDP10 system, the initial coverage was more modest. Peter Monk remembers [ref. 20] that initially the Exeter system “covered the policy records, financial records etc for Personal and Domestic General Insurance. This included matters such as house content, house property, private and commercial vehicle insurance. It famously produced statistics, the life blood of the underwriting world that had been weak previously. It didn't incorporate claims, and it didn't extend to other classes of insurance such as the CU's Life business”. The Life side was not fully computerised until much later.

Lest the foregoing paragraph seems to down-play the achievements of Frank Knight, here is a personal appreciation from an early member of his team: “Frank Knight deserved the highest praise for his foresight, recruiting the right people for the KDP10 team. The team was unique. Worked well together. United in comradeship with the greatest respect for FK, who was constantly under pressure from London” [ref. 22].

Returning to 1962, here are some highlights of CU computing activities, taken from [ref. 3]. The target in 1962 was to process five million policies per week. Each policy record averaged 350 characters. The eventual daily computing load was to handle 1,000 new policies, 5,000 policy alterations and 28,000 policies affected by cash payments. Data would be arriving daily from several tens of branch offices or departments.

The plan called for two main computer runs per day. In brief:

**Run 1.** Input data from branches via the SWIFT system, check it and sort it. Print all new policies and memoranda ready for despatch.

**Run 2.** Update main file (held on magnetic tape), using the data from Run 1. Update all statistics. Print required endorsements, renewal documents, accounts for agents, etc.

By late 1965 the above scheme was extended in its duration as a result of *Two-Shift* working being introduced. Two teams were involved, each team working on alternate days from 8.00am to 11.00pm.

To quote the Summary given in [ref. 3]: “The effect of using a computer in the manner described is to limit the work of the clerical staff of the company to what is of first importance: public relations service. The branch staffs are able to concentrate on interviews and correspondence concerned with arrangement of policies, settlement of claims, disposal of queries, and provision of decisions and advice. When the results of this work are sent as data to the Computer Centre, the latter becomes fully responsible for checking, issue of documents, all functional running – the whole being completely self-checking and guaranteed to a high degree of accuracy”.

## 8. What came next?

In accordance with advice from English Electric, all KDP10 installations, and in particular the one at Concorde House, were upgraded on site to KDF8s. The two processors were more-or-less software compatible – technical details are given in [ref. 8]. In brief, the KDF8's ferrite memory cycle time was 12.5 microseconds.

whereas the KDP10's was 15 microseconds. Read or Write transfers between the KDF8 computer and its magnetic tape decks was at the rate of 40K characters/sec., thus also giving a performance advantage over the KDP10. The only significant upgrade to the instruction set for the KDF8 involved an improvement in the Simultaneity, or so-called 'time-sharing', features. Simultaneity for the KDP10 was defined as 'coincident execution of two instructions, both or one of which is an input-output instruction'. The implication was that Simultaneity was defined more precisely on the KDF8 than in the KDP10.

Twin KDF8 processors replaced the KDP10 in Concorde House in 1965. Figure 13 shows the Commercial Union's upgraded computer room. Each KDF8 had 131K characters of core store and 13 tape decks per machine. Work continued apace until March 1968, when the KDF8s and Commercial Union's entire computing equipment was moved from Exeter to Whyteleafe in Surrey, ten miles south of central London [ref. 20].



**Fig. 13. The twin-processor KDF8 installation in Concorde House, Exeter, in 1966.** The photo was taken during the daily maintenance period. The three men on the left are English Electric engineers. The two people standing at the console are CU staff. On the left is Dave Barwell (then in charge of the computer area); on the right is Alan Mazonovich (computer Run-Coordinator, ie job scheduler). *Photo taken by David Olphin.*

Why did the Computer Centre move to Whyteleafe? One of the programmers involved at the time, David Olphin, thinks that the decision might not entirely have been driven by technical reasons or cost savings [ref. 18]. Rumours at the time suggested that it was also because the new CU Manager in overall charge (Michael Reynoldson) lived in Purley, Surrey, not far from Whyteleafe. Reynoldson worked in the CU's London Head Office. He had little previous connection with any of the

