Catalogue E, for box-files E1 – E4.

Catalogue of historical computer documents donated by Professor D B G Edwards.

Scope.
These items, donated by Professor Edwards in December 2015, cover the design of computer systems within the University of Manchester, the people involved in the projects and the growth of a Department of Computer Science. A large number of photographs is included, both of equipment, of people and of buildings. The main period covered is from 1948 – 1988, with some additional material dating from 1935 and some up to 1998.

Box-files E1 & E2 contain documents and manuals. Box-files E3 & E4 (catalogued from page 10 onwards below) contain photographs.

Background.
David Beverley George Edwards, known to colleagues as Dai, was born in Tonteg, South Wales in 1928. In 1945 he went to Manchester University to read Physics. In his third year he specialised in Electronics and came under the influence of Professor F.C. Williams. Dai graduated in Physics in July 1948. In September of that year he became a research student working under F.C. Williams in the Department of Electro-Technics on the expansion of the 'Baby' (SSEM) digital computer. He obtained his MSc in December 1949 and joined the University staff as an Assistant Lecturer. Dai remained a member of the academic staff all his working life, first within Electrical Engineering and then (from 1964) within the Department of Computer Science. He was promoted to Lecturer in 1954 and gained his PhD for the design and construction of MEG. In 1959 he became a Senior Lecturer, leading the engineering team for the MUSE/Atlas project. He was promoted to Reader in 1964. In October 1966 he was appointed Professor of Computer Engineering, which post became the ICL Chair of Computer Engineering in 1967. He served as Head of the Computer Science Department from 1980 – 87. He took early retirement in 1988 and was appointed Emeritus Professor.

He has published 45 significant papers and held a number of patents, the most significant being as a co-inventor with Tom Kilburn and Frank Sumner for the One Level Store (Virtual Memory).

Box	Date	Title	Description/comments
E1	1911 - 2012	Obituaries, bio-data and/or funeral service leaflets for 10 people connected with computing at Manchester University.	Includes: Lawrence Allard (ex-GEC, CRT development), John Bennett (ex-Ferranti Mark I* etc.), Dai Edwards, Dick Grimsdale, Harold Hankins (ex-UMIST), Hilary Kahn (Napper), Tom Kilburn, Geoff Riding (ex- Computing Service), Alec Robinson, Maurice Wilkes, F C Williams. The material on Kilburn includes the Royal Society

			Memoire and a 13-page note by DBGE. The material on Williams includes the 10-page illustrated article by M J Cunningham as published in *Engineering Science & Education Journal*, April 1994, pages 55 - 64
E1	1935	Newspaper cuttings of March 1935, reporting the installation of a Differential Analyser at Manchester University.	Newspapers include the Manchester Guardian and The Times. One article includes a photo of Douglas Hartree and the DA. It seems that in June 1996 DBGE had asked Alan Fearns (of the Registrar's Department?) to collect the cuttings and, in particular, to investigate the source of the description 'Machine that Thinks' in one of the articles.
E1	1945 - 1988	"People": DBGE's file of brief bio-notes on other Manchester people	Includes: Audrey Bates, Cicely Popplewell, Bernard Richards, Christopher Strachey, Alan Turing. Also: (a). Staff in the Physics Department at Manchester, 1945 – 1948. (b). List of Ferranti (programming) staff at Moston who were connected with the Ferranti Mark I or Mark I*. (This list comes from Olaf Chedzoy and relates to Olaf's efforts to organise a reunion (which took place at Curdon Mill, Somerset, on 21st April 1993). (c). List of all academic, research & ancilliary staff in the Department of Computer Science, June 1988.
E1	1946	Notes on Lecture 23 from the Moore School eight-week course on: *Theory and techniques for design of electronic digital computers*, July/August 1946.	Five foolscap pages of hand-written notes, headed: Index no. 28. DBGE has said, on 15/12/2015: "I think these were eventually dug out of Rees, I did not get the feeling that they were freely given [to Tom or to FC]". By way of background, 28 scientists and engineers were invited to attend the Moore School course. Amongst these were just three Englishmen: David Rees, Maurice Wilkes and Douglas Hartree. David Rees, ex-Bletchley Park, was in the Maths Department at Manchester University from the end of the war until about the end of 1948 and had been sent on the course by Prof Max Newman.
E1	1947	A storage system for use with binary digital computing machines. T Kilburn. 1st December 1947.	This is a copy reprinted in June 1978 to mark the 30th anniversary of the SSEM (Baby). Spirally-bound foolscap; 51 typed foolscap pages plus about 35 pages of diagrams and photos, plus two pages of a 1978 historical introduction.
E1	1948; 1998	'The University of Manchester's *Baby*, the first modern computer. John Deane. Published by the Australian Computer Museum Society, 1998.	42-page A5 typed illustrated booklet, light blue cover. A good, readable description produced to mark the 50th anniversary.

