

**Catalogue J, for box-files J1 – J4.**

**Scope:** Early Borehamwood security-classified research reports. The bulk of the reports covered in this catalogue are connected in some way or other to advanced radar and instrumentation – in which context the specific development of general-purpose digital computers only emerged gradually and did not blossom fully until after about 1952.

The material has been divided for convenience into five groups:

**(1). Indexes and listings (in box-file J1).** Research reports produced at Borehamwood evolved over the years into five (somewhat overlapping) categories:

<i>description</i>	<i>prefix</i>	<i>approx. number issued</i>
The principal project reports	(none)	544, from 1946 -> 1965
Technical reports, supplementing above	T	264, from 1950 -> 1962
Studies and proposals; applications	S	298, from 1954 -> 1963
Progress reports	PR	287, from 1952 -> 1963
Maintenance manuals	M	140, from 1950 -> 1963

In the mid-1950s there was also an 'L' series of occasional reports at Borehamwood, of which very few seem to have survived. The procedures for placing a particular document in a given category do not appear to have been entirely consistent and were partly determined by subject-matter. Thus, the 'PR' category, besides obvious progress reports, also contains many other documents relating to guidance, inertial navigation and control systems for weapons and aircraft. Also, many of the applications studies for prospective computer customers for the Elliott 402 and 405 computers are contained in the 'S' category.

**(2): Check-list of reports preserved in microfiche form.** Gives the contents of 175 envelopes, each envelope containing a microfiche sheet. Each sheet holds images of up to about 70 pages of text, diagrams or photos. In practice, each microfiche sheet holds anything from one-third of a report to several reports, within the date-range 1946 to 1952. **All the envelopes are contained in box-files J3 and J4.**

**(3): Check-list of reports preserved in original paper form, box-file J2.**

**(4): Selected extracts copied from microfiche, for convenience, box-file J2.**

**(5): Maurice V Needham's documents relating to the CDS project.** Note that these are physically in **box-file V0** which is kept by the HMS Collingwood Museum, Fareham, Hants.

**(1). Indexes and listings:**

<b>Cat. No.</b>	<b>Date</b>	<b>Title</b>	<b>Comments.</b>
J1	Nov. 1968	Library of Technical Reports, 1946 to 1966. Inside the front cover it explains: "The Index to library of reports issued by the technical publications department of Radar Service and Repair Division on behalf of Elliott Brothers (London) Ltd. This library is located in the Security Office, Borehamwood".	The Index is divided into five sections, each prefixed respectively with: General (no prefix), Technical (T), Applications (S), Progress (PR) and Manuals (M). The prefixing scheme did not come in until about 1950. Each entry gives: <report no.> <title> <date> <classification, ie Secret, Classified, Restricted, Private and Confidential, or Unrestricted>. Note that author(s) are not listed (but see below). This document is nevertheless

			the best surviving listing of early Borehamwood research reports.
J1	March 1964	Reports issued by the technical publications department, 1950 to 1964 (February). Radar and Communications Service and repair Division Publications Department, Stanmore.	This Index is similarly divided into five sections. Each entry gives: <report no.> <title> <authors>. Thus it can be used in conjunction with the above Index. Note that the period covered does in fact start in 1946 (not 1950).
J1	March 1964	Reports issued by the technical publications department, 1950 to 1964 (February).	This is a photocopy of selected pages from the above document, copied at Borehamwood with the permission of the Security Officer on 17 <sup>th</sup> February 2003.
J1	May 1969	Library of technical reports: current series.	This Index is divided into six parts: Airspace Control; E.A.R.S Management; Research & Advanced Projects; Airborne Radar; Airborne Communications; Mobile Radar; Radar Service & Repair. The period covered is approximately 1962 to 1969. Two copies of this document exist.
J1	Sept. to Nov. 2001	Analysis of Elliott reports which were shortly to be passed into the care of the Science Museum, London.	Rod Smith, an Assistant Curator at the Science Museum, had obtained listings of Borehamwood reports that, it was hoped, would soon be given by Marconi to the museum. SHL made this listing in order to highlight the importance of the documents to computer historians.
J1	Dec. 2002	Science Museum (London) listing of certain Elliott reports, compiled by Rod Smith of the Science Museum (South Kensington), following a visit to Borehamwood at a time when GEC/Marconi (the successors to Elliott-Automation) were vacating the premises and disposing of documents.	Yellow file containing a 28-page listing, which was compiled by Rod Smith, following a visit to the Borehamwood Strong Room in 2002 on behalf of the Science Museum. Unfortunately, his listing does not give the original identity-number or the full title of each report, so cross-checking with the above-mentioned original Borehamwood Indexes is not straightforward. It is not known how many of the reports mentioned by Rod Smith survived the 2002 clear-out.
J1	March 2003	Check-list of early Borehamwood Internal Reports considered relevant to computer history. This list, compiled by SHL during the writing of <i>Moving Targets</i> , is for general guidance only.	10 pages of typed notes and listings, compiled from the two original Indexes (see above) and by viewing microfiche copies of selected reports. Annotations indicate where, within Sections 1, 2 or 4 of the Elliott Catalogue, copies of (parts of) some of the listed reports may be found.

