Guide to the Grace Murray Hopper Collection

NMAH.AC.0324
Don Darroch
1990
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Collection Overview

Repository: Archives Center, National Museum of American History
Title: Grace Murray Hopper Collection
Identifier: NMAH.AC.0324
Date: 1944-1965
Extent: 2.5 Cubic feet (7 boxes, 1 map-folder)
Creator: Hopper, Grace Murray, 1906- (mathematician)
Physical Sciences, Division of (NMAH, Smithsonian Institution).
Language: English
Collection is in English.

Administrative Information

Acquisition Information

Provenance
Transferred from the Division of Physical Sciences to the Archives Center, February 6, 1989.

Related Materials
Materials at the Archives Center
Computer Oral History Collection (AC0196)
This collection contains five oral history interviews with Grace Murray Hopper conducted on: July 1, 1968; November 1, 1968; January 7, 1969; February 4, 1969; and July 5, 1972.

Processing Information
Collection processed by Don Darroch, 1990.

Preferred Citation
Grace Murray Hopper Collection, 1944-1965, Archives Center, National Museum of American History

Restrictions
Collection is open for research.
Biographical / Historical

Grace Murray Hopper (1906-1992) obtained her Ph.D. in mathematics from Yale University in 1934. She was an associate professor of mathematics at Vassar College when she joined the Women's Reserve of the United States Navy, Women Accepted for Volunteer Emergency Service (WAVES) in 1944 and was assigned to the computing project at Harvard University. She served under Commander Howard H. Aiken as a Wave until 1946, and remained at Harvard's Computation Laboratory as a research fellow until 1949. In that year she joined the Eckert-Mauchly Computer Corporation as a senior mathematician. When Eckert-Mauchly became a division of Remington Rand, Hopper remained as senior programmer, a title she retained until 1959. Subsequently, she served as systems engineer and director of automatic programming development (1959-1964) and staff scientist in systems programming (1964-1971) for the UNIVAC division of Sperry Rand Corporation. Hopper retired from UNIVAC in 1972, having returned to active service in the U.S. Navy from which she eventually retired with the rank of Rear Admiral.

Scope and Contents

The material includes technical notes, operating instructions and descriptions relating to projects which Hopper participated in at Harvard during and after World War II and later in the private sector. These projects involved the creation of the Navy's Mark I, II and III "mechanical calculators" (the fore runners of today's computers) and the UNIVAC and ENIAC civilian models. The photographs document both equipment and Hopper with her colleagues at work and on social occasions. There are numerous published articles and memoranda by Hopper and others on various technical aspects of computers. Clippings of newspaper and magazine articles relating to computers and their development are also included, as well as periodicals and brochures. A "humor file" contains jokes and anecdotes collected by Hopper.

Much of the material is annotated by Hopper, primarily through notations on 3 x 5 white slips of paper. Some of the annotations by Elizabeth Luebbert, who served as a summer research assistant in the Museum's Computer History Project.

Arrangement

The collection is divided into eleven series.

Series 1: Technical Documents, 1944-1949
Series 2: Photographs of Mark II, 1948
Series 3: Photographs at Harvard, 1944-1945
Series 4: Reports and Articles, 1946-1948
Series 6: Compiling Routines, 1952-1954
Series 7: Press Clippings, 1944-1953
Series 8: Periodicals and Brochures, 1950-1953
Series 9: Humor file, 1944-1953
Series 10: Machine Tape, undated
Series 11: Audiovisual Materials, undated

Names and Subject Terms

This collection is indexed in the online catalog of the Smithsonian Institution under the following terms:

Subjects:
  Computer programmers
  Computer programming
  Computers
  Mathematicians
  Systems engineering
  Univac computer

Types of Materials:
  Articles -- 20th century
  Technical notes

Names:
  Physical Sciences, Division of (NMAH, Smithsonian Institution).
  Remington Rand.
Container Listing

Series 1: Technical Documents, 1944 - 1949

**Image(s)**

**Box 1, Folder 1**
- Mark I plugging manual  
  **Image(s)**

**Box 1, Folder 2**
- Reprints of "The Automatic Sequence Controlled Calculator" by Aiken and Hopper, I and II.

**Box 1, Folder 3**
- IBM pamphlet, IBM Automatic Sequence Controlled Calculator. Program for A Symposium of Large Scale Digital Calculating Machinery, 7-10 January 1947. (4 copies)  
  **Image(s)**

**Box 1, Folder 3**
- Program for A Symposium on Large-Scale Digital Calculating Machinery,, 13-16 September 1949.  
  **Image(s)**

**Box 1, Folder 3**
- Tables of constants for the Mark I.  
  **Image(s)**

**Box 1, Folder 3**
- I Random sequences of digits  
  **Image(s)**

**Box 1, Folder 3**
- II Random sequences of angles 000 to 360  
  **Image(s)**

**Box 1, Folder 3**
- III Random normal deviates in units of standard errors  
  **Image(s)**

**Box 1, Folder 3**
- IV Binomial distribution function  
  **Image(s)**

**Box 1, Folder 3**
- V Normal distribution function  
  **Image(s)**

**Box 1, Folder 3**
- Poisson distribution  
  **Image(s)**

**Box 1, Folder 3**
- Tables of one over factorial (1/1 to 1/20)

**Box 1, Folder 3**
- Powers of ten (0.1 to 0.9)

**Box 1, Folder 3**
- Constants (pi, square roots, logs, )

**Box 1, Folder 3**
- Reciprocals of numbers 1-99
Box 1, Folder 3  N factorial 1-12
Box 1, Folder 3  Log n factorial 1-100
Box 1, Folder 3  Powers of two 1-70
Box 1, Folder 3  Graph of trials of approximation
Box 1, Folder 3  Coding card (code 1-8431, noting switches, counters, description, all on one card, two sheets of paper on cardboard, covered with plastic)
Box 1, Folder 3  Duty officers, 23 April to 10 June, 1945
Box 1, Folder 3  Postcard from Newfoundland to "Computation Laboratory, Harvard University" date 13 Nov. 46 signature Howard Aiken on way to UNESCO; see Comrie Letters IBM P.6
Box 1, Folder 3  Operating Instructions for Problem J., typewritten by H.A. Arnold.
Box 1, Folder 3  Watch schedule for Mark I when it was running, Problem L. Nov. 45 - 1 March 46, Problem L File.
Box 1, Folder 3  Staff List--Departments of Physics, Engineering Sciences, and Applied Physics,, 30 July 1947.
Map-folder 1  Diagram of Mark I circuitry by Hopper
Box 1, Folder 4  Timing Diagram: Cams and relays involved in number transfer and schematic diagrams showing timing and principal control channels of Mark I, undated
Box 1, Folder 4  Schematic diagram: Number transfer circuits Mark I Diagram, undated
Box 1, Folder 4  Multiplication Plugging diagram see also: Aiken and Hopper "The Automatic Sequence Controlled Calculator--III", Figure 6.
Box 1, Folder 5  Formulas and coding for Problem G on the Mark I.
Box 1, Folder 6  Successive Differences, undated
Box 1, Folder 7  Photographs of blueprint drawings, contain all of the circuits of Mark I:
Box 1, Folder 7  5/6/46 EHM Normal Storage Counter and Automatic Check Counter (2 copies)
Box 1, Folder 7  5/17/46 EHM Switches, Independent Variable Switch and Special Storage Counters (2 copies)
Box 1, Folder 7  5/28/46 EHM Counter Employed in Logarithm Unit
Box 1, Folder 7  6/8/46 EHM Sequence-Start, Repeat, Stop-Cascade Relays - C Codes
Box 1, Folder 7  6/11/46 EHM Multiplicand - Divisor Counter (Doubling)(2 copies)
Box 1, Folder 7  6/19/46 CMC Sequence-Cascade Relays - B Codes Part I
Box 1, Folder 7  Photographs of blueprint drawings, contain all of the circuits of Mark I (continued):
Box 1, Folder 7  6/21/46 CMC Sequence-Cascade Relays - B Codes Part II
Box 1, Folder 7  6/24/46 EHM Dividend Counter
Box 1, Folder 7  6/25/46 CMC Sequence-Cascade Relays - A Codes Part II
Box 1, Folder 7  7/3/46 CMC Sequence-Cascade Relays - A Codes Part I
Box 1, Folder 7  7/24/46 CMC Intermediate Counter - Sign Circuits
Box 1, Folder 7  7/25/46 EHM Multiply, Divide Relay Panel (2 copies)
Box 1, Folder 7  8/10/46 EHM Exponential Unit (2 copies)
Box 1, Folder 7  8/13/46 CMC Product-Quotient and Quotient-Shift Counters
Box 1, Folder 7  8/20/46 EHM Sine Unit - Sequencing (2 copies)
Box 1, Folder 7  8/24/46 CMC Logarithm Unit - Control Circuits
Box 1, Folder 7  8/31/46 EHM Sine In-Out Counter
Box 1, Folder 7  9/4/46 CMC Multiply-Divide Sequencing Part I - Sequence Counter
Box 1, Folder 7  9/26/46 MFF Multiplier and Multiplicand-Divisor (Single) Counters
Box 1, Folder 7  11/8/46 MFF Tape Punch and Tape Register
Box 1, Folder 7  12/5/46 MFF Sequence Readout Lights and Normalizing Register
Box 1, Folder 7  1/14/47 MFF Print Counter and Typewriters
Photographs of blueprint drawings, contain all of the circuits of Mark I (continued):

