

Catalogue MA, for box-files MA1 – MA14.**Catalogue of S H Lavington's own documents on Manchester computing.****Scope.**

These items were donated by Simon Lavington (SHL) in February 2016. They mainly cover the history of stored-program computing at Manchester University and the spin-off industrial developments in the Manchester region that led to the Ferranti Mark I, Mark I*, Mercury and Atlas computers. Other subjects covered include CRT storage patent litigation, NRDC's activities and associated American developments; correspondence connected with Alan Turing; the growth of the Department of Computer Science at Manchester; SHL's correspondence with computer pioneers; anniversaries of the SSEM (Baby) and Atlas computers. The time-period is 1945 – 2015.

Background.

Simon Lavington was born in London in December 1939. He went to Manchester University to study electrical engineering in 1959. Upon graduating in 1962, he joined Tom Kilburn's Atlas team as a research student and worked on the hardware and software for automatic speech recognition. He became an assistant lecturer in Computer Science in 1965, obtained his Ph.D. in 1968 and thereupon joined Kilburn's MU5 design team. He was promoted to Senior Lecturer in 1974. He left Manchester in 1986 to become Professor of Computer Science at the University of Essex, where he worked on hardware support for knowledge-based systems. He retired in 2002 and was made Emeritus Professor. Simon has pursued computer history as a hobby since 1968, publishing five books on the subject. He is a committee member of the Computer Conservation Society. He initiated the CCS's *Our Computer Heritage* project.

This catalogue.

The catalogue is arranged for convenience in seven sections, thus:

Box-files	Coverage	Catalogue pages
MA1, MA2a, MA2b, MA4, MA5	All Manchester computing documents, except those as specified below	2 – 17
MA3	All photographs, except MU5 and Atlas	17 – 23
MA6	Computing papers published in scientific journals	23 – 26
MA7	Meg and the Ferranti Mercury and MU5	27 – 29
MA8	SHL's computer history correspondence	29 – 31
MA9	Listing of historic computer documents as held by the Department of Computer Science in 1984	31
MA10 – MA14	MUSE and Atlas	31 – 44

MA14 is in fact an over-size box measuring about 30cms by 60cms by 17 cms which holds three large Atlas manuals and two Atlas paper tape reels.

Box-files MA1, MA2a, MA2b, MA4 – MA5.

Box	Date	Title	Description/comments
MA1	1945 – 1955; (1979)	Documents for the Dirks Affidavits. These concern a patent action in the USA by Bell Systems, who wished to contest US Patent 4027287 dated 31 st May 1977 'Storage-controlled output device', by Gerhard Dirks. Bell Systems wished to challenge Dirks by establishing the extent to which Tom Kilburn's December 1947 Report on CRT storage was disseminated in the USA. To support the claim of wide dissemination, TK and SHL both agreed to sign legally-binding Affidavits in 1979. Reference was also made to NRDC's 'CRT Store Interference Action' of the early 1950s. The lawyers concerned in 1979 were Bob Robinson (International patents Department, NCR) and J C Albrecht, Western Electric.	This file contains photocopies of many interesting historical documents that establish the dates of interchange of people and CRT ideas between the UK and the USA in the period 1945 to 1954. The documents include: (a). Timeline produced by NRDC, typed on 2 foolscap pages, covering the period November 1945 to August 1949. (b) Letter from W B Lewis (ex-TRE, then Atomic Energy of Canada, Chalk River), July 1952, to F C Williams; (c). D R Hartree, Cambridge, July 1950, to FCW. (d) L H Bannister (a member of FCW's group at TRE), TRE Ottawa, to J S V Walton, British Joint Services Mission, Washington, July 1952. (e). John Womersley, NPL, to Lewis, TRE, August 1946, regarding planned visit of A M Turing to TRE on 12 th August 1946. This visit may or may not have taken place – (see below). (f). Memo of telephone conversation between H J Crawley and Womersley, September 1952, stating that he had no recollection of the above visit. (g). S W Noble (TRE) to Crawley (NRDC), dated October 1952 and saying that Turing did come to TRE in August 1946. (f). A M Uttley to Crawley, Oct. 1952, confirming the above visit. (g). Bannister to Crawley, Oct. 1952, confirming the above visit but not on the original date. (h). G Tootill to Crawley, July 1952. (j). S C Bartlett, Harwell, to Russell, patents, (k). FCW to Sir Robert Watson-Watt, July 1950. (l). Womersley to FCW, Feb 1947. (m). J S V Walton, Brit Joint Services Mission to Crawley, Aug. 1952. (n). Crawley to Walton.
MA2a	1946, 1948	Photocopies of two letters from Max Newman, shedding light on the origins of computer design at Manchester.	Letter (a): from Max Newman to John von Neumann, dated 8 th February 1946. Describes the background to Newman's plans 'to embark on a computing machine section here', his application to the Royal

			<p>Society for funding, his thoughts on the NPL project and his plans to “tackle mathematical, ie non-numerical problems”. Letter (b) from Max Newman to David Brunt dated 22nd December 1948, reporting on progress with the Royal Society’s grant. Amongst other things, salary costing predictions and building plans are discussed. Max Newman also says: “All materials needed for construction work on the prototype have been given without cost by the Ministry of Supply (TRE), and it is reasonable to suppose they will continue to give all necessary electrical material”.</p>
MA2a	1 st Dec. 1947	A storage system for use with binary digital computing machines. T Kilburn.	<p>Photocopy of a typed foolscap report, consisting of 52 pages of text, 32 pages of diagrams and one page with three photos. This report was produced for the Telecommunications research Establishment (TRE). At the time Kilburn was on secondment from TRE, working with Professor F C Williams in the Electro-technics Department at Manchester University. Kilburn was also registered for a Ph.D. and he told SHL in 1976 that he regarded this report as a practice run for his thesis. Also included at the end: a two-sided page of historical notes by SHL and some diagrams. The notes give evidence that the report was distributed widely in the UK and USA. For further evidence, refer to the 1979 Dirks Affidavit papers, above.</p>
MA2a	2001	Retrospective comments from Laurie Allard on physical imperfections in electrostatic storage tubes.	<p>CRT imperfections were called <i>phonies</i> by F C Williams. This single A4-page document is a summary of an interview with Laurie Allard of GEC, makers of the CRTs used in the early Manchester computers. He discusses the causes of phonies and what GEC did to minimise them.</p>
MA2a	1948	Laboratory notebook, labelled ‘Digital Computer’. G C Tootill.	<p>Photocopy of 34 pages of this notebook, covering the period 4th June to 28th November 1948. (The original is in the NAHC). These photocopied pages seem to have been made by SHL on two separate occasions, judging from the intensity of the image. Also included: SHL’s 1974 trace of the amended first program (18/7/48), as used in a diagram for the booklet <i>A History of Manchester Computers</i>. Tootill’s notebook was re-discovered by SHL, when</p>

			searching through miscellaneous old files in the Department of Computer Science in about 1973 -74, when researching the above booklet. The importance of Tootill's notebook is that, when carefully re-examined in 1974 by Williams, Kilburn and Tootill, it established 21 st June 1948 as the day when the SSEM's hardware first successfully ran a program. (This date had hitherto been forgotten).
MA2a	1948	Note on a visit to Manchester of Julian Bigelow from the institute for Advanced Study, Princeton.	Photocopy of a few sentences describing Bigelow's impressions of the SSEM. The sentences come from a paper presented at the June 1976 Los Alamos Conference and published in <i>A History of Computing in the Twentieth Century</i> in 1980. It is believed that the date of Bigelow's visit was 18 th July 1948. See also Dirk's Affidavit documents, above.
MA2a	1948	Code for charge storage computer.	A single-sheet quarto hand-out used by Tom Kilburn, when he gave a series of four lectures on the prototype Manchester Mark I computer on 8 th – 12 th November 1948. This copy has the office date-stamp 'Filed 30 th November 1948' in the top right-hand corner. This hand-out represents the first version of the enhanced SSEM's 20-bit instruction format, which employed five function bits before programmed I/O and drum transfers had been added.
MA2a	1948 – 1949; 2015	The development of the Manchester University Mark I computer: an interview with Emeritus Professor D B G (Dai) Edwards.	4 typed pages, being SHL's notes of a half-hour telephone conversation with Professor Edwards on 6 th May 2015. The purpose of the conversation was to clarify events at Manchester University between July 1948 and April 1949, during which period the Small Scale Experimental Machine, also known as <i>The Baby</i> , was enhanced and extended to become the Manchester Mark I computer. Edwards joined F C Williams' group as a research student on 13 th Sept. 1948, to work on CRT storage and the B tube. (A second copy).
MA2a	1949	Informal report on the design of the Ferranti Mark I computing machine. Dictated by G C Tootill. (Extracts).	A4 photocopy of extracts of an original typed foolscap document, the whole consisting of more than 30 pages. (The original may be in the National Archive for the History of Computing; Chris Burton is believed to have a copy). The first page deals with "The requirements placed upon

			us by Professor Newman and Mr Turing". Also given is Appendix II: Generation of random numbers, written by A M Turing.
MA2a	1950	G W problem continued.	Single quarto sheet of computer output, dated 16 th August 1950. It is assumed that this comes from a program run on the Manchester University Mark I computer. A possible explanation is that it comes from a program written by D G Prinz. To quote page 38 of <i>Early British Computers</i> : "It is of some interest to note that during 1950 one of the last users of the Manchester University Mark I computer before it was dismantled was Dr D G Prinz of Ferranti Ltd. who computed Laguerre functions in connection with the control of guided weapons".
MA2a	1946 – 1951	Distribution of 57 Manchester computer patents filed between 1946 and 1951.	Single A4 transparency (bar graph), produced by analysing the number of patents filed per year. Made by SHL for a computer history presentation – possibly for the paper presented at Los Alamos in 1976.
MA2a	July 1951	Manchester University Computer: inaugural conference.	40-page glossy illustrated booklet in maroon covers. This copy was donated by H W Gearing, Metal Box Co., (who is believed to have attended, though the 'list of attendees' shows another name representing the Metal Box Co.)
MA2a	1952	The Manchester electronic computer. Ferranti.	18-page glossy brochure. Many photos, some in colour, showing the Ferranti Mark I. This is Ferranti publication is List DC4, issued December 1952.
MA2a	1953	Electronic computer for Holland.	Photocopy of an article in the Ferranti Journal, Vol. 11, June 1953 (Coronation issue), Page 47, under <i>Notes & News</i> . Describes the order of a mark I* for Royal Dutch Shell's Amsterdam Research Lab. Comments that: (a) this is Ferranti's first sale of a computer 'for industrial use'; (b) negotiations begun in June 1952, order received March 1953; (c) cost is £100,000; (d) some applications discussed.
MA2a	1954	Ferranti Electronic Digital Computer.	4-page glossy brochure, including two pages devoted to describing "a selection of problems which have been completed on the Ferranti electronic digital computer". It is inferred that these applications were performed on the Ferranti mark I at Manchester University, though the photo on the cover of the brochure shows a Ferranti

			Mark I*. This document is Ferranti publication List DC8a, issued April 1954.
MA2a	1993	Ferranti programmers' reunion at Curdon Mill, Somerset, 21 st April 1993. Olaf Chedzoy who joined Ferranti Moston in October 1952, organised the reunion.	30-page typed A5 booklet, consisting of autobiographical notes from 28 former Ferranti Moston programmers who used the Mark I in the period 1951 – 1955. Those present included: Olaf and Doreen Chedzoy, Mary Lee and Conway Bemers-Lee , Betty (Dyke) Joe Hall, Vera (Hewison) and Tony Brooker, Joyce and Adrian Clarke, Dorothy and Bernard Steele, Harry and Liz (Bessie) Cotton, Mary (Tunnell) and Joe Shenton, Ted Braunholtz, Joan (Kaye) and John Travis, Eric and Sybil Robertson, Wendy (Walton) Breeze, Joy and Tony Williamson, John Bennett, Sheila (Fletcher) and Edward Hawton, Tony and Mary Baker (of Royal Insurance), Bernard Swann, Bill and Muriel Wallace (Engineer), Alec and Sylvia Robinson (Engineer), Cyril and Pat Gradwell, Hugh and Carole Ross, Tony Ralston (Summer student). The following were unable to attend: Audrey (Bates) Clayton, (now lives in Maryland), Rosabelle (Edge) Bolton (Summer student), Don Leapman, (now lives in Canada), Chris and Liz Wilson, who have had to withdraw. Good wishes for the Reunion were also received from Jennifer Leech, Cecily (Popplewell) Williams, Alan Bagshaw, Martin Wingstedt and Ted and Nell Hodgkinson. Includes a letter from Olaf to SHL, dated 30/10/2016.
MA2a	1993	<i>Who'd believe me now?</i> A short story written by Olaf Chedzoy for the above Programmers' Reunion.	Photocopy of an 8-page A5 booklet.
MA2a	1952 & 1995 & 1998	Descriptions and correspondence relating to A E Glennie's automatic coding system (Autocode) for the Ferranti Mark I computer.	(a). Photocopy of a 16-page typewritten manual describing Glennie's AUTOCODE routine. (Probably a draft for a manual to be entitled <i>The Routine AUTOCODE and its use</i>). (b) Photocopy of 14 pages of Glennie's lecture notes on 'The automatic coding of an electronic computer' dated 14 th December 1952. (This lecture was delivered at Cambridge in February 1953). (c). Four-page handwritten letter from Glennie to SHL, dated 17/3/1998. (d) Three-page handwritten CV for Glennie, dated 18/3/98, which was enclosed with the above letter. (e) SHL's reply letter, dated 27/3/98.