## (2). Check-list of reports preserved in microfiche form, box-files J3 and J4.

The six report-groups **highlighted in green** in the following list have been digitally scanned, both as pdf and as jpg files. These files are held on a CD – see box-file R4 of the Elliott catalogue. The CD is a particularly useful source of digital images of MRS5, the 152 computer, early packaged circuits, the Three-Dimensional Simulator (TRIDAC) and the Elliott Differential Analyser.

1B,	2 to 5B,	6 to 7B,	8 to 16B,	9 to 12,
13 to 14,	17,	18 to 19,	21 to 25,	22 to 32,
26 part 1,	26 part 2,	26 part 3,	27 to 31,	33 to 36B,
37 to 39 part 1,	37 to 39 part 2,	38 to 41 part 1,	38 to 41 part 2,	42,
43 part 1,	43 part 2,	44 to 45B,	46,	47 part 1,

47 part 2,	48 – 50,	49B to 51 part 1,	49B to 51 part 2,	52B to 56,
53 to 54,	57 to 59B,	58 to 60,	61,	62 to 63,
64 to 66B,	67 to 72,	69 to 70,	73 to 80,	75B to 77,
78 to 79 part 1,	78 to 79 part 2,	81 to 84,	82 to 85,	86,
97B to 90,	91 to 92,	93 to 94,	95,	96 to 99 part 1,
97 to 100,	101 to 102,	103B to 118B,	104,	105 to 107,
108 to 111B,	113 to 114,	115C to 117,	119 to 125B,	120,
123 to 129,	126 to 128,	130 to 131,	132 to 134,	135,
<b>136 to 142B,</b>	137 to 140B,	139,	143,	144 to 145,
146 to 152,	147,	153B to 161B,	154B,	157,
158 to 160,	162,	163 to 165,	164 to 167,	168 to 175B,
169 to 170,	172 to 173,	176 to 178,	179 to 181B,	180,
182 to 190,	183B to 184B,	186,	191.	192 to 195,
193,	196 to 198B,	199B to 200,	201 to 204B part 1,	201 to 204B part 2,
<b>202,</b>	205 to 207,	206,	208 to 212,	210 to 211,
213 to 225B,	216 to 218B,	219B,	220,	221,
222 to 223B,	<b>224 to 226,</b>	227B to 228B,	229 to 230B,	231,
232 to 254,	233 to 234,	235 to 236,	237 to 239,	240,
241 part 1,	241 part 2,	242 to 244,	245,	246 part 1,
246 part 2,	247B to 248,	249,	250 to 251,	252 V1 part 1,
252 V1 part2,	252 V2 part 1,	252 V2 part 2,	252 V2 part 3,	252 V3 part 1,
252 V3 part 2,	252 V3 part 3,	252 V4 part 1,	252 V4 part 2,	252 V4 part 3,
252 V5 part 1,	252 V5 part 2,	253,	255 to 282,	256 to 257,
258,	259,	260 to 261,	262,	263,
264,	265,	267 part 1,	267 part 2,	268 to 269,
270 to 271,	272 to 273,	274 part 1,	274 part 2,	274 part 3,
278 to 280,	281,	283,	284,	285 to 287 part 1,
285 to 287 part 2,	288,	289 to 290,	291,	292 to 293,
294,	295,	296,	297,	<b>298 to 300 part 1,</b>
<b>298 to 300 part 2,</b>	298 to 300 part 3,	301,	302,	<b>303.</b>

The above 175 microfiche envelopes are held in two plastic card-index boxes, labelled J3 and J4. Box J3 contains the envelopes for reports up to <199B to 200> and J4 contains the rest. In terms of the SHL Elliott Collection, catalogue-numbers have been assigned to the envelopes as follows:

<b>Cat. No.</b>	<b>Date-range</b>	<b>Description</b>
J3	Within period 1946 - 1952	Microfiche for report(s) 1B
J3	Within period 1946 - 1952	Microfiche for report(s) 2 to 5B
J3	Within period 1946 - 1952	Microfiche for report(s) 6 to 7B
<i>etc</i>		
<i>etc.</i>		
J3	Within period 1946 - 1952	Microfiche for report(s) 97 to 100
<i>etc</i>		
J3	Within period 1946 - 1952	Microfiche for report(s) 199B to 200. This is the end of the first card-index box.
J4		Microfiche for report(s) 201 to 204B part 1. This is the start of the second card-index box.
<i>etc</i>		
J4	Within period 1946 - 1952	Microfiche for report(s) 302
J4	Within period 1946 - 1952	Microfiche for report(s) 303

### 3: Check-list of reports preserved in original paper form, box-file J2

<b>Cat. Number</b>	<b>Date</b>	<b>Title of report</b>	<b>Comments</b>
J2/190	29 <sup>th</sup> Dec. 1949	Report no. 128: Gyro torque motor for MRS 5. R J Simpson	Contains motor drawings and performance-graphs.

J2/191	21 <sup>st</sup> Dec. 1949	Report no. 158: MRS 5 Progress Report no. 10 (Contract No. CP.12349/46). J F Coales.	(From the Introduction): "DNO has now told us that the financial provision next year must be cut to less than half the estimate ...". The main text contains good summaries of the state of the 152 computer development.
J2/192	5 <sup>th</sup> April 1950	Report no. 193: MRS 5 Progress Report no. 11. 905 Progress Report no. 1. J F Coales.	From 20 <sup>th</sup> March 1950 the original MRS 5 contract has been replaced by one to develop the Type 905 radar. The report contains 23 photographs of the MRS 5 system. It is believed that the 905 project was subsequently referred to as the "Netting" project – possibly a reference to the need for a ship to acquire, or 'net', the radar tracks of hostile aircraft.

#### 4: Selected extracts copied from microfiche for convenience, box-file J2.

The photocopied pages are stored for convenience in five groups, each group occupying a wallet. All wallets are in box-file J2. The correspondence between wallet, report-number and catalogue-number is as follows:

<i>Wallet 1:</i>	<i>reports 1B to 77</i>	<i>cat. numbers J2/200 to 229</i>
<i>Wallet 2:</i>	<i>reports 80 to 159B</i>	<i>cat. numbers J2/230 to 249</i>
<i>Wallet 3:</i>	<i>reports 163 to 199;</i>	<i>cat. numbers J2/250 to 261</i>
<i>Group 4:</i>	<i>reports 202 to 276</i>	<i>cat. numbers J2/262 to 278</i>
<i>Group 5:</i>	<i>reports 283 to 303</i>	<i>cat. numbers J2/279 to 288.</i>

<b>Cat. No.</b>	<b>Elliott Report No.</b>	<b>Title</b>	<b>No. of pages copied</b>
J2/200 <i>Start of first wallet.</i> J2	1B	Interim report of automatic boiler control.	2
J2/201	2	Standard instrument jewels	1
J2/202	6	The influence of shot noise on the location of a star in daylight by the photo-electric method	2
J2/203	7B	MRSV: PR No. 1	3
J2/204	8	A reflecting dynamometer wattmeter	1
J2/205	15B	The measurement of shock strains	1
J2/206	16B	Variable stabilised power unit type R 028	1
J2/207	22	Electrical pulse storage by means of a Cathode Ray Tube	4
J2/208	24	A newly developed push-pull DC amplifier for use with the Cathode Ray Oscilloscope for electro-physiological purposes.	1
J2/209	26	The theory and design of magnetic amplifier	3
J2/210	32	A barrier layer photocell amplifier	1
J2/211	33	Measurement of flow in large water mains	1
J2/212	34	H <sub>2</sub> S detector	1
J2/213	44	MRSV: PR No. 4	8
J2/214	45B	Magnetic amplifier for the Dewpoint Hygrometer	1
J2/215	46	Automatic landing control type R 041.	3
J2/216	49B	Magnetic amplifier unit for engine speed control servo	1
J2/217	53	Sensitive magnetometer AN-ASQ-1: modification for	1