E1	1948; 1998	DBGE's hand-written notes on Geoff Tootill's Notebook and the first program, etc.	4 sheets of DBGE's notes, plus 4 photocopied pages from Tootill's original notebook. DBGE made these notes for the 50th anniversary of The Baby in 1998. Also, more photocopied pages from Tootill's notebook, giving: (a) the search for primes; (b) notes on computer faults.
E1	1948; 1998	'Dai's green notebook' – Sept. 1948 – March 1949.	Single A4 sheet of modern notes, written by DBGE. Gives the dates of some notable technical events in Dai's work as a research student on the enhanced baby computer. For example: "20th Oct. 1948 (Weds): new tube from GEC (refer to impending Lockspeiser visit)". DBGE made these notes for the 50th anniversary of The Baby in 1998. On 15/12/2015 DBGE commented thus. "The green notebook was one which I started as Tommy [Thomas] and I arrived at the University to do research so that it specified our starting date in September 1948. The rest of the book consisted of brief notes by me in the early stages of acquiring knowledge and, whilst I did keep it for some considerable time, I believe I ditched it eventually as being of little value. Sorry about that!!"
E1	1948; 1995	DBGE's notes on Dot and strobe generation; X time base; Clock.	The notes are in three sections: Dot and strobe generation (5 pages including Chris Burton's circuit diagram); X time base (3 pages); Clock (4 pages, incl. annotated photo). The notes were made by DBGE in 1995 to aid Chris Burton and his team in their re-build of the 1948 Baby computer (the SSEM).
E1	1948	Final codes for the charge storage computer.	A4 photocopy of a single typed quarto sheet, annotated by DBGE with the date 5th December 1948. Other hand-written annotations appear to be on the original.
E1	1997; 1998	The Small-scale Experimental Machine rebuild project: two letters from Chris Burton to DBGE.	Chris Burton, ex-Ferranti and a member of the Computer Conservation Society, led a project to rebuild the 1998 baby computer (the SSEM). These two letters illustrate the help given by DBGE in providing essential technical details of the original computer.
E1	1948; 1970	Correspondence relevant to the Ministry of Supply contract with Ferranti "to construct an electronic calculating machine to the instructions of Professor F C Williams".	Photocopies of: (a) The October 26th 1984 letter from Sir Ben Lockspeiser to Eric Grundy (Instrument Department, Ferranti). (b) Grundy's reply to Lockspeiser, date 27th October. (c). An A4 typed page from A Ridding (probably of ICL and possibly ex-Ferranti), dated 30th April 1970, giving the details of the contract placed by MOS on 19th February 1949, for a total price of £113,783 2s 7d. *(Scanned in: Mark I Lockspeiser MOS contract.pdf)*
E1	1949; 1988.	Reproduction of an article on the Manchester University	Four-page facsimile A4 illustrated brochure, with additional comments by DBGE and photos on

		computer in the *Illustrated London News*, Saturday 25th June 1949.	the final page. Produced to mark the 40th Anniversary.
E1	1949	Some routines involving large integers. Professor M H A Newman.	Photocopy of two foolscap typed sheets, being pages 69 and 70 of the Proceedings of the June 1949 Cambridge Conference.
E1	1949	(a). DI Routine, 23rd March 1949. (b). Multiplier DI	DI stands for 'Daily Inspection'. These handwritten quarto sheets are DBGE's testing and diagnostic notes for checking the correct operation of the Manchester Mark I computer (*MADM).* They are in two sections: (a) Six handwritten quarto sheets for the main sections of the machine; (b) five handwritten quarto sheets for checking the computer's multiplier circuits. On 15/12/2015 DBGE added the following comment. "There were an ever increasing number of test programs to check the hardware performance as the computer was being enhanced. These test programs at that date were written by us as the need arose. A DI became a regular occurrence on the Ferranti MK1 and then as the routines were run the heater voltages would be reduced slowly to see when failure occurred so that future faults could be found early as the emission from a valve started to diminish. The same sort of process also took place by varying the dc voltage supplies".
E1	1949	Generation of random numbers. A M Turing. 21st November 1949.	4 typed foolscap pages (text, equations & diagrams), being Appendix II of the *Informal report on the design of the Ferranti Mark I computing machine* by G C Tootill. Ferranti Ltd., 1949. (The full report was, according to Tootill, "of about 10 to 20 thousand words and dozens of diagrams"). The Mark I had an instruction for generating random digits by hardware.
E1	1950	Input & output tape equipment. 1st May 1950.	Ten handwritten quarto sides, giving both the hardware (switches, etc.) and software (via program flow-diagrams) description of how input and output is arranged for the Manchester Mark I. On page 1 is the heading: "Turin [sic] convention for tape".Also, gives code for calling input and output routines. Also, mathematical notes for library routines for deriving some standard functions (trig, exp, log, sqrt).
E1	1950	Instruction set for the Ferranti Mark I.	A set of seven Ferranti Moston A4 stapled drawings, giving the order code for the Ferranti Mark I and dated variously in autumn 1950 (latest date = 9/11/1950). The Ferranti Mark I ran test programs at Moston before being delivered to the University on 12th February 1951.
E1	1950	Digital computer Mk I. Tape	Dyeline drawing, approx. A2 size (folded).