			<p>(f) SHL's letter to Glennie, dated 29/1/1998, via MOD Pensions people.</p> <p>(g) SHL's correspondence with Don Knuth, 1995 – 1998.</p> <p>(h) Letter to SHL from Donald Knuth, dated 2/2/1998, giving the background to Glennie's work and Donald's write-up of it.</p> <p>(j) SHL's hand-written notes of a 'phone conversation on 1/2/1998 with Tony Brooker, when SHL asked Tony about Alick Glennie and Glennie's autocode.</p> <p>(k) Copy of an e-mail message from Tony brooker, dated 2/2/1998, referring to Glennie and to Tony's article on <i>High level programming languages on the Manchester computers</i> – (see below for this).</p> <p>For detailed comments on (a) and (b) see: <i>The early development of programming languages</i>, D E Knuth & L Trabb Pardo, in <i>A History of computing in the twentieth century</i>. Ed. Metropolis et al, Academic Press, 1980, pages 197 - 273</p>
MA2b	March 1951	<p>Programmers' handbook for Manchester Electronic Computer Mark II. (Note: the qualification 'Mark II' was used to distinguish this computer from its research predecessor at the University of Manchester. The nomenclature 'Mark II' refers to the production version which was later called the Ferranti Mark I computer).</p>	<p>110-page foolscap manual in buff card covers. Undated and anonymous, but known to have been written by A M Turing and issued in March 1951. Several tens of these manuals were printed. This copy, which was given to SHL sometime in the period 1995 – 2005, has 'CHAD. 42/51' (standing for 'Ferranti Chadderton', which might have included Ferranti Moston?) written in ink on the front cover. Two sets of Errata sheets were issued, respectively on 13th and 28th March 1951. Dai Edwards' copies of these are archived in box-file E1 and have been scanned in as: <i>Mark I Turings manual two errata docs.pdf</i>. Dai has said that these sheets were issued by Cicely Popplewell of the Computing Machine Laboratory. No errata sheets were donated with this particular copy of the manual, though a partial print-out has now been inserted into this copy of the manual. Note: the Bloomsbury Book Auctions sale catalogue of the collection of antiquarian bookseller Ben Weinreb (1912 – 1999) in October 1999 describes the two loose errata sections: a 2-page insert dated 13/3/1951 and a 3-page insert dated 28/3/1951. The relevant extract from the</p>

			<p>auction catalogue is enclosed. (Weinreb's copy of the Programmers' Manual sold for £12,000). Note also that an Appendix (on pages 85 – 97) is entitled <i>The Pilot Machine (Manchester computer Mark I)</i>. This gives a description of the research prototype which was used at the University between April 1949 and August 1950.</p>
MA2b	Oct. 1952	<p>Programmers' handbook (2nd edition) for Manchester Electronic Computer Mark II.</p>	<p>As the Preface indicates, "much material has been taken over unaltered, or only slightly modified from the 1st Edition which was written by Dr A M Turing. In addition some for the results of the first years' experience of programming for the MK II have been incorporated in the later chapters. Miss C M Popplewell and N E Hoskins of the staff of this Laboratory, and A E Glennie of the Armament Research Establishment, Fort Halstead, Sevenoaks, Kent, were responsible for chapters 3, 7 and 6 respectively". This copy of the manual was given to SHL sometime in the period 1995 – 2005.</p>
MA2b	April 1953	<p>The Ferranti Electronic Computer (parts 1 & 2: the Mark I model) K N Dodd. Armament Research Establishment, report 10/53.</p>	<p>This is copy number 37 of a manual containing 90 pages of text and about the same number of pages of logical diagrams, line diagrams and photos. The machine described became known as the Ferranti Mark I. K N Dodd spent time at Manchester, using the University's Ferranti Mark I.</p>
MA2b	May 1953	<p>The Ferranti Electronic Computer (parts 3, 4 7 5: the Mark I* model). K N Dodd. Armament Research Establishment, report 11/53.</p>	<p>This is copy number 37 of a manual containing 101 pages of text and about the same number of pages of circuit diagrams, logical diagrams and line diagrams. The machine described became known as the Ferranti Mark I*. The absence of photos in this manual might be explained by the fact that the first production Mark I* was delivered to GCHQ amid conditions of secrecy some time in 1953.</p>
MA2a	May (1954)	<p>Output from A M Turing's Morphogenesis program.</p>	<p>Nine A4 pages, photocopied by SHL on 23/11/1979 from sheets of teleprinter paper on which had been fixed by Sellotape some print-out from the Ferranti Mark I computer at Manchester. The original annotations in ink are in Turing's handwriting. The sheets are dated 24th May. After consulting Bernard Richards and Tony Brooker, it is believed that the year is 1954 so that these sheets may have come from the papers left</p>

			in Turing's house after his death on 7 th June 1954. Tony Brooker (see enclosed notes dated 12/5/1989) told SHL that the characters '++ACTION' that appear on the output indicate that the program was run under Turing's <i>Formal Mode</i> system, which Tony describes as Turing's 'personal operating system'. This provided, amongst other things, an audit trail that Turing could follow when he took his output away to mull over, after an (overnight) session using the computer. Another copy of the nine pages in included.
MA2a	1955	Ferranti high speed tape readers.	6-sided illustrated brochure with blue front cover, dealing with TR2 (previously called Mark II) and TR3 paper tape readers. Published by Ferranti Ltd., List DC 3a, June 1955. One of the photos in this brochure shows a Ferranti Mark I*.
MA2a	1955	Ferranti and Powers-Samas, etc.	Photocopy of an article in the Ferranti Journal, Vol. 13, No. 1, Spring 1955, page 8. Interesting as a snap-shot of the state of computer production. (a) "Since then [the MU Mark I] the construction of a further 8 similar computers has been undertaken. Of these, 6 have been shipped from Moston and four are now in full operation. One will replace the existing model ...". (b) implies that 'production is about to start' for Mercury and Pegasus. Also (page 15), in the <i>Notes</i> section, "Mr P D Hall appointed as Manager, Electronics Department, at Moston and Gem Mill".
MA2a	1956	Ferranti Journal, Spring 1956. (a). <i>Rome, December 14th 1955: the inauguration of a Ferranti computer.</i> B W Pollard. (b). <i>Long distance test of the University of Toronto computer.</i>	(a). On pages 9 – 11 of this Journal is described the story of the sale and installation of a Ferranti Mark I*. The story starts in 1953 with a quotation, then a definite decision to purchase on 1 st March 1954, factory acceptance tests at Moston in October 1954, arrival in Italy by sea on 6 th January 1955, on-site acceptance tests in June 1955 and finally the official opening in December 1955 by the Italian head of State President Gronchi. Includes two photos of dignitaries at the ceremony. (b) On page 19 is a short item about the telephone-line connection between a paper tape reader in the University of Saskatchewan, Saskatoon, and the Ferranti Mark I computer (called FERUT) 1,700

			miles away in Toronto.
MA2a	1948 – 1957	The rise of the Ferranti Computer Department. B W Pollard.	Photocopy of an article that appeared in Ferranti Journal, Vol. 15, No. 3, 1957, pages 20 – 23. Starting with D G Prinz's 1948 trip to America, the story includes the growth of Ferranti's Computer group at Moston, the construction and installation of Ferranti Mark Is at the University and at Toronto (shipped to Canada during the first half of 1952, demonstrated at a conference in September 1952), and manufacture of Mark I* computers. In mid-1953 a Computer department had been formally established, spanning Moston, Gem Mill and London. West Gorton was acquired early in 1956 where, by September 1956, Ferranti had the largest production line for computers in Europe. Includes photos of Ferranti Mark I and Mercury under construction.
MA2a	1958 - 1965	Disposal of the Manchester University's Ferranti Mark I and the Avro Mark I* computers.	Three typed A4 pages, produced by the Ferranti Archivist in July 1965. Addresses two issues. (a) What happened to the original Ferranti Mark I after it was given back to Ferranti after the University had finished with it in 1958 and the Science Museum (London) had declined to take it. Conclusion: it was scrapped in 1962. (b) What happened to the Ferranti Mark I* that was installed at Avro's Chadderton factory. It was passed to the Leicester Museum of Technology, who placed it in storage. It was divided up in June 1973 (or 74?).
MA2a	1964; 1966	Two <i>Hawker Siddeley News</i> articles about the Ferranti Mark I* that went to Avro Chadderton.	4 photocopied A4 pages, taken from (a) page 3 of the <i>Hawker Siddeley News</i> , Vol. 1, No. 4, April 1964, Avro-Whitworth Edition; (b) page 2 of <i>Hawker Siddeley News</i> , Vol. 3, No. 1, 4 th January 1966, Aviation Edition. The first is an illustrated article describing the installation and staff. The second states that, after switch-off, the machine was being passed to the Leicester Museum of Technology. The originals of these articles are held by the British Library.
MA2a	1950s	Computational chemistry in the 1950s. H O Pritchard.	Reprint of an article that appeared in the <i>Journal of Molecular graphics modelling</i> , Vol. 19, No. 6, 2001, pages 623 – 627. Huw Pritchard was formerly a Chemistry research student at Manchester University

			at the same time as Frank Sumner. Huw and Frank became good friends, working on similar problems on the Ferranti Mark I from about 1952 onwards and then, from about 1958 onwards, on the Ferranti Mercury. The article describes the computational and user environment at Manchester and interactions with Alan Turing and Tony Brooker. Huw Pritchard became a distinguished research professor at York University, Toronto, Canada. Also attached, e-mail exchanges between SHL & Huw.
MA2a	1951 – 1957	Retrospective correspondence about the Ferranti Mark I and Mark I* installations.	These communications were a result of a 1999 Computer Conservation Society plea (published in BCS and IEE magazines) for long-serving computing people to get in contact. The aim was to collect documents & photos, hear anecdotes, and generally enlist help with preserving information about pre-1970s British computers. There were 91 responses, of which three related to mark I or Mark I* machines. Note: any photos supplied by these correspondents are catalogues below, in the 'photo' section. (a) From Owen Ephraim (responder 62), who joined Ferranti in 1953 and, amongst other things, worked on the Rome Mark I*. Has comments about computer music. Contains photos, for which see later. (b) From Allan Ellson (responder 79), who joined the Ferranti Mark I development team in May 1951 and who was later made Head of Commissioning. Contains order code; contains photos, for which see later. Note also that SHL renewed contact with Alan in 2015 and obtained additional information – see below. (b) From Donald Bailey (responder 84), who worked with Turing at Hanslope. Has comments about Turing's Ferranti Mark I programming manual.
MA2a	1969	Tracing the steps of the Ferranti Mark I.	Photocopy of an anonymous article, plus photos, that appeared in <i>Computer Weekly</i> , 10 th April 1969, pages 12 & 13.
MA2a	1972	Letters on Jevons' logic machine.	Two letters published in the March 1972 issue of the University of Manchester's <i>Communication</i> magazine. A photo 1952 shows Herbert Jevons and two versions of W S Jevons' logic machine.
MA2a	1965	Manchester University	Single typed sheet announcing the

		Computer Society, September 1965	formation of the Society and three events planned for the coming term. With the imminent arrival of the first Computer Science undergraduates, it was decided that a 'student society' should be formed. SHL, then a newly-appointed assistant lecturer, undertook to do start the ball rolling and became the first Chairman. Mike Mihailovic, a research student, was the Secretary. The first meeting, addressed by the Society's president, Tom Kilburn, was held on 19 th October 1965. Within a few months SHL had handed over the Chair to an undergraduate.
MA2a	1974	Computers on the campus.	A 12-page illustrated <i>Communication Special Report</i> , issued by the Manchester University Communications Office in march 1974. At that time there were reckoned to be 30 computers on campus.
MA2a	1980	Quantitative improvements in computer technology (logic circuits and storage devices), 1950 to 1980.	Sets of figures giving speed, power, weight, cost and volume of the following specimen hardware components: 1950: a Ferranti Mark I flip-flop (EF50 valves); 1960: an 832 flip-flop from Atlas (OC170 germanium transistors); 1970: a U0 flip-flop module from MU5 (ECL, MECL2.5, integrated circuits); 1980: An unencapsulated substrate with F100K ECL chips. (The substrate was assembled in the Dept. of Computer Science).
MA4	1974; 1978	Two articles about computing in internal University of Manchester publications	(a). <i>Communication</i> , March 1974. Special report: <i>Computers on the Campus</i> . 12 A4 pages. (b) <i>Contact</i> - the University of Manchester's Research Consultancy Service newsletter, Vol. 3, No. 3, July 1978. Article on computer history.
MA4	1976, 2001	Biographical Memoirs, notes and obituaries of F C Williams, who died in 1977.	(a). Transcript of an interview of FC conducted by Chris Evans for the Science Museum, in 1976. (13 printed pages). (b). Draft of a 3-page Introduction to the above, prepared by SHL in November 2001 at the request of David Anderson who, at that time, was engaged in writing a book containing several Chris Evans transcripts with introductions. The book, provisionally entitled <i>Pioneers of Computing</i> , was to be

			<p>published by the Science Museum/National Physical Laboratory. It is believed that David Anderson's projected book has never been published, due it is thought to administrative reasons. Chris Evans died in 1979.</p> <p>(c). E-mail exchanges with David Anderson about the above projected book.</p> <p>(d). Photocopy of the Royal Society Biographical Memoir of F C Williams, written by T Kilburn and L S Piggott (pages 583 – 604 of the relevant Proceedings of the Royal Society – vol. 24, 1978).</p> <p>(e) Page from <i>computer50</i> website, as at 17th Dec. 1997.</p>
MA4	1983	'Where is it now?' Illustrated article from the Sunday Express of 6 th Nov. 1983.	Features 'the first computer'. Includes a colour photo of Tom Kilburn holding a CRT and an EF50 valve.
MA4	1986	The Manchester Machine, by SHL	4 A4 typed pages containing a poem and references. Written by SHL for the get-together and presentation that marked his departure from Manchester, 3 rd October 1986. The poem tells the story of computer research at Manchester from 1946 to 1986.
MA4	1987, 1988	Papers relevant to the 40 th anniversary of the SSEM (Baby) in Manchester and the visit of HRH the Princess Royal.	<p>(a). Initial (undated) letter from Dai Edwards, proposing a list of historical documents to be reproduced for the anniversary, plus SHL's pencilled annotations.</p> <p>(b). Memorandum dated 28/10/1987 from Dai Edwards, proposing a Festschrift to celebrate the 40th anniversary. Contains SHL's pencilled comments.</p> <p>(c). Invitation letter from John Gurd dated April 1998, outlining the anniversary programme for 21st & 22nd June, with a pro-forma to indicate attendance, etc.</p> <p>(d). Pro-forma accompanying SHL's tickets for the anniversary dinner on 21st June.</p> <p>(e) Souvenir programme for the opening of the new Information Technology building on 21st June 1998 by Princess Anne. Includes a facsimile reproduction of the article that appeared in the <i>Illustrated London News</i> on 25th June 1949.</p> <p>(f) Article in The Guardian for 21st June 1988.</p> <p>(g) Article in The Manchester Graduate, 1988.</p>