		geophysical surveys.	
J2/218	55B	Proceedings of Symposium on magnetic amplifiers	3
J2/219	56	Alignment servos for a magnetometer	1
J2/220	58	An iron-cored polyphase wattmeter	1
J2/221	59B	Battery valve voltmeter type R 03.	1
J2/222	60	Size of numbers in the MRSV computer	7
J2/223	69	Multi-channel measurement of physical effects by confluent pulse techniques with particular reference to the analysis of strain	1
J2/224	70	An automatic dew or frost point hygrometer for measuring the water vapour content of air	1
J2/225	71	Preliminary tests on the manufacture of platinum and glass resistance thermometers as designed by Heralus.	2
J2/226	72	Thermostat bath	1
J2/227	73	Wind speed indicating voltmeter type R 044.	2
J2/228	76	Asdic signal simulator	1
J2/229	77	Resistance thermometer development programme	1
J2/230	80	Magnetic amplifiers for use in the remote indication and recording of gas flow	1
<i>Start of 2<sup>nd</sup> wallet J2</i>			
J2/231	82	MRSV: PR No. 6	8
J2/232	83	An auto Sun-Compass for world survey magnetometer	1
J2/233	87B	Magnetic amplifier home failure alarm	1
J2/234	90	The use of three adding units as a variable gear	2
J2/235	94	An automatic gum detector Type R 054	1
J2/236	97	Magnetic amplifier photo-electric counter Type R 046	1
J2/237	99	Electrical pulse storage using a Cathode Ray Tube	5
J2/238	100	2.5" differential moving coil frequency indicator (2-element type)	1
J2/239	101	A DC inverter for operating a potentiometer recorder from a thermocouple or for similar applications	1
J2/240	102	Magnetic amplifier for Gyro pick-off	1
J2/241	125B	UDE console PR Number 1	3
J2/242	126	Automatic titration unit	2
J2/243	132	Two types of commutator for use in high-speed digital computers	10
J2/244	133	A subtraction circuit for use in serial high-speed binary digital computers	11
J2/245	134	A preliminary trial of a digital data receiver using a binary disc reader.	4
J2/246	144	Pulse transformer to handle high duty cycle pulse trains in the logical circuits of computers	3
J2/247	145	Investigation into a punched tape system for measuring angular position in binary code	2
J2/248	158	MRS5: PR No. 10 ( <i>Complete report also available: see above</i> )	14
J2/249	159B	The Elliott home calculator: Model Twelve-X. ( <i>Note: this is a Christmas spoof report, featuring a bicycle! This featured in a staff Christmas concert in December 1949. For photos of the concert and dramatis personae see catalogue section 7, box-file R1.</i> )	6
<i>Start of 3<sup>rd</sup> wallet J2</i>			
J2/250	163	Theory of MRS5 computer	22
J2/251	164	Automatic resistor engraving machine	2
J2/252	166	A desk calculator in binary scale	8
J2/253	168	The present position of automatic computing machine	2

		development in England	
J2/254	171	UDE projects. Progress report no. 2	6
J2/255	183B	A scale-of-two controller for computer operations	2
J2/256	184B	20 Kc/s plug-in flip-flop	2
J2/257	186	Investigation and design of chassis and racking for printed circuit plates with forced air cooling	6
J2/258	195	MRS5 computer programme	21
J2/259	196B	Estimated cost of production for printed circuit units	2
J2/260	198B	Estimated costs of production for printed circuit units	13
J 2/261	199B	Equipment and programme for "Netting" trials 1950	3
J2/262	202	"Netting" progress report No.2	19
<i>Start of 4<sup>th</sup> wallet J2</i>			
J2/263	205	Universal safety firing and cut-off gear	2
J2/264	206	Design proposal for A I Trainer (contract no. 6/WT/8960/CB4B)	3
J2/265	208	A cathode ray tube digital store and accumulator	5
J2/266	209	A clock pulse generator for series-working binary-digital computer	1
J2/267	214	Three dimensional simulator Progress Report no. 2	2
J2/268	217	Digital computing machine components of universal application	5
J2/269	220	A digital data transmission system suitable for use with a binary digital computer of the serial type	2
J2/270	225B	RAE simulator – preliminary report on mechanical design of simulators in the USA	3
J2/271	226	The Elliott differential analyser	
J2/272	233	A local control signal distributor for operating digital reading heads situated at a distance from a controlling computer	4
J2/273	246	Design proposals for DF calculator	25
J2/274	247B	Proposals for a general purpose mathematical electronic digital computer	10 and 10
J2/275	248	A repetitive analogue divider	1
J2/276	265	"MOPSY" Progress Report no. 1	2
J2/277	267	A general purpose calculating machine for the National Research Development Corporation	8 and 17
J2/278	276	A general purpose calculating machine for the national Research Development Corporation (subsidiary report)	6
J2/279	283	An investigation of the causes of drift in Order Generators with proposals for the design of an improved Order Generator	4
<i>Start of 5<sup>th</sup> wallet J2</i>			
J2/280	286	The design of the axis resolution unit and relative motion computer for Tridac	1
J2/281	298	"Netting trials – Final Report. Also, some hand-written notes made by SHL and John Ponsonby (ex-Jodrell Bank) on 17/8/2003 about the Borehamwood egg-box radar aerial system.	43
J2/282	299	3-dimensional simulator (Tridac) PR No. 9	
J2/283	302	A CRT store for sixty 14-digit binary numbers with a digit period of three microseconds	2
J2/284	303	The development of a range of digital computer components with special reference to packaged circuit units	16
J2/285	309	Magnetostriction delay line storage	9
J2/286	339	401 mark I computer	23
J2/287	371A	The 153 computer, volume 1	40
J2/288	371B	The 153 computer, volume 2	30