		input-output organisation. 4th December 1950.	Ferranti Ltd., Moston. Logical diagram showing connection of paper tape reader and punch.
E1	c. 1950	Diagram of Ferranti Mark I's console, showing display tubes and switches.	Dyeline drawing, approx. A2 size (folded). Deduce this was produced by Ferranti Ltd., Moston, though no date or title is shown. Another copy.
E1	1951	Tape equipment, 19th January 1951.	Ten page handwritten quarto description of the detailed operation of paper tape input and output equipment for the Ferranti Mark I. With logic & waveform diagrams.
E1	1950	Letter from Lord Portal to F C Williams, dated 30th November 1950, regarding use of the Ferranti Mark I for atomic calculations.	Lord Portal was Controller of Production (Atomic Energy) at the MOS. The letter resulted in Alick Glennie from Fort Halstead (and later from the Atomic Weapons Research Establishment, Aldermaston) using the University's Ferranti Mark I computer over a considerable period until Fort Halstead and Aldermaston both obtained their own Ferranti Mark I*s. (At the time of this letter, the University Mark I (MADM) had been shut down and the Ferranti Mark I had not yet been delivered – it arrived in February 1951. Alick probably started work at Manchester in about September 1951). The 'Dr J Corner' mentioned in the letter is John Corner, Head of Theoretical Physics at AWRE. *(Scanned in: Mark I Portal AWRE.pdf).*
E1	1950	Letter from F C Williams to Sir Robert Watson-Watt, asking for help in challenging a paper presented by Eckert et al in 1949.	Photocopy of the 5-page letter (including a time-line enclosure). The inference is that the Eckert-Mauchley Computer Company had plagiarised FCW's ideas on CRT storage. Subsequent patent litigation conducted by NRDC proved that FCW was correct. See also the c. patent appeal 9108 below. *(Scanned in: CRT storage FC to Watson Watt.pdf)*
E2	1950	Technical documentation relevant to the Katz Adder	The Katz Adder was a specially-designed thermionic valve providing full binary addition. The originator was J Katz. DBGE possessed a sample valve (donated to SHL) and two documents. The first (13 typed pages incl. diagrams) describes the Rodgers' Additron type XA34, a derivative of the original Katz design that was marketed by Rogers Majestic Electronics Inc., Ontario. It was available as an experimental tube from the Canadian radio Manufacturing Corp., Ontario. The second document, entitled *A new class of switching tubes for digital applications,* is 17 typed foolscap pages, incl. illustrations, and is signed J Katz, January 1950.
E2	1951	Two Errata sheets, issued respectively on 13th and 28th March 1951, for the first edition of the *Programmers' Handbook for Manchester Electronic Computer Mark II.*	The first Errata is one foolscap and one quarto typed sheets; the second is two foolscap and one quarto sheets. On 15/12/2015 DBGE said: "I think the errata sheets were issued by Cicely [Popplewell]. Cicely had arrived in the Computing Machine Lab in October 1949 to help

			generally with system programming for the prototype computer. The handbook to which these Errata relate is a 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. (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). *Scanned in: Mark I Turings manual two errata docs.pdf).* Note that the complete 100-page manual is archived in box-file MA2b.
E2	1952	Summer School in programme design for automatic computing machines, University of Cambridge, Mathematical Laboratory, 16th – 26th September 1952	Roneo'd foolscap typed sheets containing: (a). List of the lecturers (Hartree, Miller, Gill, Douglas, Brooker, Haselgrove & Price) and the names/affiliations of 51 attendees. (b). 27 sheets containing the programming exercises and the answers. Note that Tony Brooker had joined the Computing Machine Lab at Manchester in October 1951 from Cambridge. He had lectured on the first Cambridge Summer School, which had taken place in September 1950.
E2	1952	The Manchester Electronic computer. Ferranti Ltd., List DC4, Dec. 1952	20-page illustrated glossy brochure describing the Ferranti Mark I computer. Also, photocopy of page 5 (being an update of page 12, basic machine data) from a later Ferranti brochure.
E2	c. 1953	US Patent Appeal number 9108: John Presper Eckert et al. v Frederic Calland Williams et al. Appendix E to Brief for Appellants.	Approximately 80 printed pages. Consists of court transcripts and written submitted technical evidence. Refers to what became known as 'the Williams Tube interference patent litigation'. See also the 1950 letter from F C Williams to Sir Robert Watson-Watt, above.
E2	1953	The TRE high-speed digital computer. R H A Carter, 19th March 1953.	Seven typed foolscap sheets and one folded double-foolscap die-line diagram.
E2	1952/53	Some of Alan Turing's mathematical correspondence:	Three sets of letters and replies: (a). D H Lehmer (US National Bureau of Standards, SWAC), Feb. 1952, regarding Mersenne numbers and the Riemann Zeta function. Explains results obtained on SWAC and asks what results Turing got on the Manchester Mark I. Turing responds with comments. (b). Walter Freidjung (Stockport), November 1952, regarding Mersenne primes. (c). Sam Skewes (Maths Dept, Capetown University), March/April 1953, regarding a manuscript and prime numbers. In relation to these letters and to the 1965 correspondence with Sara Turing (see below) DBGE commented thus on 15/12/2015: "I was