1/30/47 MFF Functional Relay Panel

3/21/47 LCK Interpolators - Counters and Switches

4/21/47 LCK Interpolators - Sequencing and Tape Reading

5/9/47 MFF Card Feeds and Punch

PROBLEM L by Grace Hopper unlined paper, two holes at top personnel who worked on different aspects of getting Problem L to run

Operating Instructions for Problem L includes: Operating Instructions, Plugging Instructions, 2 Plugging Diagrams, Figure I - graph of values over which tapes run, Table I - table to check off values as computed from Grace Hopper's scrapbook.

Operating Instructions Problem L folder on operator's desk contents include:

(1) Problem L Operating Instructions marked in green pencil "First Set of Op. Inst." First two pages same as in GMH scrapbook with penciled corrections; third page is graph similar but not same as Figure I above; fourth page is similar to Table I above, also fifth page; sixth page is Plugging Instructions as above with red pencil changes; seventh page, Additional Operating Instructions with pencil changes.

Operating Instructions for Problem L includes: Operating Instructions, Plugging Instructions, 2 Plugging Diagrams, Figure I - graph of values over which tapes run, Table I - table to check off values as computed from Grace Hopper's scrapbook.

Operating Instructions Problem L folder on operator's desk contents include:

(2) Problem L Operating Instructions 22 December 1944 Pages 1-2 Operating instructions 3 Test Point for Tables R4X, R4A, R4C, R4CZ, R4B 4 Note on Wronskion on graph paper, pencil doodles 5 Operating Instructions, 6 Directions for Testing 7-9 Test Tapes for Problem L: Storage Counters (back of p. 7 Sample Run Rolling and Reset Test) 10 Test Tapes for Problem L: Multiplication; (back of p. 10 Sample run Multiply Test); 11-12 Test Tapes for Problem L: Interpolator #3; 13 Plugging Diagram; (3) Determination of Which Machine Function is Causing Trouble, a debugging note to the operators

Instructions 2 Counter Diagram: Primed Quantities 3 Counter Diagram: Unprimed Quantities (4) Graph similar to Figure I above Table similar to Table I above
Box 1, Folder 10  Problem L Coding a first draft by Hopper
Image(s)

Box 1, Folder 11  Problem L Coding a second draft by Hopper

Box 1, Folder 12  Problem L Coding final draft by Hopper
Image(s)

Box 1, Folder 13  Calculation of the functions h1(z), h1(z), h2(z), H2(z). by Hopper; Part II: Method of Computation of the Functions in Hankel Functions book (Volume 2: Comp Lab Annals) pp. xxx-xxxi, a preliminary version
Image(s)

Box 1, Folder 14  Problem L Report of the development of the coding for Problem L (?) by Hopper
Image(s)

Box 1, Folder 15  Tables of the Modified Hankel Functions of Order One-Third and of Their Derivatives; by the Staff of the Computation Laboratory Volume 2 of the Annals of the Computation Laboratory xerox copy of title page through page 3 this is the result of Problem L
Image(s)

Box 1, Folder 16  Invitation to Lieutenant Grace M. Hopper "to attend the Formal Acceptance Ceremonies of the Automatic Sequence Controlled Calculator" Monday, August 7, 1944, The Faculty Room of University Hall
Image(s)

Box 1, Folder 17  Invitation to LT. Hopper from Harold M. Westergaard, Dean of the Graduate School of Engineering "to attend an informal luncheon to be held... at one o'clock at the Harvard Faculty Club... before the ceremonies of formal acceptance of the Automatic Sequence Controlled Calculator."; place card lettered "Lt. Hopper" attached
Image(s)

Box 1, Folder 18  Invitation to Dr. Grace Hopper: "President Conant requests the honor of your presence at luncheon in the Warburg Room of the Fogg Museum of Art on Tuesday, January the seventh at twelve-fifteen o'clock on the occasion of the Opening of The Computation Laboratory"; RSVP to Prof. Aiken, also envelope
Image(s)

Image(s)

Box 1, Folder 19  Badge of Grace Hopper: 2 in blue metal circle Cruft Laboratory, Harvard University, Staff No. 62
Image(s)

Box 1, Folder 19  Arm Patch, Navy: navy blue field, White eagle, I in diamond, red stripe rating class: Specialist I, third class.
Box 1, Folder 20  
Request from Lt. (jg) Grace Murray HOPPER, USNR, WR (379475) to Officer-in-Charge, BuShips, Computation Project (Howard Aiken) 18 April 1945 request to wear dress uniform as bridesmaid.

Image(s)

Box 1, Folder 21  
Work schedule Mark I, 1945-1946

Image(s)

Box 1, Folder 22  
Operating instructions, Problem L., undated

Image(s)

Box 1, Folder 23  
Coding sheets and directory, Mark I., 1947

Image(s)

Box 1, Folder 24  
Mark I Manual, notes on coding., 1947

Image(s)

Box 1, Folder 25  
Envelopes used by Navy Project at Harvard.

Box 2, Folder 1  

Image(s)

Box 2, Folder 2  
Mark II coding sheets (1) Problem Sheet PRNC-NPG-68 (Rev. 12-49) Navy-DPPO PRNC, WASH., D.C. (4 copies) could do 30 lines of coding (2) an earlier version of the coding sheet (1 copy) could do 60 lines of coding

Image(s)

Box 2, Folder 3  
Layout of Mark II Original blueprint drawing by L.C.K., 16984

Image(s)

Box 2, Folder 4  

Box 2, Folder 5  
Mark III: Number transfer circuits

Image(s)

Return to Table of Contents
Series 2: Photographs of MARK II, 1948

Image(s)

Box 2, Folder 6  Mark II Manual

Box 2, Folder 7  (1) AA 964 General View of the Calculator Frontispiece

Box 2, Folder 7  (2) AA 965 Main Control Board and Wings

Box 2, Folder 7  (3) Floor Plan of the Calculator

Box 2, Folder 7  (4) AA 955 Operator's Table and Printers

Box 2, Folder 7  (5) AA 1000 Cam Unit

Box 2, Folder 7  (6) 8 January 1948 Tape Preparation Table

Box 2, Folder 7  (7) March 1948 Relays: latch type below

Box 2, Folder 7  (8) Cam Unit: details of cam-controlled

Box 2, Folder 7  (9) Cam Unit: rear view showing arc suppression circuits and drive motor

Box 2, Folder 7  (10) 8 January 1948 Control Panel: detail showing read-out lights