Exeter staff, who rather suspected that he did not trust them being so far away from London. So the whole Concorde House enterprise was moved from a purpose built Computer Centre in Exeter to converted factory premises in Whyteleafe. In the long term, one advantage was that the Whyteleafe site did have plenty of room for expansion, unlike Concorde House. Indeed, at Whyteleafe a new computer system was installed alongside the KDF8s (see below), with a period of co-existence before the new system took over

At Whyteleafe the Chief Programmer was Tony Turner. There were three teams of four programmers each, a Systems Manager (Ashley Havinden) and six Analysts. In addition there were about 30 operations staff and many data preparation staff. As detailed below, in due course the CU switched from the KDF8s to English Electric Leo Marconi System 4 computers, which were based on the American RCA Spectra 70 range and were IBM 360 compatible. Programming for the KDF8 had been mainly in KDF8 Octal machine code until the System-4's arrived and Usercode (IBM Assembler) was adopted. Eventually the CU moved to COBOL and the IBM 360/370 range of mainframe computers.

For a succinct summary of the CU's computing progression up to 1970, one can do no better than to quote from the Minutes of the CU Board meeting held on 14<sup>th</sup> September 1970 [ref. 26]. Under the heading *New data processing equipment*, the Minutes tell the following story.

“By the end of 1968 all the CU UK branch premium and cash accounting etc. had been transferred to this equipment [ie the two KDF8s] from various punched card and manual systems. During 1968/69 the whole of the UK branch premium and cash accounting etc. were transferred to this equipment and in addition a claims service was introduced in 1969. To supplement the two KDF8s, an ICL 4/40 was rented in 1969. All this equipment is installed at Whyteleafe near Croydon. During 1969 a number of Head Office jobs (eg investments, share register) were converted to another ICL 4/40, installed in Head Office. Systems and programming work is continuing on remaining Head Office jobs, of which the Life valuation and Pension Scheme Costing are by far the largest. These Head Office jobs are scheduled to become operational progressively during 1971/72.

“To provide capacity to undertake all these Head Office jobs, carry out UK branch premium and cash accounting etc., claims servicing incorporating various improved features, and provide facilities for the later use of remote data terminals (RDTs) it is proposed to hire from ICL two System 4/70 configurations, having considered all other suitable alternative equipment. These two 4/70s at Whyteleafe plus the 4/40 at Head Office will provide the capacity required. The two KDF8s and the two Xeronic printers will be offered free of charge to educational institutions (there being no market value) and the 4/40 at Whyteleafe will be returned to ICL”.

The Board Minute goes on to compare annual equipment costs of the two existing KDF8s plus one 4/40 during 1970/71 with the proposed two 4/70s during 1972/73. The total costs are £459,788 for 1970/71 compared with £394,020 for 1972/73. Data processing staff costs are also analysed. “Staff numbers are currently 394 (having fallen from over 850 in 1968) and these will continue to fall during 1971 as the optical

readers become fully operational. Further savings in staff at Head Office will follow as the remaining Head Office jobs are computerised”.

The CU’s Whyteleafe Computer Centre was eventually closed down at the end of 2001, following the CU’s mergers with the General Accident Company and the Norwich Union (see below). All computing activity was subsequently centralised in Norwich. The CU eventually sold Concorde House in Exeter. By the 1980s the building housed Deveills Kitchen Shop and 28 one- and two-bedroom apartments.

Outside of the successful computing exercise, the 1960s and 1970s saw the Commercial Union embark on a programme of internal reorganisation. Following the 1959 takeover of the North British and Mercantile Insurance Company, Commercial Union group’s UK staff was, it is said, “reduced from 11,500 at the time of the merger to 8,000, largely by early retirement and natural wastage”. By the end of the 1960s the CU Group had a single management structure.

The company flourished. By 1989 a reviewer [ref. 21] was able to state that: “Commercial Union has been one of the leading names in insurance for more than one hundred years. In terms of premium income it is among the top three British composite – ie life and non-life – insurance companies. Its subsidiaries provide all types of insurance: fire, motor, accident, marine, aviation, and life, and from its earliest days the Commercial Union has operated on an international scale. In 1989, just under 40% of its non-life business came from the United Kingdom, a similar amount from North America, and the rest from other countries around the world. Its life business is concentrated mainly in the United Kingdom and the Netherlands”.