			quite interested in the Mersenne work initiated by Newman in which Turing was involved as well as Tom and hence was shown relevant correspondence. In this process I was also involved in seeing correspondence to both Tom and FC concerning Turing's contribution to the Manchester machine and I believe I was asked if I thought that their comments re his contribution were accurate. The actual documents may have been passed to me with many others by Mrs Hart [Prof Kilburn's secretary] after Tom retired and I was Head of Department so I would keep them out of interest".
E2	c. 1953	'Pentominoes' demonstration program for an exhibition of the Ferranti Mark I computer.	Foolscap envelope containing: (a) a 4-page foolscap typed explanation of the Pentominoes problem and instructions for preparing 5-track input paper tapes which specify the particular Pentominoes problem to be solved; (b) a piece of stiff cardboard, measuring 9" x 9" and marked out into 8 x 8 squares; (c) 12 pieces of squared paper, cut to represent the 12 possible arrangements of five adjacent squares (ie 12 pentominoes); (d) four pieces of paper cut into squares, to represent the four chosen squares to be masked out of the 8 x 8 grid; (e) three 10" lengths of 5-track paper tape, each punched with four 2-digit decimal numbers that together specify the particular problem to be solved; (f) a fragment of teleprinter paper containing a print-out of two steering tapes. (g) a fragment of paper referring to Atlas demonstration programs – see below. Unfortunately, no program code is included. In December 2015, DBGE said that Pentominoes was a standard demo that was used when groups of visitors came to the Computing Machine Laboratory at Manchester. He thought that the program had been written by Alan Turing but could give no details. Tony Brooker was unable to remember any details.
E2	c. 1962	Notes for Atlas demonstration program, possibly connected with the 7th December official inauguration.	Fragment (21 cms x 15 cms) of Flexowriter paper, with what appears to be handwritten notes on both sides for Atlas demonstration programs. These seem to be: (a) polynomial sum $\sum x_i y_i$; (b) Frank [Sumner]'s timing; (c) Brennar's PT equiv test; (d) [Vic] Forrington's relaxation problem; (e) linear equations (4 + 4 unknown); (f) brief notes, including: loading, rewinding, Bruce [Payne] Supervisor, Tape Search,

			tables of squares, sin x, approx. ∏, solve Pythagoras. Also on the paper is a typed eight-instruction ABL program that possibly makes some changes to Supervisor tables.
E2	1959 - 1963	Notes on Atlas project progress meetings.	These handwritten notes were made in about 2011 by DBGE, in the run-up to the Atlas 50th Anniversary in 2012. They consist of dates and salient points extracted from the Minutes of regular meetings held between Kilburn & DBGE and Ferranti & Plessey. Grouped as follows: (a) Regular monthly meetings held at west Gorton (14 A4 pages of notes); (b) Plessey & storage (one page); (c) Mag tape decks (I page); (d) Drum (1 page).
E2	1961	Press Release and name-list, for visit of TK and DBGE to Moscow, November 1961.	This Ferranti Press Release marks a 5-day, 10-lecture invited visit to Moscow, on the subject of the Atlas computer.
E2	1962	A short history of Ferranti Ltd.	Seven-page typed hand-out, most probably prepared for the inauguration of the Atlas computer at Manchester on 7th December 1962 by Sir John Cockcroft.
E2	1965	Correspondence (3 letters) between Mrs Sara Turing and Tom Kilburn, concerning Turing's part in the construction of MADAM, the name sometimes given to the 1949 Manchester Mark I computer.	Alan Turing's mother wrote to F C Williams on 5th Sept. 1965, asking FC to comment on a statement in Jeremy Bernstein's book *The Analytical Engine* that: "Turing had played a leading role in the construction of a large digital computer known as MADAM". She says: "Alan never hinted that he had anything to do with the construction of MADAM". FC was ill at the time and Kilburn replied on FC's behalf on 8/9/65, saying: "I am sure that Alan would not have claimed a leading role in the design and construction of MADM. As you know, his interest lay mainly in the use of that machine, and if I recall the situation correctly, his particular interest at that time was in the Riemann zeta function". Sara replied on 12/9/65, thanking Tom "for your authoritative rejection of the frequently repeated statement …". She also recalls that the BBC had given the *Scientific American* as the source of the statement. *(Scanned in: Sara Turings letters to TK.pdf).*
E2	c.1966	Four-circle single crystal X-ray diffractometer. Hilger & Watts Ltd. Undated but probably mid-1960s.	This apparatus was part of an on-line X-ray diffractometer that was designed within the Department of Electrical Engineering at Manchester. It was connected to Atlas and became operational in 1964.
E2	1968	Letter from Hilger and Watts to DBGE, dated 31st May 1968, announcing that the computer-controlled	The computer in question was a DEC PDP8. See below.