MA4	1988	<i>The next forty years</i> – current research in the Department of Computer Science.	Booklet of 15 A4 pages (some double-sided), blue covers, produced for the 40 th anniversary of The Baby.
MA4	1993	The beginnings of the Manchester computer phenomenon: people and influences. Mary Croarken.	25-page typewritten draft, sent to SHL, of the article that finally appeared in <i>Annals of the History of Computing</i> , Vol. 15, issue 3, July – Sept. 1993, pages 9 – 16.
MA4	March 1996	<i>Universal Machine</i> . The City of Manchester's promotional and planning initiative that preceded the 50 th anniversary of the SSEM (Baby).	Yellow folder containing several documents, including: (a). Anthony Wilson's flyer for <i>Universal Machine</i> ; (b). booklet entitled <i>The Birth of the Baby</i> ; (c). Press launch statement by Chris Burton, dated 5 th March 1996 and introducing the Computer Conservation Society; (d). article from the <i>Manchester Evening News</i> ; (e). City of Manchester promotional brochure. Note: at this stage in the anniversary planning, the enthusiastic entrepreneur and media-savvy celebrity Anthony Wilson seemed to SHL to be driving things. He was making sure that the anniversary was to be understood as having regional and national significance and was much more than an internal University event.
MA4	1998	SSEM/Baby 50 th Anniversary: booklets, brochures, programmes and posters.	(a). <i>Computer 50</i> : white cover, A4 size, about 48 pages. Coloured brochure containing several interesting articles. Published by the University of Manchester. (b). <i>Computer 50: Digital Summer '98</i> . Deep yellow cover, A4 size, about 10 pages plus wallet for leaflets. General information on many events. Published by the University of Manchester. (c). <i>Computer Science research</i> . Gold & brown, A4 size, 4-page stiff folder with wallet in which are A4 hand-outs from ten research groups. (d). <i>A History of Manchester Computers</i> , Simon Lavington. Second edition (published by the BCS) of a 56-page illustrated booklet first published by the NCC in 1975. Includes a letter dated 17 th April 1998 from SHL to Hilary Kahn, describing how the 10% royalties from the booklet should be split 50-50 between the

			<p>Department of Computer Science and SHL. (e). <i>The Museum of Science & Industry in Manchester</i>. White A4 stiff folder with a wallet containing nine items, including: MOSI programme of events; article on the CCS; article on reconstructing the Baby by Chris Burton, an ICL glossy anthology of thoughts on computers written by several 'celebrities and gurus'. (f) <i>Digital Summer 98</i>. 6" x 6" booklet giving the programme of events for June and July. (g) Two yellow A5 booklets giving the programme of events at the Golden Anniversary Conference on (respectively) Thursday 18th and Friday 19th June 1998. (h) Two white A4 posters, summarising the programme for the Golden Anniversary Conference on, respectively, 18th & 19th June. (j) Departmental Open Day, Saturday 20th June 1998: 4-sided stiff A5 flyer. (k) Green A4 poster for the above Open Day. (l) Alumni Dinner, Saturday 20th June. Guest list. Buff A5 stiff covers with white 4-page text. (m). <i>The birth of the baby: Manchester and the modern computer, 1948 – 1998</i>. A5 4-sided flyer for an exhibition at the Manchester Museum. (n) <i>The computer revolution</i>. A5 (folding out into A2 size) poster, produced by EPSRC. (p) A4 stiff card poster, comparing the performance of the SSEM (Baby) with ICL's Trimetra computer. (q) 8-page print-out of www.computer50.org as it was on 12/7/1997, describing the main components of the celebrations as envisaged at that time. (r) 7-page print-out, as above, but on 3/6/98.</p>
MA4	1998	<i>This Week/Next Week</i> , (internal University of Manchester 15-page magazine). Special Edition, 15 th June 1998.	"University celebrates 50 years of the computer".
MA4	1998	Newspaper & magazine articles about the 50 th anniversary.	(a). <i>Guardian</i> , Thurs 18 th June, page 24, by David Ward. (b). (Photocopy). <i>Charles Babbage Newsletter</i> (published by the Charles

			Babbage Institute, Minneapolis). Article by Hilary Kahn with photo. (c). Impact, the EPSRC Newsletter, No. 20, Sept. 1998.
MA4	1998	SHL's notes from the 50 th anniversary celebrations.	(a) Notes taken of the lectures on 17 th and 18 th June. Also included are some relevant additional GEC CRT notes of a conversation with Laurie Allard at Tom Kilburn's memorial Service on 1/5/2001. (b) <i>Some comments on the view that IBM's Selective Sequence Electronic calculator (SSEC) was the first machine to run a stored program (in January 1948).</i> 2-page A4 typed notes, prepared by SHL in case anyone at the SSEM (Baby) 50 th anniversary should mention the SSEM. The SSEM's claim had been made in the <i>Guardian</i> on 11 th June by Jack Schofield, on page III of an advertisement feature. (c). Seating plan at the Alumni Dinner on 20 th June 1998. (d). Memo sheet: <i>50th Anniversary computer celebrations, Manchester, June 1998: Selected events relevant to SHL.</i> Also, SHL's Invitation and Bridgewater Hall ticket.
MA5	1948, 1996, 1998	Exchange of letters, faxes and e-mails between Chris Burton, Tom Kilburn, Geoff Tootill and SHL, regarding the re-creation of the world's first program (as run on the SSEM (Baby) on the morning of 21 st June 1948).	These exchanges represent a combined attempt to agree on the exact coding of the first program. There was a need to produce this program: (i) for running on the replica Baby at the 50 th anniversary celebrations, and (ii) for publishing in the second edition of <i>A History of Manchester Computers</i> . It turns out that Tom and Geoff had slight differences about which version was the actual first one. Their differences seem to have remained amicably unresolved!
MA5	1982, 1996, 1998	Exchanges of letters and 'phone conversations with Tom Kilburn, concerning (i) the relative contributions of himself and F C Williams to the development of CRT storage systems, and (ii) ICL's acknowledgement of the influence of MU5 on the ICL 2900 series computers and the financial settlement. Also, letters to/from Prof. Brian Warboys.	(a). Notes of a 'phone conversation with SHL on 19/4/1996. The subject was royalties on the Mark I patents and in particular the CRT store patents. This conversation establishes that F C Williams regarded the CRT store developments as a joint achievement with TK and they had equal shares of all the patent royalties. These have been invested and, at April 1996, the capital stood at £2m. When FCW and his wife Gladys and TK and his wife Renee were all dead, the capital "is to be used for Computer Science research" at Manchester. There are other comments

			<p>relating to TK's Royal Society Biography of FCW and TK's self-deprecating remarks and the corrective action that Sir William Mansfield-Cooper (the Vice-Chancellor) would take when TK's biography was to be written.</p> <p>(b) Exchange of letters between SHL and TK, Jan/Feb 1998. The spur to these was the forthcoming 50th anniversary of the SSEM (Baby) and the production of the second edition of <i>A History of Manchester Computers</i>. TK's 7-page hand-written private letter justifies the use of the description 'Williams/Kilburn Tube. The matter of ICL's acknowledgement of the influence of MU5 on the ICL 2900 series computers is also covered. There are copies of the Vice-Chancellor's (Mark Richmond's) letters to Tom (2/12/82) and D J Dace (19/11/82) and the official ICL Acknowledgement.</p> <p>(c) Exchange of letters with Brian Warboys, at that time Head of Department, in which Brian agrees with the choice of words used in the second edition of the booklet to describe ICL's MU5 Acknowledgement. (See also Brian Procter's lecture transcript, below).</p>
MA5	1991	Arrangements and programme for a CCS seminar on <i>Manchester Computers, 1946 – 1981</i> , held in the Science Museum, London, on 23rd May 1991.	Speakers included Tom Kilburn, Dai Edwards, Dick Grimdsdale, Frank Sumner, David Howarth, Tony Brooker, Derrick Morris and Peter Hall. The session chair was SHL.
MA5	1998	Transcripts from two of the lectures given on 18 th June 1998 at the 50 th Anniversary celebrations.	<p>(a). <i>High level programming languages on the Manchester computers</i>. R A Brooker. 8-page print-out from Tony Brooker's (now defunct) Essex website. Prepared for the 50th anniversary of The Baby (SSEM). The article covers the Mark I, Mercury and Atlas Autocodes and the Compiler Compiler.</p> <p>(b). <i>Continuing the Manchester connection</i>. Transcript of Brian Procter's lecture, Tells the story of the birth of ICL, the 1900 series, and especially the ICL 2900 and the connection with MU5 (focus on 1969 – 1974). Also attached is correspondence between Hilary Kahn and SHL, regarding the form of words to be used in</p>

			acknowledging the connection between MU5 & the 2900.
MA5	1998	Correspondence regarding the EPSRC and British Council posters, produced for the 50 th anniversary events.	SHL was asked to advise the EPSRC and the British Council about the wording and illustrations to be used with their posters. In particular, EPSRC had asked for information on the Intelligent File Store project.
MA5	2002	Tom Kilburn's obituaries & bio notes.	Includes: (a). 3-page typed obit written by Dai Edwards, March 2002. (b) Obit. By SHL <i>Nature</i> , Vol. 149, 22 nd Feb. 2001, page 996. (c). Obit by SHL in <i>Wyvern</i> , the University of Essex magazine, Feb. 2001. (d) Obit by Hilary Kahn in <i>Computer Bulletin</i> , March 2001, page 9. (e). Correspondence and notes from the <i>Dewsbury Reporter</i> and from Tom's former school Wheelwright Boys Grammar School. (f). Obit by Hilary Kahn, <i>IEE News</i> , March 2001, page 15. (g) Obit. By Hilary Kahn, <i>Guardian</i> , 23 rd Jan. 2001, page 22. (h). Obit., <i>The Times</i> , 23 rd January 2001, page 21. (j) Obit. By Martin Campbell-Kelly, <i>The Independent</i> , 23 rd January 2001, page 6. (k) Obit., <i>The Daily Telegraph</i> , 27 th January 2001. (l). e-mail sent out by Hilary Kahn to the Conference of Professors & Heads of Computing, 18 th January 2001. (m) Correspondence with John Kilburn (Tom's son). (n) Service sheet, Altrincham Crematorium, 25 th January 2001. (o). Service sheet, Memorial Service, St Peter's Chaplaincy, University of Manchester, 1 st May 2001.
MA5	2008; 2011	(a) 'Program the Baby competition'. (b) The Baby: the world's first stored-program computer.	(a). Two-sided illustrated A3 flyer, as part of the School of Computer Science's <i>Digital 60</i> project celebrating the SSEM's 60 th anniversary. (b). Two-sided A4 illustrated hand-out, accompanying the SSEM (Baby) reconstruction at MOSI.
MA5	2008, 2012	Papers relevant to David Link and the Ferranti Mark I <i>Love Letters</i> installation.	Dr David Link has researched Christopher Strachey's 'Love letter' program, written for the Ferranti Mark I in about 1952. Using this

			as a basis, Dr Link has devised an interactive art installation which features reconstructed fragments of the Ferranti Mark I hardware, some up-to-date electronics and some CRT displays. The whole creates and displays the type of randomly-generated love letters that Strachey's original code could have produced. Dr Link's project, started in about 2008, won the Computer Conservation Society's <i>Tony Sale Award</i> in October 2012.
MA5	1970	Department of Computer Science: 3 rd year electronics laboratory, projects for 1970/71.	Typed foolscap hand-out, plus notes, giving a list of topics for final-year student projects ('long experiments'). Includes a description of one project, namely a store-access pattern analyser, for which the existing BIOMAC signal-processing computer was to be interfaced to the Department's ICL 1905E computer.
MA5	1973	Talking to computers.	This single-page typed hand-out was written by SHL, probably for a visitor-demonstration or Departmental Open Day. SHL supervised Ph.D. student Brian Carpenter, who had built the speech recognition equipment used for the demonstration.
MA5	1973, 1977, 1980	University of Manchester, Department of Computer Science.	Three illustrated glossy booklets, for handing out to prospective students and visitors. Each has 16 pages, which include descriptions of the undergraduate and post-graduate courses, Departmental research and a list of the academic staff.
MA5	1974 – 1979	Examples of cooperative projects between the department of Computer Science and external organisations.	(a). Printed headings as used in the department's Exhibition Room in about 1974. (b). Hand-written notes produced by SHL for Philip Radcliffe, the University's Communications Officer, in February 1979. (c). <i>30 years of industrial collaboration</i> by SHL. Article in <i>Contact</i> , a University of Manchester internal magazine, summer, 1976. Included are letters from Ferranti Ltd. and ICL approving the wording.

Box-file M3.