## **9. Conclusions.**

There is little doubt that the careful planning of, and considerable investment in, computing resources in the period 1959 to 1968 contributed greatly to the success of the Commercial Union. The company went on to grow mightily until merging with General Accident in 1998 to form CGU which merged with Norwich Union in 2000 to form CGNU which changed its name to Aviva in 2002. At the time of writing (2022), Aviva is a market leader.

## **10. Acknowledgements and picture credits.**

The author would like to acknowledge the invaluable help given by Anna Stone, the Aviva Archivist, in providing ready access to historical company documents and images. Photo credits are listed at the end, after the References.

## **11. References and notes.**

In the references below:

- (a). ‘Resurrection’ is the journal of the Computer Conservation Society, normally issued quarterly. The CCS is described here: [www.computerconservationsociety.org](http://www.computerconservationsociety.org)
- (b). ‘Aviva Archive’ indicates the company’s Group Archive in Norwich. Access to this collection has been greatly assisted by the Archivist, Anna Stone.

**1(a).** *A Century of Insurance: The Commercial Union Group of Companies, 1861–1961.* Edward Living. Published by Commercial Union, London, 1961.

**1(b).** *Exeter memories: West of England Fire and Life Insurance Company.* May 2009. See: <http://www.exetermemories.co.uk/em/commercial/westengland.php>

**2.** *Information Processing in the 19th Century.* Martin Campbell-Kelly. Resurrection number 37, 2006.

See: <https://www.computerconservationsociety.org/resurrection/res37.htm#d>

**3.** *Using a Computer for Insurance work.* F C Knight, Commercial Union, October 1960. Catalogued as document SR5085 in the Aviva Archive. 44 typed pages.

**4.** These figures are taken from a news item in the 26<sup>th</sup> November 1964 issue of The Post Magazine and Insurance Monitor, a trade publication. This item reported that the Provident Mutual Life Assurance Association's 350,000 life policies occupied nearly two million punched cards. The *Friends Provident House Magazine* for 1963 (pages 35 – 38) described how “a file containing a year of statistics would consume about 750,000 punched cards which take up 200 cu. ft. of storage space”.

**5.** See the 1<sup>st</sup> January 1959 issue of The Post Magazine and Insurance Monitor.

**6.** *Early computing in Britain: Ferranti Ltd. And government funding, 1948 – 1958.* Simon Lavington. Springer, 2019.

**7.** Two American manufacturers of stored-program electronic computers dominated the early transatlantic scene: IBM and Sperry Rand. The first successful American business computer, Sperry Rand's UNIVAC I, was first installed in the US Pentagon in June 1951. Univac installed 18 more of these computers in the period 1952 – 1954, all of them to American sites. Several went to organisations connected with defence. In other applications, three UNIVAC computers went to insurance companies in 1954, namely:

Metropolitan Life, New York;

Franklin Life Insurance, Springfield, Ohio;

Pacific Mutual Life Insurance, Los Angeles, California.

The Metropolitan Insurance Company was said at the time to have a total of 18 million policies – so clearly required a computer with bulk storage facilities. The UNIVAC I was equipped with comparatively expensive backing store facilities based on phosphor bronze metal tape.

In May 1952 IBM announced the 701 computer, the first production model of which was installed early in 1953 at the Nuclear Weapons Laboratory at Los Alamos. Almost all of the 19 IBM 701's to be delivered went to US Defence Department establishments or to military aerospace companies. By 1953 IBM had successfully introduced magnetic tape bulk storage equipment for their IBM 700 series computers, using a plastic (Mylar) backed tape coated with iron oxide.