		diffractometer designed by DBGE had gained a Queen's Award for technological achievement. Also, letter to DBGE from Mansfield-Cooper, Vice-Chancellor.	
E2	1969	Computer controlled four-circle diffractometer. Hilger and Watts, January 1969.	Four-page A4 illustrated technical brochure.
E2	1975	History of Manchester Computers. Simon Lavington. Published by the National Computing Centre in 1975.	This is the first edition. A second edition (see below) was produced in 1998.
E2	1977	*Only yesterday: the growth of the computer.* A potted history of IBM's computers. Published by 3M UK Ltd.	Six-sided A4 printed illustrated brochure, giving facts about the growth of IBM, focussing on the period 1948 – 1964.
E2	1981	Correspondence and papers relevant to the £80,000 Settlement with ICL, concerning use of Manchester paging and virtual memory patents in the ICL 2900 series computers.	Consists of three letters dated August 1981 between DBGE and (a) NRDC, (b) the Bursar, photocopy of the cheque for £80,000, and an extract from the University's Council Minutes for 17th Nov 1981. (The paging patents were taken out via NRDC).
E2	1982	Correspondence and papers relevant to the Settlement with ICL, concerning acknowledgement of the contribution of TK and the MU5 team to the design of the ICL 2900 series computers.	Consists of two letters dated November and December 1982, between the Vice-Chancellor and (a) the University's solicitors and (b) ICL. Includes the ICL Board's formal Acknowledgement. The terms of the Settlement included a single payment of £500,000, the gift of six PERQ Workstations, various equipment discounts and provision of various facilities at cost at West Gorton.
E2	1987	DBGE's notes from the 'Cambridge 50 years' Conference, December 1987.	The event celebrated the founding of the Mathematical Laboratory at Cambridge in 1937.
E2	1988	DBGE's Ferranti notes. May 1988.	13 handwritten A4 pages, including DBGE's 11-page summary of *The Ferranti Computer Department: a history* by B B Swann (1975). Includes notes of an exchange between DBGE and Cliff Wimpenny, the Ferranti Archivist. These notes were made in connection with the 40th anniversary of the SSEM (Baby) in 1988. *(Note that some of the Ferranti source documents quoted by DBGE will be found in other sections of SHL's archival collection).*
E2	1988	Correspondence and papers relevant to the opening of the Information Technology Laboratories in June 1988 by HRH The Princess Royal.	Consists of two letters between DBGE and the Vice-Chancellor's Office. Includes 11 pages of background notes on the history of the Department, arrangements for seminars, etc. on 22nd June 1988, and considerable information on Post Experience Vocational Education (PEVE) and other short training courses (for industry) run by the Department.

Box	Date	Title	Description/comments
E2	1988	List of staff in Computer Science, June 1988.	Seven A4 pages listing all the academic staff (53), academic-related staff (13), research project staff (56) and ancillary staff (39), together with their qualifications.
E2	1998	A History of Manchester Computers. Simon Lavington. Published by the British Computer Society in 1998.	Produced for the 50th Anniversary of the SSEM ('Baby').
E2	1991	NRDC history: Hansard transcript of speech by Lord Halsbury, 3rd June 1991.	Gives, inter alia, a sentence on Manchester computer patents. Note that the NRDC (together with NEB) was transformed into the British Technology Group in about 1991.
E2	2003	Unveiling of Blue Plaque.	The plaque was attached to the rear wall of the Coupland Street building within which, on 21st June 1948, the SSEM ('Baby') first ran a program in the Electro-Technics Department. The plaque names Williams and Kilburn.

Photographs: box-files E3 & E4.

Box	Date	Title	Description/comments
E3	1945	Group photo, first-year students at St Anselm Hall, University of Manchester.	b/w formal photo, with identifications and signatures on the back. Dai Edwards is second-from-left on the third row,
E3	1949	9 b/w photos of the Manchester Mark I computer (MADM).	Includes: (a) the Illustrated London News composite overall view; (b) 3 views (left-hand, central & right-hand) of the machine; (c) G E (Tommy) Thomas and the drum – which was in a lab on the floor above the main computer; (d) Dai Edwards, F C Williams, Tom Kilburn, Alec Robinson and Tommy Thomas with the machine (+ extra copy); (e) Tommy Thomas & Dai Edwards near the console; (f) Dai Edwards at the console.
E3		6 photos of the Ferranti Mark I, before and after its delivery to Manchester University.	Includes: (a) b/w photo of bays under construction at Ferranti's Moston factory; (b) colour photo of part of the final installed computer, with some doors open to reveal circuits; (c) 3 b/w photos of people at the Mark I console: (i) Tom Kilburn (standing) with Brian Pollard and Keith Lonsdale from Ferranti (+extra copy); (ii) Joan Hart (seated) with John Bennett standing. (e) a 'high speed' 5-track paper tape reader, Mark I.
E3	1949 - 1952	12 photos of Mark I components and technologies.	Includes: (a) 3 b/w photos of CRT storage units: (i) a single-tube early version; (ii) a production version of (i); and (iii) a twin-tube unit as used on the Mark I*. (b) 1 b/w photo with caption "Photograph 1, Mk II magnetic wheel". This was a second version of