Box	Date	Title	Description/comments
------------	-------------	--------------	-----------------------------

MA3	1949	Photo of the left-hand side (6 racks) of the Manchester Mark I computer.	Although this glossy photo was taken in mid-1949, the six racks (counting from the left) are said to give a good indication of the total hardware of the June 1948 SSEM ('Baby'). The photo was taken at the University by members of the Department of Electrical Engineering and copyright is now deemed to reside with the School of Computer Science, University of Manchester.
MA3	1949	Alex Robinson's 16 photos of the Manchester Mark I	Sometime during April/June 1949 A A (Alec) Robinson took a series of 16 overlapping photos of the entire Mark I computer (except for the drum and I/) equipment, which were in other rooms). Each print is 4" x 2.5". These photos formed the basis of the montage produced by the <i>Illustrated London News</i> (see below). The set of 16 prints were given to SHL by Tom Kilburn in about 1978. SHL asked the Departmental Librarian to make a new montage. She proved inadequate. SHL stopped the project after observing that the Librarian had started to cut up the original prints without careful prior planning. Nevertheless, the (mangled) prints proved helpful to Chris Burton when seeking details of the original circuitry for his Baby re-build project in 1997. Photocopies of the original prints before mutilation, and correspondence between SHL and Chris Burton, are included.
MA3	1949	Set of 3 prints (and several duplicates) of the Manchester Mark I computer.	For ease of identification, the prints are labelled on the reverse with the page-number of a similar image that appears in the second edition of <i>A History of Manchester Computers</i> . (This therefore provides descriptions). The photos were all taken at the University by members of the Department of Electrical Engineering, though page 11 was a montage of several separate images (each taken by A A Robinson, see above) and made into a composite by the <i>Illustrated London News</i> for the magazine's June 1949 edition. Copyright for all the photos is now deemed to reside with the School of Computer Science, University of Manchester.
MA3	1951	Set of five glossy prints of the first Ferranti Mark I	These were donated by H W Gearing and are assumed to be a set given to him at the July Inaugural Conference. Each 6" x 8" photo is labelled with a typed caption on the reverse. The copyright almost certainly resides with Ferranti Ltd. and, hence, with the Ferranti

			Archive at MOSI.
MA3	c. 1951	The second Ferranti Mark I on the factory floor at Moston.	<p>This photo (and a copy) was donated by Allan Ellson, a former Ferranti engineer. People in photo (left-to-right): Bill Wallace and David Wilde looking at the monitor; Brian Welby in the background; Alan Ellson crouching; Jock Wilson standing at right, holding door.</p> <p>This photo shows the Mark I that went to the University of Toronto, where it arrived in April 1952 and was called FERUT. The image shows the machine nearing completion in Ferranti's Moston works prior to shipment.</p>
MA3	1952	Two photos of Williams-Kilburn storage tubes for the IBM 701 computer.	<p>The first photo shows (l to r) F C Williams, H J Crawley (NRDC) and J C Mcpherson (IBM). The second photo shows one of IBM's storage tubes. The first image is on page 19 of <i>A History of Manchester Computers</i>. Copyright of the photos is uncertain but is believed to reside with IBM.</p>
MA3	1951 – 1954	Miscellaneous views of Ferranti Mark I and Mark I* installations. (Note: there exist many more photos of Mark I and Mark I* installations, as .jpg files on SHL's computer).	<p>NB – these are photocopies, not originals.</p> <p>(a). John Bennett standing at the console of the Ferranti Mark I at Manchester University.</p> <p>(b). D G Prinz and Margaret ? (a Ferranti programmer), at the console of the Ferranti Mark I at Manchester. They are shown programming a chess problem. This image, from Picture Post Library, appeared in the quarterly magazine <i>Now and Then</i>, No. 98, Spring 1957. It is believed that the photo dates from about 1952.</p> <p>(c). Ferranti maintenance engineers round the console of the Mark I* computer at Amsterdam, 1954 (photo donated by Allan Ellson).</p> <p>(d). Ferranti Mark I* at Fort Halstead in about 1954.</p> <p>(e). 4 photos (3 in colour) of the Ferranti Mark I installed at INAC, Rome, in 1955. (i) Gronchi & others at the console, from the rear of the console; (ii) machine from the front (no people); (iii) an engineer checking a logic door; (iv) data preparation equipment. (Photocopies donated by Owen Ephraim).</p> <p>(f). Group photo showing President Gronchi and others at the inauguration of the Mark I* at Rome, December 1955. (Photocopy donated by Owen Ephraim).</p>
MA3	c. 1952	World-wide distribution of CRT storage installations.	This photo has been reproduced from a glass slide in the collection of the Computing

			Machine Laboratory at Manchester. It was probably made for a lecture given by F C Williams and probably shows the installations world-wide which had working electro-static (ie Williams-Kilburn tube) storage in 1952. Each site is labelled with its capacity in kilo-digits.
MA3	c. 1952 - 1976	Various portrait photos of computer pioneers.	(a). F C Williams (taken in about 1952, it is believed). (b) T Kilburn (taken in about 1962, in is believed). (c). 14 computer pioneers (including Williams, Kilburn and Newman) at the opening of the Science Museum's Computing gallery in December 1975. (For full caption, see page 26 of <i>Early British Computers</i>).
MA3	1953	The experimental transistor computer.	Glossy b/w print, 9" x 7", of the machine as at about November 1953. (Photo reproduced on page 34 of <i>A History of Manchester Computers</i>).
	1956	The Metropolitan-Vickers MV950 computer.	Glossy b/w print, 9" x 7", of the MV950 with an operator sitting at the console. Similar to the photo that appeared on page 36 of <i>A History of Manchester Computers</i> , but with small differences such as 'handles on the logic doors', etc. Note that more information on the MV905 is in box-file UK4.
MA3	c. 1978	Photos to compare Ferranti Mark I technologies with contemporary and later hardware.	(a). Storage: a CRT Williams-Kilburn storage tube compared with a mercury delay line from DEUCE and a nickel delay line from Pegasus. (b). a Mark I logic door compared with (i) an Atlas pcb and (ii) some MU5 modules. Copyright for all the photos is now deemed to reside with the School of Computer Science, University of Manchester.
MA3	1997	Photos of the rebuild of the SSEM (Baby)	(a) Two of the b/w photos show Chris Burton and members of his team at work on the replica Baby. The rebuild took place in an area set aside for the project in the main UMRCC computer room, on the ground floor of the Kilburn Building. (b) Four of the b/w photos show various front and rear views of the above rebuild, probably when it had been completed and was ready to be moved to MOSI. (c) Double-page colour photo of the cockpit of a Spitfire, being pages 22 & 23 of the <i>Guardian</i> for October 6 th 2006. The five red buttons at the left of the photo are radio

			<p>channel-selectors. These type of buttons were used on the control panel of the SSEM (Baby).</p> <p>(c) Double-page colour photo of the cockpit of a Spitfire, being pages 22 & 23 of the <i>Guardian</i> for October 6th 2006. The five red buttons at the left of the photo are radio channel-selectors. These type of buttons were used on the control panel of the SSEM (Baby).</p> <p>(d). Colour photo of The Baby at the 50th Anniversary celebrations in MOSI, showing (left-to-right) Geoff Tootill, SHL, Tom Kilburn standing in front of the racks.</p>
MA3	c. 1981	Photo of simulated CRT store display	B/w photo showing the words "REAL VIRTUE IN STORE" made up from dots and dashes. Created for a Tom Kilburn retirement greetings card.
MA3	c. 1965	Three photos of the Department's PDP8 computer.	It is believed that the photos were taken in the 3 rd year electronics lab. in the Dover Street building, before Computer Science had moved across to the Whitworth Building. The person seated at the machine is Dick Vogel, an Experimental Officer.
MA3	c. 1968/9	4 photos of I/O and data-preparation equipment. 2 photos of SHL in action in the TV studio.	<p>These photos were taken during the making of a 12-lecture TV series on Logical design of Computers – the first such series to be made by the University's Television Centre. At the time, the Department of Computer Science was based in the Whitworth Labs in Coupland Street. The photos show:</p> <p>(a) a paper tape reader;</p> <p>(b) a card reader, as attached to the Department's ICL 1905E/F computer;</p> <p>(c) two so-called 'punch girls' preparing punched cards (usually for students' programs);</p> <p>(d) An ASR33 teletype.</p> <p>(e) 2 posed photos of SHL "in action" in the TV studio.</p>
MA3	1972	Second edition of the booklet that accompanied the TV series on Logical Design'.	60-page, A4, illustrated. Note that many of the photos in the booklet come from the Manchester Atlas. Copies of this TV course were sold to 12 other universities (two overseas) and to ICL in the early 1970s. The production and use of the courses is written up in <i>The programming and use of television courses on Logical Design and Programming in Algol</i> . S H Lavington & J S Rohl. Proc. IFIP Conf. on Computer Education,

			Amsterdam, Aug. 1970, pages 85 – 87.
MA3	1972	Photo of equipment on the Audio-Visual control room of the new Computer Science building.	Shows the control console and video recorders for the playback of television lectures produced by departmental staff. Two early courses, each of 12 half-hour video tapes, were on Logical Design (SHL) and programming in Algol (J S Rohl).
MA3	1973 - 1980	Collection of Departmental photos, as featured in various editions of the Department of Computer Science Booklet.	(a). PDP11 computer in the 1st & 2nd yr programming lab. – (see p. 5 of 1973 booklet). (b) PDP8 computer and speech recognition – (see p. 11 of the 1973 booklet). (c). program reception area – (see p. 3 of the 1977 booklet). (d). On-line programming lab. – (see p. 5 of the 1977 booklet). (e). PDP11 lab – (see p. 9 of the 1977 booklet). (f). PDP11 lab. – (see p. 9 of the 1980 booklet). (g) 1st year and 2nd year electronics labs – (see p. 7 of the 1973 booklet). (h) Several views of the University of Manchester Regional Computing Centre's installations – (see for example p. 10 of the 1980 booklet). (j). Walkway entrance and stairs, c. 1977. (k). MU5 machine room, c. 1973 – (see front cover of 1973 booklet). (l) Integrated circuit research (c. 1980).
MA3	c. 1975	MU5 photo	Glossy colour photo, 9" x 7", of one logic bay (6 platters) of MU5.
MA3	1978/9	Mug-shots of Computer Science people.	A4 photocopied booklet, issued to all staff and students at the start of the academic year. Contains small portraits of 4 professors, 7 senior lecturers, 22 lecturers, 5 SEO's, 2 EO's, 6 secretaries, 25 technicians & related grades, 12 computer operators & related grades, 15 porters. (9 pages in all, incl. title page).
MA3	1978 – 1988	10 photos, 4 sketch diagrams and correspondence relating to Hartree's Differential Analyser and the re-assembly of about one third of the original machine firstly in the Department of Computer Science and then in the	D R Hartree introduced differential analysers (DAs) to the University of Manchester in 1934. In 1935 Metropolitan-Vickers Ltd. constructed a full-scale DA for Hartree that was, at the time, the largest in the world. Bits of this machine were restored many years later in the Simon Engineering Laboratory in the University. In 1972 the Department of Computer Science moved into a new building (now the Kilburn Building), which had a

		Museum of Science & Industry in Manchester.	special Exhibition Room for the display of historic computer equipment. In 1976 Prof. J Diamond (Simon Engineering Labs) was offering us the DA. By 1978 about a third of Hartree's DA had been transferred from the Simon Engineering Labs and assembled in the Exhibition Room. In 1980 the Exhibition Room was turned into a Microprocessor Laboratory and many of the historic equipment put into storage (in the void underneath the 250-seat lecture theatre – see photo of various historical bits). The intention was to donate the bits of Hartree's DA to the Museum of Science & Industry (MOSI) in Manchester. MOSI was unable at that time to accept the bits. In 1988 Charles Lindsay (at that time a Senior Lecturer in the Department of Computer Science) was given the task of transferring the bits to MOSI. In 1994 Charles Lindsay (by then retired) headed a group of CCS volunteers at MOSI whose aim was to restore the DA to working order. This project was suspended by MOSI in 2015 and the DA bits put into storage at MOSI.
MA3	c. 1980	8 photos relating to the exhibition of historical equipment in the Department of Computer Science.	<p>(a). 4 photos, showing the Exhibition Room after it had been turned into a Microprocessor Lab. The display cabinets in the wall were retained but the bulky equipment such as Hartree's Differential Analyser (see above) and the Atlas PAR bay had been removed.</p> <p>(b) 2 photos showing some of the removed equipment displayed in the foyer of the Computer Science Department. The Atlas console and PAR bay can be seen, together with a bare 19" rack from the 1949 Manchester Mark I and, on the extreme left just visible, a logic door from a Ferranti Mark I*.</p> <p>(c). One photo showing part of the void under the 250-seat Lecture Theatre. Not all the equipment and documents are 'historic' but a Biomac medical instrumentation computer (c. 1966) can be seen and, on the extreme right, the cabinet of the Atlas Speech Converter. Some Atlas pcbs can be seen on the shelving to the left. Bits of Hartree's DA were also stored here – see above.</p> <p>(d). One photo. A few items of small historical equipment were displayed in the Conference</p>

			Room on the second floor.
MA3	1998	Collection of colour photos taken by SHL at the 50 th Anniversary of the SSEM (Baby), Manchester, June 1998.	30 colour photos, 6" x 4", plus negatives. The set includes: (a) 6 photos of the Baby as demonstrated at MOSI; (b) 4 photos of guests in a pub near to the Bridgewater Hall, just after the official speeches; (c) 2 photos of a display board at an exhibition in the University's museum. The text being pointed to says: "In the 1970s Simon Lavington, then a lecturer in the Department of Computer Science at the University of Manchester, wrote and published histories of computing, describing and documenting the important post-war developments. His work stimulated further interest in computers as historical objects". (d) 16 photos of guests at the dinner. People shown (and identified on the back of photos) include: Eric Dunstan, Geoff Tootill, Gordon Haley, Dai Edwards, Peter Hall, Tony Sale, Alec Robinson, Dick Grimsdale, Brian napper, Hilary Kahn, Tom Kilburn, Coln Litting, Steve Furber, Mike Brady, Frank Sumner, Joan smith, Ron Lane, Jeff Rohl, SHL, Christine Dunstan, Ellen Sumner, Mrs Hart (Tom's secretary), Dick Vogel, Ina Aspinall, Dave Aspinall, Eric Sunderland, Vera brooker, Ian Watson, John Crawley, Johnny Mudge, Sue Maclean, Roland Ibbett, John Gurd, Roger Needham, Karen Sparck-Jones, Dave Smith.

Box-file M6.