Box 2, Folder 8  (11) Sequence Mechanism and Roller Panel

Box 2, Folder 8  (12) 8 January 1948 Switches: left side of calculator [constants]

Box 2, Folder 8  (13) Interpolators

Box 2, Folder 8  (14) 8 January 1948 Functional Tape Preparation Unit

Box 2, Folder 8  (15) 8 January 1948 Tape Reading and Tape Punching Mechanisms

Box 2, Folder 8  (16) 8 January 1948 Control Tape Preparation Unit
Box 2, Folder 8  (17) Sequence Mechanism: detail showing sensing pins and control tape

Box 2, Folder 8  (18) Main Control Board: rear view showing sequence mechanisms

Box 2, Folder 8  (19) Interior of Relay Cubicle

Box 2, Folder 8  (20) Sequence Mechanism

Box 2, Folder 9  (21) Sequence Mechanism: interior view

Box 2, Folder 9  (22) Operating, Panel

Box 2, Folder 9  (23) 8 January 1948 Test Panels A and B

Box 2, Folder 9  (24) Left Wing of Calculator: Interpolator Mechanisms

Box 2, Folder 9  (25) Interpolator Mechanisms: rear view

Box 2, Folder 9  (26) Front Panel of Interpolator Mechanism

Box 2, Folder 9  (27) Interpolator Mechanism: interior view

Box 2, Folder 9  (28) Detail of Tape-Reader and Tape-Punch

Box 2, Folder 9  (29) Printer: interior view showing vanes

Box 2, Folder 9  (30) Right wing of Calculator: tape-readers and tape-punches

Box 2, Folder 10  (31) Lower Portion of Main Control Panel

Box 2, Folder 10  (32) Relay Bank and Rotary Switch

Box 2, Folder 10  (33) Switches on Operator's Table, (more photographs, not in Mark II Manual)
Box 2, Folder 10  
(34) Tape Reader and Tape Punch  
Image(s)

Box 2, Folder 10  
(35) Interpolator Mechanism  
Image(s)

Box 2, Folder 10  
(36) Relays  
Image(s)

Box 2, Folder 10  
(37) Cam Unit: rear view showing arc suppression and drive motor  
Image(s)

Box 2, Folder 10  
(38) Main Control Panel  
Image(s)

Box 2, Folder 10  
(39) Test Program Panel  
Image(s)

Box 2, Folder 10  
(40) View of the Calculator  
Image(s)

Box 2, Folder 11  
(41) Front View of Main Control Board, under construction from the left  
Image(s)

Box 2, Folder 11  
(42) Front View of Main Control Board, under construction, from the right  
Image(s)

Box 2, Folder 11  
(43) 18 February 1948 Packing Mark II for move to Dahlgren  
Image(s)

Box 2, Folder 11  
(44) 20 February 1948 Crates on truck at Harvard, ready to go to Dahlgren  
Image(s)
Series 3: Photographs at Harvard, 1944-1945

Image(s)

Box 3, Folder 1
(1) Campbell with typewriter

Image(s)

Box 3, Folder 1
(2) Aiken watching typewriter output

Box 3, Folder 1
(3) Livingston and Campbell setting constant switches no later than August 1944.

Image(s)

Box 3, Folder 1

Image(s)

Box 3, Folder 1
(5) Grace Hopper upon graduation from Midshipman's School 27 June 1944

Image(s)

Box 3, Folder 1
(6) Staff Portrait, at the time of the dedication, August 1944 top: Hawkins, Livingston, Knowlton, Bissell, Wheatland; middle: Bloch, Arnold, Aiken, Hopper, Campbell; bottom: Calvin, White, Verdonck

Image(s)

Box 3, Folder 1
(7) Staff Portrait, at the time of the dedication, August 1944 top: Bissell, Calvin, Verdonck, Livingston, White; bottom: Bloch, Arnold, Aiken, Hopper, Campbell.

Image(s)

Box 3, Folder 1
(8) Lt. Arnold and Lt. Hopper outside Cruft Laboratory, 1944 or 1945

Image(s)

Box 3, Folder 1
(9) Bissell, Lt. Hopper, Verdonck same spot outside Cruft 1944 or 1945.

Image(s)

Box 3, Folder 1
(10) Bissell outside someone's back door, 1944 or 1945; (2 copies)

Image(s)

Box 3, Folder 1
(11) Lt. Hopper in dress whites in front of ivy covered wall, 1944 or 1945.

Image(s)

Box 3, Folder 1

Image(s)

Box 3, Folder 1
(13) View of the Mark I, light up, from storage counters toward printers, with Bloch looking at printer output; pre-August 1944: also clipping of same, Harvard Service News, 8 August 1944.

Image(s)

Box 3, Folder 1
(14) Navy Specialists Operators of the Mark I, in front of the Mark I. L to R: White, Livingston, Calvin, Bissell, August 1944. (15) Calvin looking at typewriter and output, 1944.
Box 3, Folder 1  (16) Parts of the Mark I. Cam, Relay, and Counter, early 1944. Image(s)

Box 3, Folder 1  (17) Mark I from constant switches towards typewriters, about 1944.

Box 3, Folder 1  (18) Mark I composite photo straight on,, 1944 or 1945. Image(s)

Box 3, Folder 1  (19) Mark I from typewriters toward constant switches,, 1944 or 1945. Image(s)

Box 3, Folder 1  (20) Mark I from constant switches towards typewriters,, 1944 or 1945. MISSING Image(s)

Box 3, Folder 2  (21) Livingston in front of a house,, 1944 or 1945. Image(s)

Box 3, Folder 2  (22) Calvin and Bissell in back of a house,, 1944 or 1945. Image(s)

Box 3, Folder 2  (23) White, seated in chair, looking at book,, 1944 or 1945. Image(s)

Box 3, Folder 2  (24) Livingston operating tape punch,, 1944 or 1945. Image(s)

Box 3, Folder 2  (25) Calvin, in back of a house,, 1944 or 1945. Image(s)

Box 3, Folder 2  (26) Four scenes of winter of 1945 along Massachusetts Avenue near Cruft Laboratory. Image(s)

Box 3, Folder 2  (27) Lt. Hopper standing behind a car parked near Cruft Lab, 1945 to 1947 (?) Image(s)

Box 3, Folder 2  (28) Grace Hopper walking across the yard near Cruft Lab (1945 to 1949 (?) Image(s)

Box 3, Folder 2  (29) Bob Campbell at table in Cruft Lab , pre-1947 (2 copies). Image(s)

Box 3, Folder 3  (30) Cheers!" L to R: Bloch at piano, Aiken, Hopper, Brendel, Campbell (4 copies). Image(s)

Box 3, Folder 3  (31) Hopper and Campbell in front of fireplace with microphone Image(s)

Box 3, Folder 3  (32) Campbell with apron on, drinking
Box 3, Folder 3  (33) Campbell, with apron on, at microphone
Image(s)

Box 3, Folder 3  (34) View of the party L to R: Hopper (partially obscured), Campbell, Priscilla (Bloch's 1st wife), Bloch, ?
Image(s)

Box 3, Folder 3  (35) Wheatland and Bissell in the kitchen pouring drinks
Image(s)

Box 3, Folder 3  (36) Aiken, Campbell and ? in front of bus by baseball diamond
Image(s)

Box 3, Folder 3  (37) Watching the ball game from the sidelines L to R: Livingston, White, Calvin, Aiken stretched out
Image(s)

Box 3, Folder 3  (38) Watching the ball game, Aiken from the other side with some wives on the bench
Image(s)

Box 3, Folder 3  (39) The ball game; Hawkins the catcher, Mrs. Campbell(?) at bat, Livingston and ? with wives as spectators

Box 3, Folder 3  (40) The ball game: Hawkins as catcher, White at bat
Image(s)

Box 3, Folder 3  (41) Aiken chopping wood for a fire
Image(s)

Box 3, Folder 3  (42) Lt. (J.G.) Lish Bailey and Gary Huntsberger beside a tree
Image(s)