			the 1949 drum; (c) 2 b/w photos of head structures for the above 1949 drum; (d) 1 b/w photo, printed caption on rear, of read/write heads and micrometer adjuster for the Ferranti Mark I drum; (e) a Ferranti Mark I drum under test at Moston. (f) 4 b/w photos of CRT store patterns. (e) 1 b/w photo of Mark I waveforms.
E3	1948 - 1951	3 schematic diagrams of the register-level architecture of the 1948 SSEM, the 1949 Manchester Mark I and the Ferranti Mark I.	These colour diagrams were produced in about 1988 by Dai Edwards – probably for the 40th Anniversary of the SSEM (Baby).
E3	c. 1950	Group staff photo of the Department of Electrical Engineering, University of Manchester.	B/w photo showing 19 people. An overlay identifies: G E (Tommy(Thomas, F C Williams, Tom Kilburn, LP (Leslie Piggott), CL (Colum Litting), EL (Eric Laithwaite, D B G Edwards.
E3	1954	Photo of Meg.	Meg (thought to be short for 'megacycle') was the follow-on research computer from the Manchester Mark I. Meg first ran a program in May 1954. Meg was serial/parallel, with a CRT main memory. The production version, the Ferranti Mercury, replaced the CRT store with a ferrite core store.
E3	1954	5 b/w photos taken at a staff reception in the Library of the new Electrical Engineering Department in Dover Street.	The new building opened in 1954. Academic and related staff are shown with their partners. The two larger close-up photos show (left-to-right) Dai Edwards, Tim Kilburn, Eric Laithwaite. Tony Brooker (identified on the reverse) is shown in one of the smaller photos. Colm Litting, Tom Kilburn and F C Williams are identified on the reverse of another of the smaller photos.
E3	1948 – 1962	Collection of 42 negatives, possibly copy-negs. Several are duplicates.	These are possibly copy-negs rather than originals but the quality is good. Descriptions of prints of most of the images will be found in adjacent catalogue entries. The collection includes: (a). 14 b/w negs of the 1949 Manchester Mark I (MADM); (b) 6 negs of 1949 machine waveforms and store-patterns; (c) 6 b/w negs of the Manchester Atlas in December 1962 at around the time of the official inauguration; (d) 7 b/w negs of drum stores (Atlas and Mercury?); (e) 6 colour negs of overall schematics of the 1948 SSEM, 1949 Mark I and 1951 Ferranti Mark I. (f) 5" x 4" b/w neg of part of the Whitworth Labs., Coupland Street.
E3	1958 -	3 photos of the Ferranti	The computer shown was delivered to the Dover

	1960	Mercury	Street building late in 1957 and was in service by February 1958. The four drum cabinets are at the right. The second photo was taken in about 1960 and shows the addition of a Graphical Output Unit (designed in the University?) which allowed curves drawn on a CRT screen to be photographed by a built-in 35mm computer-controlled camera. The third photo shows a Mercury drum cabinet with doors opened.
E3	1959 – 1962	Photos of the Atlas Fixed Store.	Includes: (a) 2 b/w photos of an early design where the ferrite slugs could be inserted pneumatically; (b) 2 b/w photos: (i) Dick Grimsdale with the prototype Fixed Store (about 1960); (ii) close-up of the mesh. (c) 2 b/w photos of the production Fixed Store during final assembly (late 1961 or early 1962); (d) 3 colour & 1 b/w photos of Fixed Store 'hairbrushes'.
E3	1960 - 61	Photos of Atlas Plessey ferrite core stores.	Including: (a) 3 colour photos of a 1K stack of 48-bit words (+ 2 parity bits). (b) 4 b/w photos probably of the prototype B store (approx.. 128 x 24-bit words). (c) 4 b/w photos possibly taken at Plessey's Laboratory showing equipment used to test core stores for Atlas? (d) 4 b/w polaroid photos of waveforms of store signals obtained during 'worst-case' pattern testing. Judging by the hand-written annotations, these might possibly refer to the Atlas B store?
E3	c. 1961	Photos of Atlas MD5 drum.	10 photos, most probably of the earlier Ferranti MD5 drum, including: (a) 2 b/w & 2 colour photos of the drum heads; (b) 3 b/w photos of the drum (one a close-up of the head-connectors); (c) 1 b/w photo of a drum and its racking during assembly; (d) 2 b/w photo, possibly of a drum amplifier printed-circuit board.
E3	1961-1962	12 b/w photos of the Manchester Atlas during final commissioning.	Images (which are identified on the back of the photos) include the following: (a). Cabinet 1 (bays 0, 1 & 2) being built at Ferranti's West Gorton factory. (Cabinet 1 is the CPU, namely: Floating-point accumulator in bay 2; B store, B-arith & Control in bay 1; Distributor, V-store, etc. in bay 0). (b) The above cabinet on lorry en route to Manchester University, June 1961. (c). Cabinet as installed at Dover Street. (d). Mike Lanigan and Atlas in Dover Street, early 1962. The following cabinets are shown (left-to-right) {working store, drum co-ord, periph