Box	Date	Title	Description/comments
MA6	1946	Calculations and electronics: automatic computator [sic] designed by the NPL.	The Electrician, 8 th November 1946, pages 1279 – 1280. News item quoting extensively from a statement issued by the DSIR.
MA6	1947	Mercury memory tanks in new EDVAC computer.	Electronics, May 1947, pages 168 – 173
MA6	1947	A memory tube. A V Haeff.	Electronics, September 1947, pages 80 – 83.
MA6	1947	Design of mercury delay lines. T K Sharples.	Electronics, November 1947, pages 134 – 138.
MA6	1948	A storage system for use with binary-digital computing machines. F C Williams, T Kilburn.	Read at an IEE meeting on 2 nd November 1948. 18 pages. Published in Proc. IEE, Vol.96, Part 2, No. 50, April 1949, pages 183 – 202.
MA6	1949	The University of	Nature, Vol. 164, October 22 nd 1949, pages

		Manchester universal high-speed digital computing machine. T Kilburn.	684 – 687. Describes what became known as the Manchester Mark I, or MADM.
MA6	1950	Universal high-speed digital computers: a small-scale experimental machine. F C Williams, T Kilburn, G C Tootill.	IEE Proceedings, Vol. 98, Part II, No. 16, February 1951, pages 13 – 28. Describes the SSEM, or Baby, as it was in June 1948.
MA6	1950	The position synchronisation of a rotating drum. F C Williams, J C West.	Proc. IEE Vol. 98, Part II, No. 61, Feb. 1951, pages 29 – 34.
MA6	1950	Electrostatic storage tube. S H Dodd, H Klemperer, P Youtz.	Electrical Engineering, Nov. 1950, pages 990 – 995. Describes a 'holding-beam' type of storage tube, developed at MIT. References the Williams/Kilburn 1948/9 paper, see above.
MA6	1950	Storage of small signals on a dielectric surface. J V Harrington.	J. Applied Physics, Vol. 21, No. 10, Oct. 1950, pages 1048 – 1053. A mathematical analysis, based on experience with the barrier-grid tube. References Haeff and Klemperer.
MA6	1951	The selective electrostatic storage tube. Jan Rachman	RCA Review, March 1951, pages 53 – 96.
MA6	1951	The new universal digital computing machine at the University of Manchester. T Kilburn.	Nature, Vol. 168, July 21 st 1951, pages 95 – 99. Describes the Ferranti Mark I which had come into operation at the University.
MA6	1951	Universal high-speed digital computers: serial computing circuits. F C Williams, A A Robinson, T Kilburn.	Read at an IEE meeting on 20 th Nov. 1951. Includes several types of circuit arrangement for addition, including analogue. Published in Proc IEE, Vol. 99, Part II, 1952, pages 107 – 120.
MA6	1951	Universal high-speed digital computers: a magnetic store. F C Williams, T Kilburn, G E Thomas.	Read at an IEE meeting on 20 th Nov. 1951. Published in Proc IEE, Vol. 99, Part II, 1952, pages 94 -106, Describes the original (1949) drum.
MA6	1952	Recent advances in cathode-ray-tube storage. F C Williams, T Kilburn, C N W Litting, D B G Edwards, G R Hoffman.	Describes various spot configurations, experiments to understand and quantify effects, and underlying theory. Presented at the IEE Symposium of papers on digital computers in April 1953. Published in Proc IEE, Vol.100, Part II, No. 77, October 1953, pages 513 – 522.
MA6	1952	Universal high-speed digital computers: a decimal storage system. T Kilburn, G Ord.	IEE Describes the representation of decimal digits on a CRT store. Presented at the IEE Symposium of papers on digital computers in April 1953. Published in Proc IEE, Vol.100,

			Part II, No. 77, October 1953, pages 523 – 539.
MA6	1952	The Binac. A A Auerbach, J P Eckert, R F Shaw, J R Weiner, L D Wilson.	Proc. IRE, Jan – June 1952, pages 12 – 29.
MA6	1953	Digital computers at Manchester University. T Kilburn, G C Tootill, D B G Edwards, B W Pollard.	Describes the progression from the SSEM, to the Manchester University Mark I to the Ferranti Mark I. Presented at the IEE Symposium of papers on digital computers in April 1953. Published in Proc IEE, Vol.100, Part II, No. 77, October 1953, pages 47 – 500.
MA6	1953	The construction and operation of the Manchester University computer. B W Pollard, K Lonsdale.	Presented at the IEE Symposium of papers on digital computers in April 1953. Published in Proc IEE, Vol.100, Part II, No. 77, October 1953, pages 501 – 512. Describes the physical construction and production details of the Ferranti Mark I, together with a detailed analysis of maintenance procedures, faults experienced and reliability obtained.
MA6	1954	An attempt to simplify coding for the Manchester electronic computer. R A Brooker.	Published in the British Journal of Applied Physics, Vol. 6, September 1955, pages 307 – 311. Describes the Mark I autocode.
MA6	1954	The physics of cathode ray storage tubes. C N W Litting.	Journal of Scientific Instruments, Vol. 31, No. 10, Oct. 1954, pages 351 – 356. Compares several theories of electrostatic storage. References Forrester (MIT), Jensen (RCA), Klemperer, Haef and Kates (Toronto).
MA6	1955	High density Williams storage. S Y Wong.	IRE Trans on Electronic Computers, Vol. EC4, No. 4, Dec. 1955, pages 156 – 158. References Eckert and Pomerene.
MA6	1956	The programming strategy used with the Manchester University Mark I computer. R A Brooker.	Paper read at the IEE Convention on digital-computer techniques, April 1956. Published in Proc IEE Vol. 103, Part B, supplement 1-3, 1956, pages 151 – 157. Mostly concerns the Ferranti Mark I and Mark I* but looks forward to the 'Mark II' (by which he means the Ferranti Mercury).
MA6	1956	A magnetic-tape digital-recording equipment. A A Robinson, F McAulay, A H Banks, D Hogg.	Proc IEE Vol. 103, Part B, 1956. Describes several experiments with magnetic tape, ending with an experimental system handling 400 ft lengths of 35mm magnetic tape.
MA6	1956	Reading of magnetic records by reluctance variation. T Kilburn, H R Hoffman, P Wolstenholme.	Proc IEE Vol. 103, Part B, 1956. Solves the problem of reading slow-moving or stationary magnetic records.
MA6	1956	An improved method for Williams storage. M Graham.	IRE Trans on Electronic Computers, Vol. EC5, No. 3, Sept. 1956, page 140. Briefly reports on work done at Brookhaven national

			Laboratory.
MA6	1956	A transistor digital computer with a magnetic drum store. T Kilburn, R L Grimsdale, D C Webb.	Proc IEE Vol. 103 Part B, 1-3, 1956, pages 390 – 406.
MA6	1956	Mercury: a high-speed digital computer. K Lonsdale, E T Warburton.	Proc IEE Vol. 103 Part B, 1-3, 1956, pages 174 - 183.
MA6	1958	A decimal adder using a stored addition table. M A Maclean, D Aspinall.	Proc IEE Vol. 105, Part B, 1958.
MA6	1968	A system design proposal. T Kilburn, D Morris, J S Rohl, F H Sumner.	Proc. IFIP Congress, Edinburgh, August 1968, pages D76 – D80.
MA6	1974	The implementation of record processing in MU5. P C Capon, R N Ibbett, C R C B Parker.	IEE Conf. on Computer Systems and Technology, London, October 1974.
MA6	1976	Synchronisation and arbitration circuits in digital systems. D J Kinniment, J V Woods.	Proc IEE Vol.123, no.10, Oct. 1976, pages 961 – 966.
MA6	1977	The MU5 multicomputer communication system. Simon Lavington, Gareth Thomas, David Edwards.	IEEE Trans on computers, Vol. C26, No. 1, January 1977, pages 19 – 28.
MA6	1977	The MU5 name store. R N Ibbett, M A Husband.	Computer Journal, Vo. 20, No. 3, 1977, pages 227 – 231.
MA6	1977	Assessing the power of an order code. Simon Lavington.	Proc. IFIP-77, Toronto, 1977, pages 477 – 480.
MA6	1977	Performance measurements of the MU5 primary instruction pipeline.	Proc. IFIP-77, Toronto, 1977, pages 471 – 476.
MA6	1977	How to call procedures, or second thoughts on Ackermann's Function. B A Wichmann.	Software – practice and experience. Vol. 7, 1977, pages 317 – 329. Has pencilled notes by SHL giving MU5 comparative figures and, stapled to the end, four pages of print-out dated 21/10/1977 showing the MU5 Algol compiler's object code and the Algol source code for Ackermann's Function on MU5.
MA6	1977	The hardware/software interface of the ICL 2900 range of computers. D H R Huxtable, J M M Pinkerton.	Computer journal, vol. 20, no. 4, November 1977, pages 290 – 295.

Box-file MA7.

Box	Date	Title	Description/comments
MA7	1954	A proposed program organisation for the Ferranti Mark II computer. J V Garwick.	Photocopy of an 8-page typed proposal, dated 20 th April 1954. The 'Mark II' in the title refers to the machine that became known as the Ferranti Mercury. Dr Jan V Garwick was a Section Head at the Norwegian Defence Research Establishment (NDRE). The first production Mercury was delivered to NDRE at Kjeller, 15 km east of Oslo, in about August 1957. The machine was called Frederik (or Frederic). The title page is over-stamped by a distribution list, showing that one of the paper's seven copies went to Ferranti Ltd. The paper discusses an elementary 'operating system' and especially the Routine Changing Sequence'. It is known that Garwick created a program input routine for Frederic that was different from that used by all the other Mercury machines. (See also below for e-mail exchanges with Bill Olle and Knut Korsvold).
MA7	1957	Photo of Mercury computers being constructed at Ferranti's West Gorton factory.	Photocopy of a photo that appeared in the Ferranti Journal, Vol. 15, No. 3, 1957, page 23.
MA7	1958	Programming examples for the Ferranti Mercury computer. List CS161, Nov. 1958	38-page foolscap manual with grey covers. This copy formerly owned by I R MacCallum.
MA7	1958	Mercury extracts from: Ferranti computers, data-processing systems, auxiliary equipment and services.	Photocopy of pages 12 & 13 from the 40-page illustrated Ferranti glossy brochure, List DC 36, November 1958. This is the only material on Mercury in the whole brochure.
MA7	1958	The Ferranti Mercury computer. K Lonsdale.	Photocopy of an illustrated 5-page article from the Ferranti Journal, Vol.?, No.?, probably 1958.
MA7	1960	Ferranti Mercury computer: programmers' handbook. List CS225A, April 1960.	72-page foolscap manual with grey covers. This copy formerly owned by I R MacCallum.
MA7	1961	The Pegasus, Mercury Sirius Autocodes.	8-page Ferranti leaflet, list AUP/1, September 1961. Gives a description of the language and an example program.
MA7	1999	Exchanges of e-mails between SHL and Bill Olle and Knut Korsvold, regarding the first Mercury installation (in Norway).	The exchanges seek to throw light upon why the first production Mercury went to Norway. Amongst other things, the e-mails give the background to J V Garwick (see above). Also, in Ferranti records the application of Mercury at NDRE is said to be 'atomic energy

			work'. Knut Korsvold says that the machine was (also) used for cryptanalysis and for statistical checks on supposedly randomly-generated punched paper tapes.
MA7	1972 - 1976	MU5 Instruction set, etc.	a) Instruction set, R N Ibbett, dated 14/1/72. b) Descriptor formats, RNI, Feb. 1973. c) MU5 instruction times – a programmers' guide. RNI, 19/1/1976.
MA7	1973	MU5 hand-outs for the Department of Computer Science's Open Day, May 1973 (or possibly 1978?).	a). MU5 overall characteristics. b). Demonstration program (to find the highest factor by the method used on the SSEM (Baby). Comparative timings are given (MU5 is approx. 50,000 times faster).
MA7	1973	MU5 PROP Name Store search test	Reel of 8-track paper tape with the code for an MU5 test program, written in XPL (the MU5 assembly language). Marked SHL 16/5/73. SHL was in charge of diagnostic programs for MU5.
MA7	1974	The MU5 Computer Complex	14-page photocopied typed overview with diagrams. Author R N Ibbett, November 1974. Has pencilled updates by SHL.
MA7	c. 1975	Two manuals: a) MU5 Hardware Manual Volume 1 (of 3), undated. b) MU5 Basic Programming Manual (July 1975).	These two A4 typed manuals were produced in the Department of Computer Science, University of Manchester. They were formerly owned by R N Ibbett, a leading member of the MU5 hardware design team. The contents of both manuals were contributed by (and updated when necessary by) the MU5 design team. Manual (a) has 180 pages; manual (b) has 146 pages. Manual (a) is incomplete, since some of it was never actually written. As at November 2015 the two manuals reside with Professor Roland Ibbett in Edinburgh.
MA7	1975	MU5 average instruction times, as at 28 th May 1975.	These results, tabulated by SHL, show 'best' and 'worst' average instruction times when running specimen Algol and Fortran programs chosen from well-regarded benchmarking suites of scientific programs. The average times range from 169 nanosecs. to 675 nanosecs. per instruction. (See below for more details of the programs).
MA7	1976	MU5 benchmarking results	Red folder of comparisons, carried out by SHL in 1976, between MU5 and the CDC7600 for a variety of standard Algol and Fortran benchmarking programs. (Some Atlas figures also included). Detailed results are given, together with the code of some programs and correspondence with relevant organisations (principally NPL and the Central Computer Agency).

MA7	c. 1978	MU5 and the ICL 2900 range	About 20 pages of SHL's hand-written notes, February 1978. Some of the material appears to have been prepared with reference to (a draft of?) the book <i>The MU5 computer system</i> by Derrick Morris and Roland Ibbett which was published in 1979.
MA7	1982	Notice of final shut-down of MU5	Internal memo from Dick Vogel to all Computer Science staff, saying that the scrapping of MU5 will start on 1 st August 1982.
MA7	1982	MU6G instruction set manual. Issue 2, 2 nd May 1982.	MU6G was intended as a medium-performance 64-bit floating-point processor which could act as a front-end processor for a supercomputer (within a multi-computer complex).

Box-file MA8.