### 5: Maurice V Needham's documents relating to the CDS project, box-file V0.

<b>Box</b>	<b>Date</b>	<b>Title</b>	<b>Description/comments</b>
V0	c. 1945	Framed photo of a battleship (HMS Prince of Wales?), with annotations to show radar types 271, 279, 284.	The external dimensions of the frame are: 10" x 14".
V0	1950	B/w group photo of Elliott staff & American visitors, during a meeting to discuss the CDS project.	The meeting was called the <i>UK/US Conference on Data Transmission &amp; Allied Subjects</i> , Borehamwood, 14 <sup>th</sup> – 17 <sup>th</sup> July 1950. Maurice Needham is on the extreme right, back row.
V0	1951	CDS X-models. Volume 1, 3/9/1951. Report no. 252 of the Borehamwood Research Labs of Elliott Brothers (London) Ltd.	Originally annotated 'Secret & Discrete'. Declassified to <i>Official</i> on 20 <sup>th</sup> November 2015 by Lt Cdr P H Marland.
V0	1951	CDS X-models. Volume 2, Drawings & photographs. 3/9/1951. Report no. 252 of the Borehamwood Research Labs of Elliott Brothers (London) Ltd.	Originally annotated 'Secret & Discrete'. Declassified to <i>Official</i> on 20 <sup>th</sup> November 2015 by Lt Cdr P H Marland.
V0	1951	Three framed and captioned b/w photos of CDS, each about 8" x 10".	Captions all say: <i>Comprehensive Display System 1951</i> . Photo (a) shows (left-to-right): high definition radar tracking group; tactical plot display in foreground; early warning radar tracking group in background. Photo (b) shows fighter direction (interception) display. Photo (c) is taken from position (a) but looking in the opposite direction.
V0	1951	35 loose glossy b/w photos of CDS and related apparatus.	The subject-matter is as in the above framed photos but there are several extra close-up shots and several 'behind-the-scenes' shots. There are many duplicate images.
V0	1951	3 b/w photos of block-diagrams of the CDS system, showing how the various functional units connect via the central store.	
V0	1951	Two boxes of glass plates (b/w negatives), mostly of CDS photos.	The boxes are labelled 'Radar slides'. One box contains 3.5" x 4.5" plates and the other 6.5" x 4.75".
V0	1984 - 1990	Pink wallet-type folder. Naval Radar Trust and associated meetings, names & addresses, correspondence, manuscript drafts, reprints of JNS articles, etc. etc.	Overall theme: making sure that the history of naval radar during the Second World War was recorded. It is clear that MVN was cooperating closely with John Coales and others. Included is: type 274 & HMS Howe. Circular letter from John Coales, dated

			<p>March 1985 and sent to about 50 former ASE (ie HM Signals School) colleagues. 1935 – 1946. Name &amp; Group list, 1937 – 1942. List of manufacturing companies who worked with ASE on radar during World War II. List of reports, ND1 – ND76. Reprints of papers that appeared in JNS. Drafts of book by Derek Howse. Reunions (eg at Churchill College, Cambridge). Name &amp; address lists, etc. etc.</p>
V0		<p>The Batti-Wallah's Society. (Former Naval electrical, radio, radar &amp; signalling personnel, founded 1906).</p>	<p>File of historical information, souvenir programmes, etc., of The Batti-Wallah's Society. (MVW had been a member since 1960).</p>