			coord}, CPU, Fixed Store, Mag tape coord. (e) Sebastian de Ferranti and Tom Kilburn and Atlas, Dec. 1962. (2 prints). (f). Atlas cabinets on the assembly line at West Gorton. In the centre of the photo, towards the rear, the nearest cabinet is the Tape & Periph coordinator of the Cambridge Atlas 2. (g) an unidentified 2-door cabinet during assembly – (Fixed Store?) (h) Artist's impression of Atlas, as in about 1960.
E3	1963 - 1971	9 b/w photos of the Manchester Atlas during its working life.	Images (which are identified on the back of the photos) include two photos taken at the closing-down jollifications on 30th Sept. 1971.
E3	Mid-1960s	24 miscellaneous DGBE personal photos	23 of these were taken on a trip made by Dai Edwards to visit research facilities in Czechoslovakia, probably in the period 1964 – 1968. The 24th photo shows G E Thomas (right) and an unidentified man, probably in the mid-1960s.
E3	1968 – 1975?	3 photos of groups of first-year Computer Science students.	(a) A group of 10 students standing on the steps of the Whitworth Lab., Coupland Street. These are probably part of the 38-strong second-ever intake, in October 1966. G D Argent is standing on the right; Mary Ganderton is 4th from right. (b) a group of 11 students and one of 13 students, probably taken in an October in the period 1967 – 1971; (c) groups of first-year students, possibly from the period Oct. 1972 – 1975.
E3	c. 1970	ICL 1905E in the Whitworth Building.	This 1905E was used at the start of the MU5 project for two main purposes: (i) as a platform for operating system development (MUSS); (i) to test the special associative chips to be used in the MU5 CPRs, Name Store, etc. For these purposes the 1905E was modified to make it a paged machine. The orange cabinets in the right-hand background are the Ferroxcube mass core store units (from America). They were intended for MU5 but were in Coupland Street for some familiarisation and pre testing etc. When transferred to MU5 the Ferroxcube cabinets were painted ICL grey/blue.
E3	c. 1969	Hilger & Watts on-line X-ray diffractometer.	In the background is a PDP8 computer. Dai Edwards led the design team. The arrangement closely followed the design of the X-ray Diffractometer which was attached to Atlas at Manchester in about 1964.
E3	1956 - 1972	Historic storage components.	Four photos: (a). A b/w photo of part of a core plane, with a magnified view of some cores. (b). A colour photo showing four ferrite cores (of respective diameters 80thou, 50 thou, 30 thou and 12 thousandths of an inch) compared with a 50 thou square semiconductor chip containing 8

			bits of associative (ie content-addressable) storage. The chip probably comes from MU5's Current Page Registers or the Name Store. (c) A colour photo showing some 30 thou cores compared with a 256 bit MOS store chip of size 150mm x 110mm. (d) A colour photo of a CRT Williams/Kilburn tube compared with an unidentified module of RAM (or DRAM?) chips.
E3	c. 1973	Departmental 'Open Day'.	9 colour prints of the public wandering round various demonstrations. Most departments in the University opened their doors to the public on this Saturday. As far as can be remembered, it was estimated that about 35,000 people may have visited University buildings on this day. Computer Science was one of the most popular.
E3	c. 1974	7 colour photos of MU5.	These include: (a) a B2 module (containing some unidentified combination of AND/OR, or AND/NAND gates); (b) a double-width module. This is the 'RAM' part of an associative store, being a conventional 32x4-bit RAM module. The 8 central chips each give 16x1-bit storage while the two other chips provide a buffer register. (c) a close-up of modules plugged into a platter; (d) the rear of a platter; (e) two logic bays: on the left (probably) the Plessey 250 nsec plated-wire store, with its bay door open; on the right: the six-platter door swung open in the adjacent bay is MU5's Store Access Control (SAC) unit. (f) An overall view of the MU5 machine room, posed for the departmental glossy brochure. People (left-to-right): at the console, unidentified girl, Simon Lavington, Gordon Frank, Roland Ibbett; at the drum cabinet: Pete Whitehead, Tony Whitehouse; at the Performance Monitoring Unit, Lynn Plant. (g) a drawing of waveforms for the 250 nsec. plated wire store.
E3	1978	2 b/w photos taken at the 30th Anniversary of SSEM (Baby).	The photos were taken at a reception at the National Computing Centre in Manchester. The NCC had sponsored and published the booklet *History of Manchester Computers,* by Simon Lavington, published in 1975. The first photo shows (left-to-right): Tommy Thomas, Tom Kilburn, Geoff Tootill, Dai Edwards, david Firnberg (CEO of NCC, holding the booklet) and Simon Lavington. The second photo shows Tom cutting a cake, on which is inscribed "30 years of computing".
E3	Approx. 1978 - 88	11 miscellaneous equipment photos	These include: (a) 2 colour photos of either Dataflow or little MU5 or MU6; (b) 2 colour photos of