Box	Date	Title	Description/comments
MA8	1972 – 1976	Incoming and outgoing correspondence, May 1972 to August 1976.	Includes letters from/to: F C Williams, Jane Pugh (Assistant Keeper, Science Museum), Kenneth O May (Editor, <i>Historica Mathematica</i>), D E Knuth (Stanford), major J C Churchill (ADP team, UKLF), Brian Randell (Newcastle), R L Grimsdale (Surrey), L E Rosenthal, M Wells (Leeds)
MA8		Incoming and outgoing correspondence, August 1976 to July 1978.	Includes letters from M Woodger (NPL), Andrew Hodges, M Campbell-Kelly, Brian Randell, David Firnberg (NCC), Andrew Hodges, Chris Evans (NPL), Martin Campbell-Kelly, H J Crawley (NRDC), Tamar Oppenheimer, (UN, New York), Jane Pugh, I J Good (Virginia Polytechnic), N Metropolis (Los Alamos)
MA8		Incoming and outgoing correspondence, August 1978 to Aug. 1979.	Includes letters from Paul Ceruzzi (Kansas City), Paul Armer (Charles Babbage Institute), Heidi Baldus (Digital Press), Brian Randell, R G Robinson (NCR Patents Dept.), Vol. 1, No. 1 of the Charles Babbage Institute's Newsletter, 1 st May 1979, Harry Shershow (Personal Computing, Boston), Martin Campbell-Kelly, L S Piggott (regarding FCW's files), Vincent Knowles (Registrar, Manchester University), Brian Randell, B Richards (UMIST), Andrew Hodges, O J Orchard (patent Agent, London, re Dirks patent), J C Albrecht (Teletype Corp. Illinois, re Dirks patent), Max Newman (Maths Dept., Manchester University), David Firnberg (NCC), Joan Smith (Editor, IUCC Newsletter),

			C J van Rijsberg, University of Cambridge Computer Lab), K G Johnston (Western Electric), Andrew D Booth (Canada).
MA8		Incoming and outgoing correspondence, August 1979 to July 1980.	Includes letters from Paul Armer, Oliver Strimpel (Science Museum), Maurice Wilkes (Cambridge), Vol. 1, No. 2 of the Charles Babage Institute's Newsletter, 31 [sic] Sept. 1979, Jackie Wilson (NPL, on death of Chris Evans), G A Blaauw (Netherlands), 'Challenge of the Chip' booklet from the exhibition in the Science Museum, & list of equipment loaned.
MA8		Incoming and outgoing correspondence, August 1980 to Nov. 1981.	Includes letters from Andrew Hodges, Paul Armer, J B Alton (Contemporary Scientific Archives Centre, Oxford), G F Santos (Ibadan, Nigeria), P A Bobillier (IFIP, Silver Core Award), Godfrey Hall (NCC), Matthew Taub (IEE)
MA8		Incoming and outgoing correspondence, January 1982 to December 1982.	Includes letters from R J Campbell (Ferranti Archivist), Gwen Bell (DEC & Digital Computer Museum), R J Preis (Computer Pioneer Award for TK), C J Somers (Ferranti Archivist), Richard Hills, (North Western Museum of Science & Industry), Ann Fitch and Adrian Milne (BBC Enterprises, for buying a copy of 'Eye on Research', the Brain in the Box, video tape, broadcast on 12 th January 1958 and featuring the Ferranti mark I and the Ferranti Mercury at Manchester University and F C Williams and Tom Kilburn), Jenny Brown (Digital(DEC)), Alec McAulay (Editor, Manchester University Press), Tom Kilburn, Donald Davies (NPL).
MA8		Incoming and outgoing correspondence, January 1883 to October 1986.	Includes letters from Elizabeth Davies (BCS Editor), Martin Campbell-Kelly, Patricia Fara (Prismatron), Ashley Goldsworthy (IFIP), Erik Dagless (IEE), Jack Howlett (ICL, & 'National Computer Museum and Archive'), Ruth Evans (Manchester University Press), Paul Ceruzzi (The Computer Museum), Georges Ifrah (IBM World trade wall chart), John Wilson (History, Manchester U.), Stella Butler (Greater Manchester Museum of Science & Industry), Ted Broadbent (EE at Manchester U.), G Collinson (ICL), A K H Thomas (Ferranti), Frances Hartley (MUP), Andrew Hodges, Eiichi Goto (Tokyo),
MA8		SHL's contacts: names & addresses, up to 1986.	Many of these names are connected with computer history. There are also two University of Manchester Faculty of Science

			handbooks, respectively for the sessions 1979/80 and 1980/81, which give names and addresses of all academic staff.
--	--	--	---

Box-file MA9.

Box	Date	Title	Description/comments
MA9	1984 – 1985 (1934 – 83)	Lineprinter listing and accompanying diskette describing about 840 historic computer documents, as held within the Department of Computer Science, Manchester University, in 1984.	The database (a print-out and an 8" floppy diskette, RT-11 format, double sided) references about 840 paper documents then in the care of SHL at Manchester. It does not include photos. The listing's format includes <date>, <author>, <title>, <type>, where <type> can be: A(article), B(book), C(conference proceedings), L(letter), M(manual), N(notes), R(report), etc. The database was compiled by an M.Sc. student and contains a few minor spelling mistakes, etc. The data was used as a test of the Semantic Binary Relationship Model (SBRM), as part of the Intelligent File Store (IFS) project at Manchester and (after 1986) at the University of Essex. In about 1986 all these 840 documents were offered to the National Archive for the History of Computing. It is believed that, except for some journal reprints, most items were accepted by the NAHC and now appear in the NAHC catalogue: http://www.chstm.manchester.ac.uk/downloads/media,38917,en.pdf
MA9	1984 – 1985.	File of notes on the above database, including Internal Report IFS/1/84 by Y J Jiang and S H Lavington.	The notes give the database format and performance statistics when the data was held as an SBRM (semantic binary relationship model) database on the Intelligent File Store. The Internal Report IFS/1/84, dated January 1984 consists of 8 typed pages.

Box-files MA10 – MA14.

Box	Date	Title	Description/comments.
MA10	1957	Order code for future scientific computer. S Gill, 9 th May 1957.	Photocopy of a short typed Ferranti internal memo sent by Stan Gill to Brian Pollard, Manager of Ferranti's Computer Department, and six other Ferranti staff. The gist is: "Although it is not yet clear what type of scientific computer we shall build next ... we should start to gather ideas".
MA10	1958	Draft report on the Manchester electronic computer project. C Strachey, J	Photocopy of Tom Kilburn's copy of this six-page typed foolscap report, with TK's hand-written comments and corrections. This report, produced by an NRDC Working Group, was an assessment of the University's MUSE

		Howlett, D Wheeler & E H Cooke-Yarborough. April 1958. Also, accompanying letters.	project. In summary, the report concluded that the expected performance of MUSE would fall short of the needs of the nuclear physicists. Kilburn did not agree and went ahead with his design, leading to the humorous local re-naming of MUSE as <i>BISON</i> : Built In Spite Of NRDC. Also, photocopies of three associated letters are included: (a) from Cooke-Yarborough to TK dated 23/4/1958; (b) from Cooke-Yarborough to TK dated 25/4/1958; (c) from Cooke-Yarborough's secretary to TK dated 25/4/1958. The originals of these documents were donated to NAHC by SHL in about 1985 and carry the NAHC catalogue number NAHC/MUC/series 2/B5.
MA10	1960	Photocopies of the three IEE papers describing the essence of Atlas's high-performance central processor system, namely the parallel adder, the Fixed Store and the B Store.	Red folder containing three seminal papers that appeared in Proc. IEE Vol. 107, Part B, No. 36, Nov. 1960. Includes: (a) A digital computer store with very short read time. T Kilburn & R L Grimsdale (pages 567 – 572); (b) A parallel arithmetic unit using a saturated-transistor fast-carry circuit. T Kilburn, D B G Edwards & D Aspinall (pages 573 – 584); (c) Ferrite-core memory systems with rapid cycle times. D B G Edwards, M J Lanigan & T Kilburn (pages 585 – 598); (d) High-speed light output signals from electroluminescent storage systems. G R Hoffman, D H Smith & D C Jeffreys (first page only, page 599); (e) part of the discussion on all four papers and the authors' replies to the discussions, pages 606 – 607.
MA10	1960	7 b/w photos of the MUSE/Pilot Atlas in Dover Street.	Good-quality copies of original photos held at the Museum of Science & Industry (MOSI), Manchester, in their Ferranti Archive. One or two of the people shown might have been from Plessey. Of the University/Ferranti people, the following have been identified: (a) In photo M641/60/2: left group: ano1, Les Etchels the technician, Phil Patience, ano2; centre background, ano3; right group: (probably Paddy Podesta, Ferranti), Mike Lanigan, DBGE's head, Ianto Warburton. (b) In photo M452/60/3: foreground l to r: Gordon Haley, Yao Chen's head, Ianto Warburton's head; in background, ano (possibly Dick Grimsdale?). See also the CD below.
MA10	1960	Atlas: a new concept in large computer design. S Gill.	Article (2 A4 pages) reprinted from the <i>Comm ACM</i> , June 1960. Starts with the sentence: "Atlas is being designed jointly by Ferranti Ltd. and a team at the University of Manchester headed by Professor T Kilburn". Cites four 1959 papers authored by Kilburn et al. This document is on Brian Spoor's CD.
MA10	c. 1960	Atlas: Information flow, block schematic.	Photocopy of Figure 1.1 from an undated internal report. Has hand-annotations in ink, possibly by TK, giving the initials of various engineers who were at the time in charge of commissioning various units. The interpretation is believed to be: B-acc & A-accumulator: Ianto Warburton & Gordon Haley (both Ferranti); Fixed Store: Richard (Dick) Grimsdale & Keith Bowden (both

			University); Distributor: E C Y (Yao) Chen (Ferranti); Tape Co-ordinator (Dave Aspinall (University); Tape Decks: Ron Lane (?) (Ferranti); Drums: E M (Eric) Dunstan (University); Core Store: M J (Mike) Lanigan (University).
MA10	1960 - 1963	CD containing 7 early, good-quality, b/w photos of the Manchester Atlas.	This CD was given to SHL by the MOSI Archivist on 15/11/2012. Copyright is with the Ferranti Archive & MOSI. Each photo is a large file (10 – 20Mbytes). The set comprises: (a) 2 photos of the Pilot Atlas (see the photo entry above); (b) 1 photo of Tom Kilburn and Mike Lanigan with the B-arithmetic unit of the Pilot Atlas; (c) 2 photos of Atlas assembly at West Gorton; (d) 1 photo of the first Atlas bay to be installed in Dover Street; (e) 1 photo of the official inauguration in December 1962;
MA10	1960 - 1961	15 b/w photos of the Atlas B Store.	This set of 15 photos was given to SHL in 2012 by Harold Faulkner, a former Plessey engineer who worked on the development of the Atlas B Store. At the time this was possibly the fastest ferrite core store. Accompanying letter from Harold to SHL.
MA10	1961 - 1963	12 photos of the early days of the Manchester Atlas.	These are good-quality copies of images (incl dated captions) held at the Museum of Science & Industry, Manchester, namely: (a) 4 photos of Ferranti's West Gorton factory, June 1961 – March 1963, showing Atlas pcb production, Atlas commissioning area, central computer loaded onto a lorry; (b) 5 (+ 1 copy) photos of Atlas equipment being assembled in the computer room at Dover Street, June 1961 – Sept. 1962; (c) 2 photos at the time of the official inauguration, December 1962. One of these is in colour; (d) photo of the first lineprinter to be installed at Dover Street, February 1963.
MA10	1961	Atlas Description: distribution list for a series of updates, issued 6 th January 1961, to the large manual known colloquially as the <i>Atlas Bible</i> .	Single typed sheet, issued by A B (Ben) Cooper of Ferranti Ltd. This is interesting because it gives the names of those at the University and at Ferranti Ltd. who were sufficiently close to the Atlas project to have their own copy of the Atlas Description. See also below, <i>Atlas Bible</i> , 1962.
MA10	1961	The basic Atlas packages: technical description. Report EP32, April 1961	Typed quarto document, 27 pages, issued by Ferranti West Gorton to the Atlas hardware design team. Contains descriptions and circuit diagrams of the seven Atlas basic circuit types, from which other variants (with various logic gating arrangements, etc.) are derived. The manual does not include the special circuits used for the parallel adders, core stores, magnetic tape and drum systems, etc. Note that the circuit diagrams shown are circa 1961 and do not therefore include later minor modifications – for example, 'Tom's diode'. This manual originally belonged to Keith Howker, a Ferranti hardware engineer. It was later given to Johnny Mudge, a research student

			working in the Dept. of electrical Engineering at Manchester. Johnny Mudge donated it to SHL in December 2013. Also, a single-page sketch, drawn on 21/6/2013 by Keith Howker, showing the position of 'Tom's diode' and the reason for its inclusion. Document EP32 has been scanned and uploaded to the Atlas website as a pdf file.
MA10	1961	The Atlas Supervisor. T Kilburn, R B Payne & D J Howarth.	Reprint (by Ferranti in February 1962) of a paper that appeared in the Proceedings of the AFIPS December 12-14, 1961, eastern joint computer conference: computers: key to total systems control, pages 279 – 294. This paper was preceded by two Supervisor papers published in <i>The Computer Journal</i> , Vol. 4, 1961, pages 222 ff 226 ff. This AFIPS paper includes this sentence: "Although a great deal of it [the Supervisor] has already been coded at the time of writing, there are still a few details to be thrashed out ...". The 'thrashing out' continued at Manchester until at least the end of 1963. This document is on Brian Spoor's CD.
MA10	1961	Features of the Ferranti Atlas computer. Brochure CS272B, May 1961.	23-page illustrated A4 booklet; grey covers, spiral binding. Line drawings, diagrams and two un-captioned photos: (a) shows (l to r) Mike Lanigan and Tom Kilburn with the B-arith unit of the Pilot Atlas in about 1960; (b) shows Dick Grimdsdale with the pilot Fixed Store in about 1960. Another copy (but minus its spiral binding).
MA10	1961	Ferranti Atlas computer. List CP1, Sept. 1961.	7-page technical brochure. Another copy.
MA10	1961	The Mercury, Orion, Atlas Autocode. List AUP4, September 1961.	7-page technical brochure. Another copy. A quote from the brochure: "The Autocode compiler was originally written for Mercury. Compilers are at present being written to enable Autocode programs to be run on the Ferranti Atlas and Orion computers".
MA10	1961 - 1962	Two films of Atlas (on 2 CDs, with a copy of each).	(a) COI film, 1962: <i>This week in Britain</i> : No. 192, <i>Atlas computer</i> . 2mins 45 secs., b/w. (b) Ferranti film, 1961: <i>An Atlas for Manchester</i> . 8 minutes, colour. Includes a three-page description of copyright ownership, provenance, etc. (See also below).
MA11	1963	DVD with colour film: Look at Life, number 16: <i>Figure it out</i> .	This film was produced by J Arthur Rank. The rights are now owned by ITV Studios and ITN. Film lasts for about 8 minutes, of which only about 33 secs. show Atlas. The Atlas sequence starts at time 4:15 with an exterior view of the Dover Street building. The film shows many other computers, including a Ferranti Perseus, an Elliott 405, an Elliott 803, a ruggedised Elliott 900 series, an IBM 7090 (?) with a cut-down IBM 1401, a research computer (called MAC) at Birkbeck College and the ERNIE random number generator for Premium Bonds.
MA11	1961 - 1962	Sample Compiler Compiler flow charts.	Photocopies of four flow charts, the originals having been produced by Jeff Rohl during the period summer 1961 to spring 1962 whilst he was Tony Brooker's research student at Manchester. The flowcharts show evidence of