The above data on computer deliveries comes from *A History of Modern Computing.* Paul Ceruzzi, MIT Press, 1998. See:

[http://inis.jinr.ru/sl/Cs\\_Computer%20science/Ceruzzi%20P.E.%20A%20History%20of%20Modern%20Computing%20\(MIT,2003\)\(ISBN%200262532034\)\(452s\)\\_Cs\\_.pdf](http://inis.jinr.ru/sl/Cs_Computer%20science/Ceruzzi%20P.E.%20A%20History%20of%20Modern%20Computing%20(MIT,2003)(ISBN%200262532034)(452s)_Cs_.pdf)

**8.** The delivery data and other technical characteristics of many British computers of the 1950s to 1970s is given on the Computer Conservation Society's *Our Computer Heritage* website. See: <https://www.ourcomputerheritage.org/index.htm>

**9.** *Computer Report March 1960*. Frank Knight. Commercial Union Assurance Co. Ltd. Document CU3558 in the Aviva Company Archive. 24 typed pages.

**10.** *ICL: a business and technical history*. M Campbell-Kelly. Oxford University Press, 1989.

**11.** *Computers at Metrovick: the MV 950 & AEI 1010*. Ron Foulkes. *Resurrection* 43, Summer 2008.  
<https://www.computerconservationsociety.org/resurrection/res43.htm#>

**12.** *The relationship between science and technology: university research and the computer industry 1945 – 1962*. P Drath. Ph.D. thesis, University of Manchester, October 1973. See Table 3.5.

**13.** *Further notes from: The KDF9 Computer— 30 Years On*. Bob Beard. *Resurrection* Autumn 1997, pages 7 – 15.  
<https://web.archive.org/web/20200727140754/http://www.cs.man.ac.uk/CCS/Archive/Resurrection/pdf/res18.pdf>

**14.** *Progress along the electronics road*. Unsigned article in *Concorde*, the Commercial Union's House Magazine, Winter 1960, page 8.

**15.** KDF9 brochure. English Electric, 1963. See:  
<https://www.computerhistory.org/brochures/doc-437295729c34f/>  
"Tape units of similar characteristics but operating at the rate of 66,666 characters per second will shortly be available".

**16.** The delivery data and other technical characteristics of many British computers of the 1950s to 1970s is given on the Computer Conservation Society's *Our Computer Heritage* website: <https://www.ourcomputerheritage.org/index.htm>

**17.** *Experience in the practical use of data transmission*. D J Dace. *Computer Journal*, volume 6, Issue 1, 1963, Pages 17–23.

**18.** E-mails from David Olphin to Simon Lavington, sporadically between November 2020 and February 2022. David joined the Commercial Union in 1963 and worked in the Branch Computer Services team before becoming a programmer based at the Commercial Union's Exeter Computer Centre. He moved to Whyteleafe in 1968 and left the Commercial Union in 1972. He later worked for what was to become Aviva in Norwich from 1994-2005.

**19.** See the comment by K L Smith (IBM UK), during the discussion at the BCS Cardiff meeting at which Dace's paper (ref.17) was presented.

20. Peter Monk, former Commercial Union programmer, e-mails to Simon Lavington in January 2021 and February 2022.

21. International Directory of Company Histories. Article by John Swain on the Commercial Union, written in 1989. See:  
<https://www.encyclopedia.com/books/politics-and-business-magazines/commercial-union-plc>

22. Margaret Atkinson (née Mitchell), former Commercial Union Exeter employee, e-mails to Simon Lavington in March 2022.

23. *The fully integrated insurance office*. A brief summary of a paper by Mr F C Knight, Commercial Union, read at The Electronic Data Processing Symposium at Olympia, London, 4th – 6th October 1961. Concord, Winter 1961, page 8.

24. CU Actuarial Report for 1963 (written in April 1964).

25. Concord Winter 1960.

26. CU Board Minutes 14th Sept. 1970.

#### **Sources of the photographs and images.**

The images in Figures 1 – 3, 6, 8 – 12 come from Commercial Unions staff magazines and CU documents held in the Aviva Archive, Norwich, Many thanks to the Aviva Archivist, Anna Stone, for providing them. Photo 4 comes from the Chilton Computing website. Peter Monk provided photo 5; David Olphin provided photo 13. Figure 7 comes from the English Electric KDP10 programming Manual.