Box 3, Folder 3  (43) Eating around the campfire Huntsberger on log, White standing behind fire
Image(s)

Box 3, Folder 3  (44) Down the path Aiken in khaki, Hopper towing little red wagon
Image(s)

Box 3, Folder 3  (45) To launch the canoes or go in swimming? L to R: Ruth Knowlton in dark bathing suit Verdonck, Aiken, Hopper in light bathing suit, Lt. from Dahlgren
Image(s)

Box 3, Folder 3  (46) Bus parked in backyard of Grace Hopper's parents country home in New Hampshire ? furthest right, Aiken bending
Image(s)

Box 3, Folder 3  (47) Bus parked in backyard of Hopper's parents country home in New Hampshire. Mr. and Mrs. Murray (her parents) are the two furthest right sitting in chairs
Box 3, Folder 3  
(48) Setting off on the bus at Harvard, L to R: Bloch, Aiken, Calvin (?), Lt. from Dahlgren, Arnold, Campbell, Bissell

Box 3, Folder 3  
(49) Preparing to board the bus at Harvard L to R: Aiken, Bloch, Arnold, Campbell, Lt. from Dahlgren, Calvin, Bissell

Box 3, Folder 3  
(50) The Iceman Cometh, getting ice before the trip L to R: Hawkins, Campbell, Bloch, Livingston, Aiken, Iceman, Bissell

Box 3, Folder 3  
(51) Another iceman picture L to R: Hawkins, Bloch, Livingston, Aiken, iceman

Box 3, Folder 3  
(52) A rest stop on the trip L to R: Aiken, Calvin, Bissell and Bloch after each other, Campbell holding his wife's arm, Arnold looking on, Livingston beside Campbell, Lt. from Dahlgren by door of bus, White on other side of door, Hopper in doorway

Box 3, Folder 3  
(53) A rest stop on the trip (same house as above picture) L to R: Hopper at door of bus accepting liquid refreshment from Bissell by driver's seat

Box 3, Folder 4  
(54) Steeple of Harvard's Memorial Church in the Harvard Yard as seen from the science buildings

Box 3, Folder 4  
(55) Basement of Cruft Lab, 9 September 1945

Box 3, Folder 4  
(56) Working on the blueprints for the Mark II 27 September 1945; L to R: Aiken, Campbell, Miller, ?, Wilkins

Box 3, Folder 4  
(57) In the machine shop 27 September 1945. L to R: Porter, ?, Hourihan, Huntsberger

Box 3, Folder 4  

Box 3, Folder 4  

Box 3, Folder 4  
(60) Working on the plugging and backboard wiring of the Mark II, 5 June 1946
(61) Working on the plugging and backboard wiring of the Mark II 5 June 1946. Chief Porter, White shirt

(62) Ensign Brendel with the sequence mechanism, 1945 or 1946

(63) Ensign Brendel at desk with coding chart on wall behind, 1945 or 1946

(64) Looking through the plastic cover to Mark I printers L to R; Campbell (in the shadow), Livingston, White, pre-1947

(65) Working on the plugging for the Mark II. L to R: Hawkins going at the machine, Burns with pencil behind ear, Roche looking on, Bloch sitting with wiring diagram, 20 September 1946

(66) One of the Specialists and his wife (?) about 1945 or 1946 in folder marked "The LATIN QUARTER, Winchester Street, Boston, Mass." taken by Club Photo Service, Winchester St. Boston 16, Mass. Tel., Hancock 2859

(67) Envelope from WINTHROP FOSTER, Northampton's Camera Store with order for prints made from negatives for Mitchell, Hotel 206

(68) Plan for the Basement of the Computation Laboratory

(69) Construction of the Computation Laboratory basement complete, putting up walls around the outside, also girders to support floor of computer room. Note: wet concrete in left corner of picture

(70) Construction of the Computation Laboratory basement complete, walls built up higher than previous picture, frames being laid for pouring the first floor, area is better policed; the wet concrete is dry

(71) Aiken between two men on the loading platform of the nearly complete Computation Laboratory, October 1946

(72) Beginning to move the Mark I to its new home in the Computation Laboratory L to R: Lucchini wielding hammer, Pizzano and Roche holding A-frame, Burns standing

(73) The Computation Lab as it stood complete Fall, 1946
Box 3, Folder 5  
(74) Lt. Hopper seen at her desk in the Computation Laboratory; glass shelves with early calculating machines seen in background, 1947

Box 3, Folder 5  
(75) Wheatland (?) looking through glass shelves with calculating machines to Campbell and Bloch sitting at their desks (Bloch looking toward camera), 1947. Computation Laboratory

Box 3, Folder 6  
(76) Drawing of interpolator tape with various values. Photograph of this is Neg. # AA-443 March 27, 1946; the values ARG 0.32 to ARG 0.31 are seen like this in the Mark I Manual, Fig. 14

Box 3, Folder 6  
(77) Richard P. Babbage, Charles Babbage's grandson, showing parts of the difference engine to Aiken, December, 1946; also seen in the Christian Science Monitor, 9 January 1947 ("Britain's First Mathematical Engine.")

Box 3, Folder 6  
(78) Cmdr. Aiken and Lt. Hopper with parts of the difference engine; Christian Science Monitor picture seen in the Christian Science Monitor 20 March 1946, 1st page of second section

Box 3, Folder 6  
(79) Official portrait of Aiken, sitting holding a book, 15 February 1946

Box 3, Folder 6  
(80) At the dedication of the Computation Laboratory L to R: Rear Admiral W.D. Baker, Commander of the U.S. Naval Base in Boston; Grace Hopper; Capt. A.M. Van Eaton, wartime commander of Fargo Barracks in Boston similar, but not the same picture published in the Christian Science Monitor Tuesday, 7 January 1947.

Box 3, Folder 6  
(81) Showing off the Mark II, 1947. L to R: Woltmann, explaining the tape reader; Admiral Deyo, Commandant, First Naval District; Capt. C.C. Bramble; Admiral C.T. Joy, Director, Naval Proving Ground, Dahlgren, Va.; Aiken, Reynolds

Box 3, Folder 6  
(82) Aiken showing the tape punches and readers to Rear Admiral C.T. Joy, Director, Naval Proving Ground, Dahlgren, Va., 1947

Box 3, Folder 6  
(83) Lt. Commander Joseph O. Harrison, Jr., going over diagrams for the Mark III (?)

Box 3, Folder 6  
(84) Peter Lindley with pipe and slide rule

Box 3, Folder 6  
(85) Mark III tape reader
Box 3, Folder 6  (86) Unidentified man, undated
Series 4: Reports and Articles, 1946 - 1948

Box 3, Folder 7

Official Register of Harvard University (Volume XLIII, 25 September 1946, No. 25) Department of Engineering Sciences and Applied Physics, containing an announcement for 1946-1947; published by the University * Cambridge, Massachusetts. Includes: photo of Mark I (p. 52); half-page on Computation Laboratory (p. 53); Research Course 20t. (Professor Aiken) Numerical Analysis and Design of Calculating Instruments (p. 48). Image(s)

Box 3, Folder 8

Harvard University Press. Fall Books, 1946 (correct as of 30 September 1946) Mathematics section, page 20: A Manual of Operation for the Automatic Sequence Controlled Calculator by the Staff of the Computation Laboratory; short description of contents, pages, diagrams, Tables of the Modified Hankel Functions of Order One-Third and of Their Derivatives, by the Staff of the Computation Laboratory, mentions importance of tables, pages,

Box 3, Folder 9

Harvard University: The President's Report -1946: Promotion to Professor (p. 25); Howard Hathaway Aiken -Professor of Applied Mathematics. Appointments to Associate Professorship (p. 27); Donald Howard Menzel -Associate Director for Solar Research in the Harvard College Observatory.