			<p>modifications during this period and are covered with annotations from Derrick Morris and others. There are 118 pages in all, of which the four here are for routines R218, R220, R221 and R253. Some of these charts have been scanned in – see:</p> <p>http://elearn.cs.man.ac.uk/~atlas/</p>
MA14 (ov)	c. 1962	Atlas system description, known colloquially as <i>The Atlas Bible</i> , or <i>Ben's Bible</i> .	<p>Blue foolscap ring binder, 3.8cms thick, consisting of 335 foolscap pages "intended for persons concerned with the design of the system". Each page has an issue-date. Individual pages were updated over the period June 1959 to July 1963 and inserted in ring-binders as the Atlas hardware and systems software matured at Manchester. The whole, marked "confidential", was known colloquially as the Atlas Bible or Ben's Bible (because the Ferranti person in charge of project documentation was Ben Cooper – see also entry above, under Atlas Description). The pages in this particular copy span the period 2/1/61 to 1/7/63, with most of them being issued prior to September 1962. Topics covered include everything from the timing and overlap of instructions to the layout of the engineers' console. This copy, donated by Iain MacCallum, was scanned in 2015 – see:</p> <p>http://elearn.cs.man.ac.uk/~atlas/docs/AtlasBible.pdf</p>
MA11	1962	Daily Telegraph photo and article, February 23 rd 1962, page 15.	Photocopy of image, showing Yao Chen and Tom Kilburn in front of the Atlas central processor at Manchester. (This copy comes from Monash University's Museum, Melbourne.
MA11	c. 1962	14 sample diagrams from a set of Atlas schematic and logic diagrams.	<p>Purple folder. The full set of 240 diagrams, formerly used by the Atlas maintenance engineer Eric Sunderland, is in box-file S4. These 14 sample diagrams, contained in a purple folder, are A3-sized photocopies. They include:</p> <ul style="list-style-type: none"> (a) 1 diagram (+ copy) of Central Control, Adder; (b) 4 diagrams of Accumulator (exponent arithmetic, fractional arithmetic, juke box addition, juke box logics); (c) 1 diagram of the Page Address Registers; (d) 2 diagrams of the plate layout (ie printed-circuit board, or package, disposition) for the Harwell (Chilton) Peripheral Coordinator; (e) 5 diagrams of plate layout for various logic boxes from various bays; (f) 1 diagram of the Atlas battery unit, which was positioned in a separate Battery Room.
MA11	1962	One-level storage system. T Kilburn et al.	<p>Reprint (by Ferranti Ltd. in May 1963) of the following important Atlas paper:</p> <p>Kilburn, T, Edwards, D B G, Lanigan, M J and Sumner, F H, <i>One level storage system</i>. IRE Trans on Electronic Computers, Vol. EC-11, No. 2, April 1962, pages 223 – 235. This document is on Brian Spoor's CD.</p>
MA11	1962	The Atlas scheduling system. D J Howarth, P D Jones & M T Wyld (Ferranti Ltd.)	13-page typed A4 document, dated August 1962. "This paper will be presented at the IFIP Conference in Munich, August 1962, and will be printed in the Computer Journal, October 1962".

MA11	1962	Atlas instruction times, on the morning of the inauguration ceremony.	Atlas console Teletype print-out dated 7 th December 1962 at 08:42 – ie on the morning of the official inauguration of the Manchester Atlas by Sir John Cockcroft. Gives time in microseconds of 12 specimen instructions (fastest = 1.52 μ sec.), together with the inner-loop unit times for a scalar product (10.95 μ sec.) and for a polynomial summation (7.37 μ sec.). SHL remembers that he was given this souvenir on the day.
MA11	1963 (?)	Overall logic diagram of Atlas Page Address Registers.	Photocopy of A4 single-sheet engineering drawing ED 3.10, Ferranti Ltd., 16 th October 1963 (date is rather illegible).
MA14 ov	c. 1963	Reel of 5-track paper tape containing the Atlas Intermediate Input A (IIA) assembly language.	This long blue paper tape is contained in a tin of Balkan Sobrani pipe tobacco, measuring 9 cms in diameter. The tape was given to SHL in 1982 by Maurice Smith. The tape was used when commissioning the London University Atlas.
MA11	1963	Atlas provisional programming manual, CC348, January 1963	116-page A4 manual, grey covers, formerly spiral-bound but this copy is minus its spiral binding. This document is on Brian Spoor's CD. (Placed in a red transparent folder).
MA11	1963	Ferranti Atlas computer: programming exercises. List CS 349, Sept. 1963.	Buff folder containing 50 typed pages. "Intended to be used in conjunction with the Atlas provisional programming manual CS 348" – (see above). This document is on Brian Spoor's CD.
MA12	1963	Atlas Autocode programming manual. R A Brooker & J S Rohl. February 1963.	Foolscap manual (approx. 74 pages) in buff covers. Believed to have been the first bound Atlas Autocode users' manual, though SHL's memory suggests that a short internal course on AA was held in the autumn of 1962 for which duplicated notes may have been issued.
MA12	1963	Two letters: Ownership of the Manchester University Atlas. 3 rd June 1963.	(a) Photocopy of a two-page letter from Peter Hall, the Manager of Ferranti's Computer Department, to the Bursar, University of Manchester. Establishes that, as from 1 st January 1963, the Manchester Atlas is owned and maintained by Ferranti and that the University has half the available computing time for free. (b) Photocopy of the Bursar's reply, dated 29 th July 1963, to Peter Hall saying that the University Council approves the arrangements.
MA12	1963	Ferranti Atlas 2 computer. List CP11, February 1963.	7-page technical brochure.
MA12	1963	The aim of the proposed Titan supervisor. CR Spooner. 11 th January 1963.	21 typed quarto pages, plus one page Appendix. Chris Spooner, from Ferranti, outlines the hardware differences between an Atlas 1 and an Atlas 2 (eg the Titan at Cambridge) and deduces that Titan needs a substantially-modified Atlas 1 supervisor. This document is on Brian Spoor's CD.
MA12	1963	A brief description of the proposed Titan supervisor – in particular the hardware	Typed quarto report, 15 pages plus 10 pages of Appendices. Introduces the idea of the 'Well': "historically the Titan Well is a generalisation of the Atlas Input and Output Wells, but it now covers a broader field of use than merely input and output". Based on the set of initials on

		requirements. CR Spooner. 8 th February 1963.	the final page of this report, one may deduce that Barry Landy (BRL) contributed to the text. This document is on Brian Spoor's CD.
MA12	1963	The Atlas 2 Supervisor. D W Barron & C R Spooner.	Six-page typed quarto paper, dated 9 th April 1963. This document is on Brian Spoor's CD.
MA12	c. 1963	A non-sequential buffering system using a variable number of tapes. D W Barron, D F Hartley & C R Spooner.	Five-page typed quarto paper, undated but probably after April 1963. This document is on Brian Spoor's CD.
MA12	c. 1963	Atlas 2 Well.	Six foolscap diagrams, illustrating the flow of information for an Atlas 2 buffering 'well' based on various numbers of magnetic tape decks. Undated but probably after April 1963. This document is on Brian Spoor's CD.
MA12	1963	Atlas 2 Supervisor: guide to introductory reading. RAJ/DR 26 th November 1963.	Single sheet of typed foolscap. Lists 14 reports and papers, most of which appear in this present catalogue. The reference in item 11(a) of the list to 'Atlas 1 Description' has the hand-written note 'large blue file' beside it. This probably refers to the Atlas Bible (see above). The author's initials 'RAJ' at the foot of the page are believed to be those of Richard Jennings (of Ferranti). This document is on Brian Spoor's CD.
MA14 ov	1963	Iain MacCallum's listing of the Compiler Compiler source code for Atlas.	Red foolscap binder containing a listing of the bootstrap loader of the Compiler Compiler for Atlas (total 218 pages). Given to SHL in 2001 by Iain MacCallum, who worked on the Compiler Compiler at Manchester for his M.Sc. The contents of the red binder are in four sections: (1). 30 foolscap pages of Atlas Octal Input, constituting a basic Compiler Compiler Kernel. These pages were produced by a cross assembler for Atlas running on the Mercury computer. These pages were printed from 5-hole paper tape on a Creed Teleprinter. This section is read by the Octal Input routine in the Atlas Fixed Store. (2). 107 foolscap pages of Atlas Intermediate Code printed from 7-hole paper tape on a Flexowriter. Section 2 constitutes a minimal compiler that will read the Phases, Formats and Routines of Section 3 in the full Compiler Compiler Language. (3). 75 pages of Phases, Formats and Routines in the full Compiler Compiler Language. (4). 6 Compiler Compiler test run outputs, resulting from loading & running Sections 1 to 3. These outputs are printed on continuous perforated lineprinter paper, with the sprocket holes removed. The runs are dated 22 nd December 1963 and timed at between 10:45 and 13:11. The contents of the red binder were carefully scanned in 2014 and tested via an Atlas emulator. The contents and various related documents are available at: http://elearn.cs.man.ac.uk/~atlas/
MA12	1963	Human teacher for a	A reporter came to Dover Street and Frank Sumner

		computer? Article on the Daily Telegraph. Date is 1963; deduce summer 1963.	chatted about the plans for speech input/output for Atlas. The article is, typically, not quite accurate. Frank was supervising three research students: Ron Mathers, at that time completing his Ph.D. (on traffic control and speech synthethis); Simon Lavington, who had started his M.Sc. in Sept. 1962 and Lynn Rosenthal, who had just started his M.Sc. Ron and Simon were designing & building an on-line A/D/A converter (called the Speech Converter) and had been to Edinburgh to see the work on <i>PAT</i> , the Parametric Artificial Tract (an 8-parameter analogue vocoder). Lynn carried on the synthetic speech work after Ron left. After the Speech Converter was operational, Simon worked on software for automatic speech recognition. The resulting Atlas hardware and software is described in: <i>Some facilities for speech processing by computer</i> . S H Lavington & L E Rosenthal, Computer Journal, Vol. 9, No. 4, Feb. 1967, pages 330 to 339. See also: <i>Computer simulation of a speech recognition system</i> , S H Lavington, Proc. IEE, Vol.116, No. 6, June 1969, pages 1053 – 1059.
MA12	c. 1964/5	Speech recognition program.	Flexowriter print-out of program SAPROD (statistical analysis and recognition of digits), written in Atlas Autocode with minor use of machine instructions for reading mag tape, etc. This large AA program was built up over many months by SHL, in a rather ad hoc manner, whilst studying samples of speech provided by male and female speakers with a variety of local accents. The utterances were first fed through an on-line A-D Converter and stored on mag tape. SAPROD then read speech from tape, attempted to locate the start and end of spoken words and then to recognise each word. The vocabulary consisted of the spoken digits 0, 1, 2, ...9. The emphasis was on the development of simple parameters, such as counts of the number of zero-crossings and number of positions of zero time-derivative in a fixed interval, that might complement the classical technique of fourier analysis. Compared with modern automatic speech recognition performance in 2016, the success of SAPROD was very modest. One of SAPROD's techniques was however patented by SHL and was used for a time by ICT in its speech recognition experiments.
MA12	1964	Input and output for ICT Atlas computers 1 and 2. ICT Ltd., April 1964.	31-page typed foolscap document. "This document is a corrected and expanded version of Chapter 8 of the Atlas provisional programming manual (CS 348) and supersedes the provisional corrected version of Chapter 8 dated September 1963".
MA12	1964	How Britain's scientific computing power is being doubled by five ICT Atlas computers.	Collection of seven photocopied A4 sheets from the following pages of <i>New Scientist</i> : issue 394, 4 th June 1964, 4 pages; issue 396, 18 th June, 2 pages. Also, one page from the May – July 1964 issue of a different journal. All these articles refer to the inauguration of the London University Atlas on 26 th May 1964.
MA12	1965	3 b/w photos of the Manchester Atlas	John Hoffman was an Atlas maintenance engineer. The three photos show:

		machine room, donated by John Hoffman.	(a) overall view of the console, etc. part of the paper tape punch of photo (b) is just visible at the right-hand edge of photo (a); (b) John carrying out an adjustment of the paper tape punch situated to the right of the Atlas console; (c) John adjusting a magnetic tape deck in the room leading off from the centre-rear of photo (a).
MA14 ov	1965	The ICT Atlas 1 computer: programming manual for Atlas basic language (ABL). Manual CS348A, January 1965	A4 manual, white covers, black spiral binding, over an inch thick. This manual supersedes the earlier 348. This document is on Brian Spoor's CD.
MA12	1965	Atlas Autocode programming manual. R A Brooker & J S Rohl. 1 st March 1965.	Foolscap manual (approx. 92 pages) in green covers. Believed to have been the first bound Atlas Autocode users' manual. Copies of this edition were widely circulated amongst users. Inside is a page of hand-written notes by SHL dated June 1970, giving statistics about the observed behaviour of AA jobs at run time.
MA12	1966	Extracts from <i>The Atlas 1 Supervisor, operating system and scheduling system</i> . Issues by ICT Atlas Support group, 88 High Holborn, London WC1. November 1966, TL1685.	Three pages from Section 8: <i>Details of the Atlas 1 computer installations</i> . Gives the configurations for Manchester, London and Chilton (SRC).
MA12	1967	Note on the comparative size of Atlas. D A Birkett, ICT Company information Officer, 14 th April 1967	Photocopy of a single-page A4 typed Internal Memo, the original of which is (or at any rate, was in 2002) in the Science Museum's Document Archive, catalogue no. COM/1993/1441. The sub-heading of the memo says: "Information based on conversation with John Dawes of Universities & National Research Region on 14 th April 1967. The memo rates Atlas informally against the CDC 6600, Univac 1108, Burroughs B8500, IBM 360/75 and IBM 360/90, all of which are said to be 'more powerful than Atlas'. No figures are given. The memo also says: "It is probably still true that the operating system for Atlas is the most efficient of any large computer system in the world".
MA12	1968	A computer for all purposes: the work of the Atlas computer laboratory. R F Churchhouse. 1968.	6-page article, reprinted from <i>Quest</i> , the house journal of the Science Research council, Vol. 1, No. 3, July 1968. Gives the history of the Chilton Atlas and notes on applications such as crystallography, space research, survey analysis, etc.
MA12	1968	Muse disc file object program use.	Five-page typed foolscap document, dated 22 nd July 1968. Author: Eric Sunderland.
MA12	1970	Atlas experiments to determine the time spent executing PERM code.	Buff foolscap file containing code, output, graphs, etc. Minor modifications to the Supervisor were made (by Eric Sunderland) so as to allow SHL to investigate the run-time behaviour of end-user programs. Amongst several