			CAD/printed-circuit facilities in the Department of computer Science; (c) 1 colour photo of Workstations (Suns?) in a student laboratory; (d) 1 b/w photo of Vivian Bowden (?) and Bill Talbot (?) in front of a bay of an ICL 1906A (?) (e) 3 colour + 1 b/w photos of unidentified equipment. (f) 1 colour photo graphical patterns on a dot matrix screen.
E3	c. 1988	11 colour photos of University buildings connected with computing history.	These include: (a) 3 photos of the Whitworth Labs., Coupland Street; (b) 3 photos of the former Computing Machine Laboratory, Coupland Street, built in 1950; (c) 3 photos of the back of the original Electro-technics department (and/or the old Physics Department), showing the wall-plaque inserted to mark the spot near which the SSEM (Baby) first ran a program; (d) 2 photographs of the former Elec. Eng. Dept. in Dover Street (built 1954). Note that this shows what used to be treated as the main entrance, before the other side of the building became 'de-cluttered' with much older Victorian buildings.
E3	c. 1986	12 colour photos of the machine room at the University of Manchester Regional Computing Centre (UMRCC), Kilburn Building.	Precise technical details unknown. Equipment includes Control Data and ICL System 39 Level 80.
E4	1986/88	31 colour photos of the new Information Technology Laboratories during construction.	These show various stages in the construction, including aerial views of the surrounding city-scape and, finally, some interior pics of the finished building.
E4	1988	The opening of the new Information Technology Laboratories on 24th June 1988 by HRH The Princess Royal.	27 colour prints. Photos of people, including: Princess Ann, Mark Richmond (the V-C), Tom Kilburn, Dai Edwards, and many more.
E4	1988	Exhibition of research projects in the Dept. of Computer Science	37 colour prints (6" x 4") + 7 negs. Includes photos of explanatory display boards on the following projects: CAD; SIDESMAN; Simulation engine;Visual Systems; Computational category theory, FRIPSE (mathematical support for programming); Dataflow computing; ParSiFal (parallel simulation on transputers); Signal processing; PCB production; Temporal logic in specification & verification; Manchester medical informatics group; FLAGSIP: 5G languages, project, system; Optical computing; Mushroom; Computer graphics
E4	1988	Exhibition of Manchester computer history, research projects, etc., in the Dept. of	Total of 38 colour prints, each 7" x 5". Includes 13 additional research project images (see also above), plus 21 historical images and 4 of other

		Computer Science. Exhibition held during the 40th anniversary of baby and the visit of HRH the Princess Royal.	subjects.
E4	1988	The SSEM (Baby)'s 40th Anniversary Dinner	28 colour prints of various Manchester computing pioneers.
E4	1958 - 1988	Aerial and high-level photos of the University and its surroundings.	12 colour and one b/w photo, including: (a). 1 b/w aerial view in about 1958, showing the new (1954) Electrical Engineering building in Dover Street and the new (about 1958) Students' Union building. (b). 3 colour aerial views of about 1985. (c). 9 colour views probably taken in about 1985 from the top of the Maths Tower (now demolished).
E4	1961 – 1988	9 photos of Dai Edwards (and Tom Kilburn) at various locations outside the University of Manchester.	Includes: (a). 1 colour photo (probably taken by Dai) of Tom Kilburn & interpreters etc. in Moscow in 1961. (b). 1 colour photo (probably taken by Dai) of Tom Kilburn in Pisa in about 1962. (c). 3 colour photos of Dai getting an honorary degree at the University of Glamorgan in 2000. (d). I colour photo, taken in about 2004, of Dai standing next to a blow-up of a 1949 photo of himself – (in 2004 at the time he was giving a talk to the CCS NW branch). (e0 3 other photos, on taken at an unidentified conference.
E4	1996	Group photo taken at Tom Kilburn's 70th birthday party.	20 people are shown. The individuals are believed to be (*left-to-right*): Mary Almond, Graham MacLean, Mavis Mudge, Johnny Mudge, Ellen Sumner, Frank Sumner, Vera Brooker (standing in front of Frank), Tony Brooker, Eric Dunstan, Mrs Hart (Tom's secretary), ??, Tom Kilburn (seated), Christine Duncan, ??, Dick Grimsdale, Dave Aspinall, Ina Aspinall, Simon Lavington, ??, Bernard Richards. It is believed that the dinner was organised by Christine Duncan.
E4	c.1998	4 photos of the Rebuilt SSEM (Baby).	These colour pics (2 + 2 copies) show the project when it was more or less complete, in the machine room of UMRCC in the Kilburn Building.
E4	1998	Group photo probably taken in connection with the 50th Anniversary of the SSEM (Baby).	The colour photo shows: (front row, left-to-right): Geoff Tootill, Tom Kilburn, Alec Robinson; (back row, left-to-right): Tommy Thomas, Dai Edwards, Laurie Allard.
E4	c. 1998	9 colour photos taken at a celebration lunch, probably in connection with the 50th Anniversary of the SSEM (Baby).	6 large (10" x 8") photos showing, respectively: Tom Kilburn, Tom with Bernard Richards & Christine Duncan, Frank Sumner, Dai Edwards, Ellen Sumner, Jane Edwards with Dick Grimsdale. 3 smaller photos showing,

			respectively: Dai Edwards with Gordon Haley (?), Tom Kilburn with Tony Brooker, several people at lunch (including Dai and Jane Edwards in the centre, Yao Chen on the extreme right).