Box 3, Folder 10

Journal of Applied Physics (Volume 17, Number 10 -October 1946) Section: Here and There (page 856); Harvard Computation Laboratory Comp. Lab, general use of Mark I. Drawings: First Floor Plan, Comp Lab (p. 856). Drawing of outside front view (cover). Image(s)

Box 3, Folder 10


Box 3, Folder 11

Mathematical Tables and other Aids to Computation. Published by the National Research Council; A Quarterly Journal edited on behalf of the Committee on Mathematical Tables and Other Aids to Computation by Raymond Clare Archibald (and) Derrick Henry Lehmer. Copies as of July 19, 1972:

Box 3, Folder 11

Number 16 October 1946

Box 3, Folder 11

Number 18 April 1947

Box 3, Folder 11

Number 20 October 1947

Box 3, Folder 12

Mathematical Tables and other Aids to Computation. Published by the National Research Council; A Quarterly Journal edited on behalf of the Committee on Mathematical Tables and Other Aids to Computation by Raymond Clare Archibald (and) Derrick Henry Lehmer. Copies as of July 19, 1972:

Box 3, Folder 12

Number 21 January 1948
Box 3, Folder 12  Number 22 * April 1948 (2 copies)

Box 3, Folder 12  Number 23 July 1948

Box 3, Folder 12  Number 24 October, 1948

Box 3, Folder 13  Electrical Engineering Published monthly by the American Institute of Electrical Engineers; Editor --G. Ross Henninger. Volume 65, Numbers 8-9, August-September 1946; Number 10, October 1946; Number 11, November 1946 (These contain the articles by Aiken and Hopper on the Mark I)

Box 4, Folder 1  Report No. 25, Bureau of Ordnance Computation Project, Harvard University, Cambridge, Massachusetts Nord -8555, TASK C. Auxiliary Functions for the Computation of the Moments of an Ogive, by Joseph O. Harrison, Jr., August 1946.

Box 4, Folder 2  Report No. 27, Bureau of Ordnance Computation Project, Harvard University, Cambridge, Massachusetts. The Numeroscope, An Electronic-Photographic Printer for Large-Scale, High-Speed Calculating Machines, by Harrison W. Fuller January, 1947

Box 3, Folder 3  Popular Science Monthly (Volume 150: No. 5 -May 1947). "Inside the Biggest Man-made Brain: Navy's new calculator has steel bones, silver nerves, paper impulses, and can make mistakes" by Stephen L. Freeland (pp. 95-100). Mark II photographs: 6 men holding some of the wiring; angled view of main panel board; floor plan; printers and test panels; view over top looking at relay cubicles; composite front view of calculator; easy removal for replacement of stepping switches

Box 3, Folder 3  Office Work at Electronic Speed, article for submission to the magazine The Office. Tissue paper copy of original 6 pages seems to be about early 1948 (Mechanical brains complete SSEC and Mark II); 3 pages history and explanation of function, 3 pages possibilities and probable features for office work.

Box 3, Folder 4  SCHEDULE "A" ELECTRONIC MACHINE wet copy process copy of original 8 pages. Date: "8-48(36" (in top right corner of first page); penciled note on top of first page, "Jane is waiting for schedule "C" from Berkley"; part of an agreement (unknown at this time) for an electronic machine with magnetic tape memory, input, and output and fast memory of mercury tanks to be used in the business of life insurance (see 1.b.).
Series 5: Eckert-Mauchly Corporation, 1949 - 1965

**Image(s)**

**Box 4, Folder 5**  
Coding of a LaPlace Boundary Value Problem for the UNIVAC by Frances E. Snyder (=Betty Holberton) and Hubert M. Livingston. Reprinted from MATHEMATICAL TABLES AND OTHER AIDS TO COMPUTATION, III, Number 25, January, 1949, pages 341-350.

**Image(s)**

**Box 4, Folder 5**  
Program of Association for Computing Machinery: Oak Ridge, Tennessee April 18, 19, 20, 1949. Sponsored by Oak Ridge National Laboratory, Oak Ridge Institute of Nuclear Studies, Carbide and Carbon Chemicals Corporation, Fairchild Corporation, NEPA Division: includes Grace Hopper's pen and pencil notes; job hunting time for her - offers she was made. Mark II Manual; 38 x 38 matrix in 59 1/2 hours included complete checking.

**Image(s)**

**Box 4, Folder 5**  
BINAC INSTRUCTIONS by Grace Hopper, 7/20/49

**Image(s)**

**Box 4, Folder 5**  
Report A-MP-3B on BINAC, 8/1/49; by AAK (Arthur A. Katz)

**Box 4, Folder 5**  

**Image(s)**

**Box 4, Folder 5**  
Matrix Algebra on the BINAC 8/10/49. Report A-230-2B and A-240-3B by HFMr (Herbert F Mitchell, Jr.) 5 pages; a copy of the original (wet copy process of the time) first attempt at matrix operations on the BINAC.

**Image(s)**

**Box 4, Folder 5**  
Demonstration problem flowchart, 8/15/49 (16 1/2 x 22") by MKL (Margery K. League); a copy of the original (wet copy process of the time) looks somewhat like a ditto.

**Image(s)**

**Box 4, Folder 5**  
Matrix Inversion Routine for the BINAC, 9/23/49. Report A-240-3B by Herbert F. Mitchell, Jr.; 4 typed pages. P. 5 is a table for symbol position in the coding, p. 6 and 7 are flowcharts Matrix Inversion I and II drawn by Helen M. Diehl at Mitchell's direction.

**Image(s)**

**Box 4, Folder 5**  

**Image(s)**

**Box 4, Folder 5**  
Two Year's Work in Five Minutes: That's what BINAC can do! The story of this newest electronic brain" is a report on progress of Philadelphia's newest industry." Reprint from the October, 1949, issue of PHILADELPHIA Magazine; 3 pages, xerox copy of same.
Box 4, Folder 5
Grace Hopper's first code card for BINAC (3 x 5 card about 1949, in yellow envelope).

Box 4, Folder 5
Invitation by The Eckert-Mauchly Computer Corporation "to attend a demonstration of the new electronic binary automatic computer BINAC": with space to write in person invited and date; 1949, 3 copies (one in an envelope) also 2 xerox pages of the invitation.

Box 4, Folder 5
The BINAC: A Product of the Eckert-Mauchly Computer Corporation. Copyright 1949 by Eckert-Mauchly Computer Corporation; 8 page pamphlet on the BINAC (to be given to people attending the demonstrations?)

Box 4, Folder 5
Mechanical Brains: An entirely new class of high-speed automatic computing machines, with rudimentary organs of memory, judgment, and mathematical logic, points to the second industrial revolution By Louis N. Ridenour. Reprinted from Fortune Magazine. Copyright 1949 TIME Inc. (4 pages, including title page photographs: plugboards of ENIAC, A Mercury Memory Organ).

Box 4, Folder 5
An Introduction to The UNIVAC System. The information herein is not for publication, and is to be held confidential. Return to Eckert-Mauchly Computer Corporation, Broad and Spring Garden Streets Philadelphia 23, PA.

Box 4, Folder 5
Table of Computers, c. 1949 (17 x 11") by Grace Murray Hopper. Lists: Agency, Type, Memory Type, Registers, Number System, Decimal Point, Multiply Time, Input, Output, Matrix, Computers: Mark I (ASCC), Bell Relay, ENIAC, Mark II, BINAC, Mark III, Whirlwind I, Hurricane, Maniac, EDVAC, and UNIVAC.

Box 4, Folder 5
Demonstration Problem for BINAC, 3/11/49. Report A -X -3: Section A collates octal-coded decimal quantities Section B converts these quantities to binary notation, computes, and reconverts computed quantities to octal-coded decimal notation.

Box 4, Folder 5
Proposed 7 pulse code for UNIVAC with odd checking pulse, 5/6/49. Code C-10 by F.E.S. (Frances Elizabeth Snyder)

Box 4, Folder 5
UNIVAC Instructions code C-10 5/6/49, by F.E.S. (Frances Elizabeth Snyder)

Box 4, Folder 5
UNIVAC Instructions Code C-10 by F.E.S. (Frances Elizabeth Snyder), 6 May 1949.