			interesting results, it was found that 75% of all jobs spend longer executing the permanent library routines (PERM) than they do executing code written by the user.
MA12	1973	Letter relating to the transfer of Chilton Atlas hardware to the Royal Scottish Museum, Edinburgh, 1 st June 1973.	Letter to Dr Jack Howlett, Director of the Atlas Computer Laboratory, from Dr A G (Alistair) Thomson, Keeper of Dept. of Technology, Royal Scottish Museum. Lists several Atlas hardware units that the Museum is anxious to acquire. Note: Allen Simpson from the Royal Scottish Museum had, earlier in 1973, asked SHL for his thoughts on what units should be preserved and the list in this letter roughly reflects SHL's advice. See also below, and the 2013 entry for Chilton hardware at NMS.
MA12	1973	Loading and storage diagram relevant to the transfer of Chilton Atlas hardware to the Royal Scottish Museum.	Sketch diagrams produced by Allen Simpson in 1973, showing the size of the hardware units, the schematic connection between the units, the original layout of units at Chilton, the suggested way in which units should be packed in a lorry for transportation, and the suggested layout in archival storage at Edinburgh. See also above, and the 2013 entry for Chilton hardware at NMS.
MA12	1974	Two letters relevant to the disposal of equipment from the Chilton Atlas.	Letters dated 1/5/74 and 15/5/74 from Jim Hailstone, Head of User Services Group at Chilton, to SHL. The Department of Computer Science at Manchester was anxious to consolidate its display of Atlas equipment and Chilton was assisting. Chilton had previously loaned 45 Atlas pcbs to the Department, so that the PAR bay could be fully-populated. A hand-written list of the relevant pcbs is included.
MA13	c. 1983	The Computer Aided Design Centre, 1968 – 1983. Anon.	Photocopy of a 28-page typed internal document, thought to have been commissioned by the Director of the CAD Centre as the basis for a formal history. This copy was sent to SHL by Brian Gott (former CAD Centre staff) in November 2012. Brian said: "Several of us have discussed the authorship but no one knows for sure. The best guess is that it was produced at the request of Arthur Llewelyn – the DTI Director before privatization". It is believed that the full text of this document was never released for publication.
MA13	1989	Atlas Silver Anniversary. Extract from <i>Flagship</i> , issue 5, Sept. 1989.	<i>Flagship</i> was the computing newsletter of the Rutherford Appleton Laboratory's Atlas Centre. Pages 16 – 25 contain a series of articles and photos from former users of the Chilton Atlas.
MA13	1996	The Ferranti/ICT Atlas computer. CCS seminar, Science Museum, 13 th March 1996.	A4 flyer for the seminar, giving an Abstract and the programme of three talks by, respectively, David Howarth, Derek Milledge and Jack Howlett.
MA13	1999 - 2000	Two e-mailed reminiscences of Atlas (Supervisor; London Atlas).	These communications were a result of a 1999 Computer Conservation Society plea (published in BCS and IEE magazines) for long-serving computing people to get in contact. The aim was to collect documents & photos, hear anecdotes, and generally enlist help with preserving information about pre-1970s British computers. There were 91 responses, of which these two were the only

			<p>Atlas ones.</p> <p>(a) From Bruce Bovill: 2.5 A4 pages of London Atlas anecdotes;</p> <p>(b) from Peter Warn: half a page of anecdotes of his time (1962 – 64) working on the Operator Requests part of the Supervisor at Manchester from Dec. 1961 – late 1963, then on the supervisor installation at Lindon, then at Harwell in mid-1964.</p>
MA13	2012	SHL's research notes of a visit to Manchester in April 2012, to examine original Atlas documents held in various archives.	<p>Red folder containing 15 pages of typed notes. Includes information on documents and photos seen at:</p> <p>(a) NAHC (pages 3 – 4 & 7 - 8);</p> <p>(b) MOSI (pages 4 – 7);</p> <p>(c) Joule Library & Paul Drath's Ph.D. thesis (pages 8 – 13);</p> <p>(d) <i>Electrical Engineering at Manchester University; the story of 125 years of achievement</i>. T E Broadbent. Published by The Manchester School of Engineering, University of Manchester, 1998. ISBN 0 – 9531203 – 0 – 9. (pages 14 – 15).</p>
MA13	2012	Layout of Manchester Atlas machine room (as I remember it).	Sketch made for SHL by Eric Sunderland (an Atlas maintenance engineer) in December 2012.
MA13	2012	Atlas 50 th Anniversary celebrations, Manchester, 4 th – 6 th December.	<p>Red folder containing:</p> <p>(a) <i>The Atlas Story</i>. Glossy brochure (1st edition) as presented to all attendees to the Symposium on 5th December;</p> <p>(b) List of attendees, as handed out on the day;</p> <p>(c) Print-out of the database of registrations, from August 2012 onwards;</p> <p>(d) two copies of a 2-side MOSI hand-out, one being an April 2012 edition with errors noted in pencil by SHL (and notified to MOSI) and the other being the December 2012 edition (where the errors all seem to have been left uncorrected);</p> <p>(e) Article appearing on page 6 of <i>Your Manchester</i> magazine;</p> <p>(f) print-out of Powerpoint slides from SHL's presentation, plus notes;</p> <p>(g) dinner menu, table lay-out and guest-list;</p> <p>(h) correspondence, including a letter from Sebastian de Ferranti.</p>
MA13	2012	Atlas 50 th Anniversary: Four CDs, being video recordings of seven talks & a question/answer session at the Symposium held at Manchester on 5 th December 2012.	<p>CD1: Introduction by John Buckle. Talks by Simon Lavington and Dai Edwards.</p> <p>CD2: Talks by David Howarth and Barry Landy.</p> <p>CD3: Talks by Dik Leatherdale and Brian Hardisty.</p> <p>CD4: Talk by Keith Jeffery, followed by questions from the audience.</p> <p>These recordings were made by Dan Hayton of the Computer Conservation Society.</p>
MA13	2012	CD containing about 100 photos of the exhibition and drinks	<p>Amongst the photos of groups of Atlas pioneers, the following images are of interest:</p> <p>9076 Eric Dunstan, Yao Chen, Robin Kerr</p>

		reception at the Atlas 50 th Anniversary, Manchester, 5 th December 2012.	9083 Barry Landy, Dave Howarth, John Crowther, David Hartley 9085 Richard Jennings, Paul Bryant, Dai Edwards 9092 Dave Aspinall, Phil Patience, Johnny Mudge 9154 Dave A, Dai E, Yao C, Eric D. The photos were taken by Chris Foster, a local photographer: chris@chrisfosterphotography.com He had been hired at £60 per hour to cover the drinks reception, etc., on 5/12/2012.
MA13	2012	DVD of the film <i>Ferranti Atlas: Britain's first Supercomputer</i> . Sponsored by Google and made by the media company 'Across the Pond'.	Plastic case containing two DVDs: (a) The Google-sponsored film that was made to mark the occasion of the Atlas 50 th Anniversary. In December 2012 it was put on to YouTube and also shown at the event in Manchester. See: http://googlepolicyeurope.blogspot.co.uk/2012/12/remembering-ferranti-atlas-uks-first.html (b) A copy of the Ferranti 1961 Atlas film (see above), sequences of which were incorporated into the Google-sponsored film.
MA13	2013	The Atlas story. Simon Lavington.	A4 22-page commemorative illustrated brochure produced in December 2012 to mark the 50 th anniversary of the Manchester Atlas. This copy is the 3 rd edition, dated 5 th March 2013.
MA13	2013	Print-out of Powerpoint slides used in SHL's presentation to the Computer Conservation Society, London, 21 st March 2013.	Six A4 pages giving images of 40 Powerpoint slides. Title of talk: <i>The Atlas Story: 1956 – 1976</i> .
MA13	2013	Notes and photos of the Chilton Atlas hardware in the Granton, Edinburgh, store of the National Museums Scotland.	Green folder, resulting from SHL's visit to Granton on 15 th & 16 th July 2013 to examine & photograph the Atlas artefacts at NMS. Includes: (a) double-sided NMS Accessions List of hardware deposited in 1973, plus SHL's hand annotations; (b) 4 pages of SHL's notes & measurements; (c) 4 copies of photos of the original Chilton Atlas installation, with hand-annotations; (d) 3 small photos of ICT's three-dimensional scale model of an Atlas installation, used for sales presentations. The NMS/Granton visit is written up here: http://elearn.cs.man.ac.uk/~atlas/docs/ See also 1973 entries, above, for the Royal Scottish Museum.
MA13	2014	CD of initial (unrefined) scan of the <i>Atlas Bible</i> .	This is the un-checked scan, undertaken by Dik Leatherdale from the copy of the manual originally owned by Iain MacCallum – (see entry under 1962 for the blue foolscap ring binder, 3.8cms thick, consisting of 335 foolscap pages). This scan was checked and refined by SHL and uploaded as a pdf file to the Atlas website. Includes some of SHL's notes.
MA13	2014	RAL 50 th Anniversary of the Chilton Atlas.	Event held on 13 th November 2014 at the Rutherford Appleton Lab. Included is:

			<p>(a) a 30-page illustrated glossy brochure containing many interesting Atlas photos;</p> <p>(b) a two-sided printed sheet of Atlas memories from Julian Gallop;</p> <p>(c) a two-sided printed sheet of Atlas memories from Trevor Amos;</p> <p>(d) SHL's notes from the event.</p>
MA13	2014	Brian Spoor's CD, containing scans of 15 Atlas documents.	Contains scanned versions of 15 Atlas 1 and Atlas 2 documents. Two of the files are in djvu format; the rest are pdf files. The pdf files have been printed out and inserted in SHL's collection; their catalogue-entries have been annotated with: <i>this document is on Brian Spoor's CD.</i>
MA13	2014	CD containing seven high-quality photos of Atlas printed-circuit boards, from NMS.	<p>These photos are of boards from the Chilton Atlas at National Museums Scotland (NMS), Granton, Edinburgh. Copyright is with NMS. The tif files are large (each between 90 and 180 Mbytes). The following pcs are shown:</p> <ul style="list-style-type: none"> 812 adder carry 813 adder input 814 adder output 842 long delay 846 strobe emitter follower 841 juke box type 1 (f/f + delay) 843 short delay

Listing of the contents of the over-sized box MA14.

Box	Date	Title	Description/comments.
MA14 (ov)	c. 1962	Atlas system description, known colloquially as The Atlas Bible, or Ben's Bible.	Blue foolscap ring binder, 3.8cms thick, consisting of 335 foolscap pages "intended for persons concerned with the design of the system". Each page has an issue-date. Individual pages were updated over the period June 1959 to July 1963 and inserted in ring-binders as the Atlas hardware and systems software matured at Manchester. The whole, marked "confidential", was known colloquially as the Atlas Bible or Ben's Bible (because the Ferranti person in charge of project documentation was Ben Cooper – see also entry above, under Atlas Description). The pages in this particular copy span the period 2/1/61 to 1/7/63, with most of them being issued prior to September 1962. Topics covered include everything from the timing and overlap of instructions to the layout of the engineers' console. This copy, donated by Iain MacCallum, was scanned in 2015 – see: http://elearn.cs.man.ac.uk/~atlas/docs/AtlasBible.pdf
MA14 ov	c. 1963	Reel of 5-track paper tape containing the Atlas Intermediate Input A (IIA)	This long blue paper tape is contained in a tin of Balkan Sobrani pipe tobacco, measuring 9 cms in diameter. The tape was given to SHL in 1982 by

		assembly language.	Maurice Smith. The tape was used when commissioning the London University Atlas.
MA14 ov	1963	Iain MacCallum's listing of the Compiler Compiler source code for Atlas.	Red foolscap binder containing a listing of the bootstrap loader of the Compiler Compiler for Atlas (total 218 pages). Given to SHL in 2001 by Iain MacCallum, who worked on the Compiler Compiler at Manchester for his M.Sc. The contents of the red binder are in four sections: (1). 30 foolscap pages of Atlas Octal Input, constituting a basic Compiler Compiler Kernel. These pages were produced by a cross assembler for Atlas running on the Mercury computer. These pages were printed from 5-hole paper tape on a Creed Teleprinter. This section is read by the Octal Input routine in the Atlas Fixed Store. (2). 107 foolscap pages of Atlas Intermediate Code printed from 7-hole paper tape on a Flexowriter. Section 2 constitutes a minimal compiler that will read the Phases, Formats and Routines of Section 3 in the full Compiler Compiler Language. (3). 75 pages of Phases, Formats and Routines in the full Compiler Compiler Language. (4). 6 Compiler Compiler test run outputs, resulting from loading & running Sections 1 to 3. These outputs are printed on continuous perforated lineprinter paper, with the sprocket holes removed. The runs are dated 22nd December 1963 and timed at between 10:45 and 13:11. The contents of the red binder were carefully scanned in 2014 and tested via an Atlas emulator. The contents and various related documents are available at: http://elearn.cs.man.ac.uk/~atlas/
MA14 ov	1965	The ICT Atlas 1 computer: programming manual for Atlas basic language (ABL). Manual CS348A, January 1965	A4 manual, white covers, black spiral binding, over an inch thick. This manual supersedes the earlier 348. This document is on Brian Spoor's CD.

For more Atlas background, see the scanned documents that have been uploaded to the following sites:

www.cs.manchester.ac.uk/Atlas50/ and
<http://www.chilton-computing.org.uk/acl/technology/atlas/overview.htm>

An Atlas emulator can be found here:

<http://www.dikleatherdale.webspace.virginmedia.com/atlas.html>

and an Atlas simulator here:

<http://www.icsa.inf.ed.ac.uk/research/groups/hase/models/atlas/index.html>