Box 4, Folder 6
UNIVAC Instructions C-10, 6/10/49, by F.E.S. (Frances Elizabeth Snyder). 6 pages first page stamped "Second Draft", GMH initial at top of first page pencil corrections, pages 1, 2, 3, 4, page 6: Code C-10 Times in Minor Cycles 8/31/49 by FES
Box 4, Folder 6  

Box 4, Folder 6  
ADDENDUM The Barber-Colman Computer: Properties as of September 22, 1949, Barber-Colman Co., Rockford, Ill. 8-95(70 Edition of September 28, 1949 by E.C.B., 3 pages. Note: "A study model of the computer has been actually operating under test since May, 1949."

Box 4, Folder 7  
UNIVAC Instruction Code C-10, 1/27/50 by FES (Frances Elizabeth Snyder), 15 pages: p. 11, Additional Information for Code C-10; p. 14, Pulse Code (2 copies, one initialed G. M. Hopper on pages 1, 11, and 14).

Box 4, Folder 7  
Solution of Matrix Equations of High Order by an Automatic Computer, 2/2/50: A-240-3 and A-240-4 by Herbert F. Mitchell, Jr., 23 pages; pages 1-19 text, 20-22 appendix, 23 Table I.

Box 4, Folder 7  

Box 4, Folder 7  
Outline for Second Lecture: Programming Course for EMCC's Engineers, 11 April 1950; A-TC-7, no author but probably by H.F. Mitchell (see First Lecture), 2 pages.

Box 4, Folder 7  

Box 4, Folder 7  
MEMO to Mr. J.P. Eckert, Jr. from Miss Betty Snyder. Subject: Table of Percents of Total UNIVAC Time Utilized by Various Operations, DP-16; Code C-10, 8 July 1950.

Box 4, Folder 7  
Flow Chart Symbols, 15 June 50, MP-2 by Arthur A. Katz

Box 4, Folder 7  
MEMORANDUM for Henry W. Schrimpf, Methods Analyst, re: ONR Mathematical Computing Advisory Panel meeting of 8 June 1950 by R.B. Thornley, Systems Reviewer, 15 June 1950; 8 tissue paper sheets, pages 1-5 report of the meeting, 6-7 agenda of the meeting, 8 table: comparative figures of cost and staff for various computers, xerox copy of same.
Box 4, Folder 7  Sample Table of Contents for Reports A-12, 22 August 1950 by GMH (Grace Murray Hopper), 1 page.

Box 4, Folder 7  2 eye-fillers go well together! Joyce Holden, movie starlet, supplements her knowledge of electronics with a visit to the UNIVAC exhibit at the National Business Show." Systems Magazine, December 1950: p. 20 photograph: Miss Holden with mercury memory.

Box 4, Folder 7  UNIVAC Programming Form No. 1-1101 (F), Copyright 1950 EMCC; a subsidiary of Remington Rand, Inc.

Box 4, Folder 7  Technical Writing, by Joseph D. Chapline, Jr.: copyright 1950 by J.P. Chapline, Jr., First Prize Billin Award Contest, 1950, Engineers' Club, Philadelphia: 8 pages, pamphlet.

Box 4, Folder 8  Programming UNIVAC Fac-tronic Systems, Manual I Advance Copy (ditto copy); post-March 1950 when EMCC became subsidiary of Remington Rand (see P. I-1-3): I-1-1 to I-1-8 History of High Speed Computers and Electronics for Business, I-2-1 to I-2-11 Problem Analysis by Surveys to Preparation of a Process Flow Chart, I-3-1 to I-1-9 Functions of the UNIVAC Fac-tronic System, I-4-1 to I-4-33 The Language of the Computer, programming and coding, I-5-1 to I-5-7 Control and Tape Handling, I-6-1 to I-6-10 Digital Sorting, Collating, External Collating, Merging, Format of output, Columnar Arrangement.

Box 4, Folder 9  New Old Faithful, 7 February 1951; 050-11, no author "The purpose of this routine is to test all UNIVAC instructions and to perform a memory check." p.1.

Box 4, Folder 9  If Robots Run the Works: LOGIC applied to assembly lines through the use of mechanical brains may spell the end of manpower shortages for industry. by John Kord Lagemann, Nation's Business, March, 1951, pp. 31-33, 79-81.

Box 4, Folder 9  Automatic Subroutine for the Elementary Transcendental Functions, October 1951, note in pencil on top of page: "Joe Harrison to Hopper problems lead to Compiler".

Box 4, Folder 9  Joint AIEE-IRE Computer Conference Program

Box 4, Folder 9  10-12 December 1951 Benjamin Franklin Hotel, 9th and Chestnut Streets, Philadelphia, PA.

Box 4, Folder 9  Code Card UNIVAC I: original code card Grace Hopper developed; Copyright 1951 by EMCC; List of Instructions, UNIVAC Pulse Code.
Box 4, Folder 10
The Education of a Computer, Dr. Grace Murray Hopper. Presented at the meetings of the Association for Computing Machinery 2-3 May 1952.

Box 4, Folder 10
Systems Engineer, 14 August 1952; one tissue paper original copy by RDW, corrected in blue pencil by Herbert F. Mitchell; first definition of a systems engineer.

Box 4, Folder 10
Evening Course in Mathematics for Digital Computers Conducted by Dr. John W. Mauchly, Fall Semester 1952-1953, Department of Mathematics, College of Liberal Arts and Sciences, Temple University, Philadelphia 22, Pennsylvania: course description pamphlet.

Box 4, Folder 10

Box 4, Folder 10
Original UNIVAC Printout of Election '52 Prediction "It's awfully early, but I'll go out on a limb. UNIVAC predicts --with 3,398,745 votes in --Stevenson Eisenhower. The chances are now 100 to 1 in favor of the election of Eisenhower."; in blue ink, "property of Grace M. Hopper".

Box 4, Folder 10
Program (Advance) Second Annual Joint AIEE, IRE, ACM Computer Conference and Exhibition, 10-12 December 1952, Park Sheraton Hotel, 7th Avenue and 55th Street, New York City: featuring "Input and Output Equipment Used in Computing Systems".

Box 4, Folder 11

Box 4, Folder 11
RemRand News; Vol. IV, No. 20, New York 10, New York, July 1953

Box 4, Folder 11

Box 4, Folder 11
Organization Chart A Family Tree of Computers Influences by Grace Hopper, 4 December 1953.

Box 4, Folder 12
Preliminary Definitions: Data-Processing Compiler by Dr. Grace Murray Hopper, 31 January 1955;
Box 4, Folder 12  
Input-Output Instructions (Preliminary) by Dr. Grace Murray Hopper, 12 February 1955, 10 pages: pages 1-2, Input-Output Instructions; pages 1-5, Sample Inventory; 3 unmarked pages, 17 statements in English, French, and German.

Box 4, Folder 12  
Automatic Programming Development: Program for B-0 Compiler Development by Marjorie M. Mulder (?) and Norma C. Cousins, 14 March 1956; 2 pages, #1 Memo, #2 Flowchart of work setup.

Box 4, Folder 12  

Box 4, Folder 12  

Box 4, Folder 12  
Automatic Programming Development: "Programming Package" or "Layette for a Computer" by Dr. Grace Murray Hopper, 23 July, 1959, 3 pages; pages 1-2 Memo, page 3 Check List of Programming to be delivered with a computer note in pencil on top sheet "Memo that started word software", Xerox copy. MISSING

Box 4, Folder 12  

Box 4, Folder 12  

Box 4, Folder 12  
Time Sequence U.S. Computers, by Grace Murray Hopper: time sequence only goes to 1959, 4 pages; page 1 time sequence, pages 2-4 list of computers and producers and destination; seems to go with a flowchart or family tree of computers, xerox copy.

Box 4, Folder 12  
Criteria for Evaluation of Compiling Systems: General Requirements (no author), 1 July 1960, 6 pages; page 1, Main title; pages 2-4 Specific Criteria; pages 5-6 Specific Evaluation of B-2.

Box 4, Folder 12  
General Views on COBOL by Jean E. Sammet, Data Systems Operations, Sylvania Electric Products, Inc. 189 B Street, Needham 94, Massachusetts, 2 December 1960.

Box 4, Folder 12  List and description of computers known to Cmdr. Hopper as of 1949-1950.
Series 6: Compiling Routines, 1952 - 1954

Box 5, Folder 1  Report of Dr. Grace Hopper on 6 January 19??

Box 5, Folder 1  Title page: COMPILING ROUTINES, 21 December 1953

Box 5, Folder 1  Memo of report by Grace M. Hopper, 6 January 19??; abstract of the report.

Box 5, Folder 1  Developments in Compiling Techniques to 31 December 1953, by Dr. Grace Murray Hopper, 31 December 1953, 11 pages: pages 1-9, 11 contain the report; page 10, table "Aids to Man’s Work" taken from Electrical Engineering, January 1954; p. 24, the report.

Box 5, Folder 1  The Education of a Computer, (EXHIBIT A) by Dr. Grace Murray Hopper presented at the meeting of the Association for Computing Machinery 3 May 1952 Pittsburgh, Pennsylvania, 12 pages.

Box 5, Folder 1  Compiling Routines, (EXHIBIT B) by Richard K. Ridgway, presented at the meetings of the Association for Computing Machinery, 8-9 September 1952, Toronto, Canada.

Box 5, Folder 1  The Education of a Computer", (EXHIBIT C) by Grace Murray Hopper Reprinted from the Proceeding of a Symposium on Industrial Applications of Automatic Computing Equipment, Midwest Research Institute, Kansas City, Missouri: 8-9 January 1953, pp 139-144.

Box 5, Folder 1  Compiling Routines, (EXHIBIT D) by Dr. Grace Murray Hopper, Vice President, Society for Industrial and Applied Mathematics, Philadelphia. Reprinted with permission from COMPUTERS AND AUTOMATION, May 1953.

Box 5, Folder 1  Bureau of the Census: Workshop on Automatic Programming for the UNIVAC, (EXHIBIT E) 16 July 1953, 3 pages; page 1: Agenda of the Workshop, pages 2-3: "Carne Problem: Response of a Particular R-C Circuit to a Pulsed Signal" by Frank M. Delaney; a demonstration of the A-1 Compiler on the UNIVAC.


Box 5, Folder 1  A-2 Compiler, four cartoons drawn by H-S Translation Phase, 28 October 1953, First Sweep 27 October 1953, Second Sweep 10/28/53, Main Compilation 10/??/53.
Box 5, Folder 1  The A-2 Compiler by Dr. Grace Murray Hopper, 29 October 1953: 3 pages plus flowchart "Compiler Method of Problem Solution".

Box 5, Folder 1  Statement of the Optical Ray Problem, (EXHIBIT F) 8 pages; page 1 statement of the problem, p. 2 data, p. 3 flow chart, p. 4 use of working storage, pp. 5-8 Information for Optical Ray Problem (i.e. coding).

Box 5, Folder 1  Letter, 3 December 1953, (EXHIBIT G) to Dr. Grace Hopper from Elmore G. Lawton, LTC, CE Army Map Service, Washington, D.C.; interested in trying A-2 Compiler on their problems, has promise of increasing efficiency of computing with UNIVAC.

Box 5, Folder 1  Letter, 14 December 1953, (EXHIBIT H) to Dr. Grace Hopper from Emil D. Schell, Chief, Mathematical Computation Branch, AFAPA-3B, DCS/Comptroller, Hq USAF, Washington 25, D.C.; made effective use of A-2 Compiler, yet somewhat handicapped by lack of descriptive material; want copies of expository material and operating instructions.

Box 5, Folder 1  Letter, 14 December 1953, (EXHIBIT I) to Dr. Grace Hopper from Emil D. Schell, Chief, Mathematical Computation Branch, AFAPA-3B, DCS/Comptroller, Hq USAF, Washington 25, D.C.; used A-2 Compiler for an Air Force problem; found subroutine to compute the cosine of an angle contained errors, enclose their corrections.Letter, (EXHIBIT J) to Dr. Grace Murray Hopper (illegible copy).

Box 5, Folder 1  Letter, Undated (EXHIBIT J) Too Faded to Determine Author, Recipient, Date, or Subject.

Box 5, Folder 1  The A-2 Compiler System: Operations Manual, (EXHIBIT K) 15 November 1953. Copyright 1953 by Remington Rand, Inc. "A working paper intended to provide...all the information necessary to make use of the existing system." "The A-2 Compiler System has been developed by Richard K. Ridgway and Margaret H. Harper under the direction of Dr. Grace M. Hopper, Programming Research Section, Electronic Computer Department, Remington Rand, Inc."

Box 5, Folder 2  Unknown Chart/Grid, Features Binary, Numerals, Letters, and Symbols. Undated.

Box 5, Folder 2  Survey of Automatic Data-handling and computing (3 pp. blank form).

Box 5, Folder 2  Glossary of Automatic Programming Terms (2 copies).
Series 7: Press Clippings, 1944 - 1953

Box 5, Folder 3  
Torrey, Volta, Robot Mathematician Knows All the Answers, POPULAR SCIENCE, October 1944, pp. 86-89, 222f.

Box 5, Folder 4  
Davis, Watson, Ten Most Important Scientific Advancements of 1944, Tribune (handwritten in pencil, possibly NY Herald Tribune, in ad for Popular Science) (note: IBM, NYC, had Xerox, find out from there).

Box 5, Folder 5  

Box 5, Folder 5  

Box 5, Folder 6  
Grant, Lester "35-Ton Super-Brain Can Solve Hardest Mathematical Problem: It can do Simple Addition or Dynamic Equations; an Hour-Long Problem Solved in 5.8 Seconds; I.B.M. Presents Device to Harvard Today" Staff Correspondent to ? dateline Aug. 6-7 August 1944.

Box 5, Folder 7  
New York Herald Tribune, "The Greatest of Mathematical Calculating Machines and Its Designer" 7 August 1944. Pictures Aiken with Mark I, Hopper with tape punch, Bloch with output

Box 5, Folder 8  
Galbraith, "Side Glances" (cartoon) date September 18th "Just what I predicted! Here's an automatic arithmetic machine that does everything --why should I go on making a fool of myself studying those miserable fractions?"

Box 5, Folder 8  
Mathematics by the Millions editorial.

Box 5, Folder 9  
Mathematical Brain, title under photos in Boston paper, 7 Aug. 1944 Aiken and Hopper with interpolator, White with tape racks, Aiken with interpolator(?)

Box 5, Folder 10  
A Mathematical Robot With All the Answers Philadelphia Inquirer, 20 August 1944. Aiken with Mark I, Hopper with tape punch, White with sequence mechanism.

Box 5, Folder 11  

Box 5, Folder 12  
The Aiken Machine editorial taped to same page as above


Harvard Told Robot Brain Just a Starter" from a Boston paper.


Mathematical Robot, TIME, 14 August 1944, picture Aiken with tape and Mark I topic: Science.


Think Machine" under picture of Hopper with tape punch, Newsweek, 14 August 1944.
Image(s)

Image(s)

Box 5, Folder 22 Robot Works Problems Never Before Solved, Popular Mechanics Magazine, October 1944; Pictures: Aiken with calculator, Hopper with tape punch, Verdonck(?) with tape racks, view of tape.
Image(s)

Image(s)

Box 5, Folder 24 Table of Contents Newspaper Clippings Given by Grace Hopper, 3 Pages
Image(s)

Box 5, Folder 24 'Mechanical Brain' from Harvard To Seek 'Push-Button' War Answers Boston Sunday Herald, 7 March 1948, (AP) Mark II, move to Dahlgren.

Box 5, Folder 24 25-Ton 'Mechanical Brain' Built at Harvard for Navy Boston Sunday Globe, 7 March 1948; photo of Mark II, move to Dahlgren.
Image(s)

Box 5, Folder 24 New, Faster Mechanical Brain Being Built at Harvard for Navy Paul Stevens (2 copies) 22 August 194?, photos: Aiken, Hopper Mark III.
Image(s)

Image(s)

Box 5, Folder 24 Navy Calculating Machine Moved to Dahlgren, Va," a Boston paper, day after 1st Naval District announced people going with calculator.
Image(s): Grace Murray Hopper Collection

Box 5, Folder 24 Mechanical Brain Moved to Navy Proving Ground New York Herald Tribune, Sunday, 8 March 1948 (AP) Mark II, Move to Dahlgren.

Box 5, Folder 24 Multiplies Billions in One Flash: Navy's New Machine Made at Harvard for $600,000 Robert M. Farrington, a Boston paper, 7 March 1948 (AP), Mark II, move to Dahlgren.
Image(s): Grace Murray Hopper Collection

Box 5, Folder 24 Harvard Unveils Huge Calculator: It Will Solve Guided Missile Ballistic Problems and New Aerodynamics for Navy: Thrice Forerunner's Size: Mark II Twelve Times as Fast, Doing in a Second a Multiplication Running into Billions William M. Blair (Special to the New York Times), 8 January 1947, Mark II dedication, 47 Symposium 1st day.
Box 5, Folder 24

Biggest Harvard 'Brain' Tuned to Navy Rockets (Page 1) continued (Page 12) as "Harvard Bares Biggest 'Brain' to Cerebrate on Navy Rockets" W.E. Playfair, Boston Herald, Wednesday, 8 January 1947 photo: Miss Kepke with abacus in front of Mark I, mislabeled Mark II. Mark II, 1st day 47 Symposium.

Image(s)

Box 5, Folder 24

Mammoth Mechanical Brain Is Irked by Too Much Work New York Herald Tribune, 12 January 1947, Mark II.

Image(s): Grace Murray Hopper Collection

Box 5, Folder 24

Huge Mechanical Brain Operated at Unveiling, 8 January 1947, (INS) Mark II.

Image(s): Grace Murray Hopper Collection

Box 5, Folder 24


Image(s)

Box 5, Folder 24


Image(s)

Box 5, Folder 24


Box 5, Folder 24

Dots on Film Latest in Speed Calculation, Boston Sunday Herald, 9 November 1947 (AP); Kodak photographic memory.

Image(s)

Box 5, Folder 24

Machine Can Calculate and Remember, The Washington Post, Wednesday, 28 January 1948 (AP) IBM SSEC.

Image(s)

Box 5, Folder 24


Image(s)

Box 5, Folder 24


Box 5, Folder 24  Science's New 'Memory Machines' do Virtually Everything But Talk, W.E. Playfair, Boston Herald, Thursday, 9 January 1947; 47 Symposium -memory devices -Sharpless (EDVAC) and Forrester (Whirlwind).


Box 5, Folder 24  M.I.T. Scientist 'Rebels' At War Research Talk: Wiener Cites Moral Issue in Use of Discoveries Against Civilians, Sara White Boston Traveler, Wednesday, 8 January 1947 (page 1, 12); part of text of letter to Atlantic Monthly entitled "A Scientist Rebels".

Box 5, Folder 24  Conscience and the Machine editorial, New York Herald Tribune, Friday, 10 January 1947, (2 copies p. 18); Wiener, military use of scientific developments.

Box 5, Folder 24  Conscience in Science editorial, Boston Globe, Friday, 10 January 1947, (page 18); Wiener, progress in science and destruction of human life.


Image(s)

Box 5, Folder 25
Christian Science Monitor, Wednesday, 20 March 1946 (1st page 2nd section) "New Mathematical Robots Unscramble Digits to Multiply Inventions", full page on high speed calculators including: "Research Labs Calculate Devices To Bridge Years of Two Plus Two" by Herbert B. Nichols (Natural Science Editor of The Christian Science Monitor), survey of developments, MIT's differential analyzers, ; "Gears Failed to Mesh Century Ago" by a Staff Correspondent early computing machines, Babbage, Pascal, Leibnitz "ENIAC Weighs 30 Tons, Fires Answers for Army" Special to the CSM from Philadelphia ENIAC, uses, problems; "Engineers Win Fast Answers From Electric 'Thinking Cap'", Special to the CSM from Pittsburgh Westinghouse network calculator.

Box 5, Folder 25
Photographs: ENIAC, setting constants, wiring, MIT electro-mechanical differential analyzer, input graphically; Westinghouse network calculator; ENIAC digit trays; Aiken and Hopper with difference engine.

Box 5, Folder 25
60-Day Moving Job Just Case of Harvard 'Brain' Fatigue, W.E. Playfair Boston Sunday Herald, 15 September 1946 (p. 1, 2C., 2 copies) move to Computation Lab from Cruft Lab, description of lab.

Box 5, Folder 25
Fabulous Robot Brain Now Works For Navy, Paul Stevens, Boston Herald, Monday, 7 August 1944, (pp. 1, 6.) also tape, Mark I dedication.

Box 5, Folder 25
Behemoths Multiply: British Calculators Got There First, Herbert B. Nichols, Christian Science Monitor, Babbage and Aiken.

Box 5, Folder 25
Britain's First Mathematical Engine, photo, Christian Science Monitor, Thursday, 9 January 1947; Richard Babbage and Aiken and piece of difference engine.

Box 5, Folder 25

Box 5, Folder 25
Harvard Opens Laboratory for Computation: Hopes to Use Mechanical Brain to Solve Problems of All Social Sciences, Stephen White, New York Times(?) 29 December 1946: new Comp Lab, uses of calculators.

Box 5, Folder 25

Box 5, Folder 25
Harvard's New 'Brain' Permits Social Studies, Boston Herald, Friday, 10 January 1947; Dr. Wassily Leontief, economic analysis on computers.

Box 5, Folder 25
Box 5, Folder 25  Forecast of the Future editorial, Herald Tribune, 12 January 1947 (handwritten) analysis of economics by computers forecast.

Box 5, Folder 25  Highbrow Harvard Bows To A Robot Brain, Sunday Mirror Magazine, 5 August 1945; Mark I, tests against known answers, uses for Navy.

Box 5, Folder 25  Symposium of Calculator Experts Opens New Computator Laboratory: Rear Admiral Joy Pledges Use of Naval Calculating Machinery To Scientists; Aiken Stressess Acute Need for Convention; President Conant, Sick, Is Unable to Give Address The Harvard Crimson Wednesday, 8 January 1947 (p. 1), 1st day of 47 Symposium.


Box 5, Folder 25  Mechanical 'Memory' Test In Symposium at Harvard, Herbert B. Nichols, Christian Science Monitor, 8 January 1947, (p. 3.); discussion of 'memory' in calculating machines at 47 Symposium.


Box 5, Folder 25  Harvard Puts Big Calculator in New Home, Natural Science Editor (H.B.N.), Christian Science Monitor, 30 December 1946 (p. 2.). Comp Lab, moving Mark I.

Box 5, Folder 25  New Computer Lightning Fast: Army Call It the World's Best Calculator, The New York Sun, Friday, 15 February 1946 (AP p. 1); second section, ENIAC announcement to the press.

Box 5, Folder 25  Mechanical Einstein' Calculator Has Mathematical World in Palm", The Boston Herald, Friday, 15 February 1946 (AP) ENIAC.

Box 5, Folder 25  Electronic 'Brain' Computes 100-Year Problem in 2 Hours, 15 February 1946 (? paper); ENIAC, set-up, compare with MIT differential analyzer.

Box 5, Folder 25  Army's Electronic 'Brains' Addled, The Boston Herald, Wednesday, 21 April 1948 (AP); reports tube breakdowns, lack of personnel to keep ENIAC busy.


Box 5, Folder 25  Electronic Brains: Calculating Machines Help Lighten Industry's Record Keeping Chores: High-Speed Computers Take Inventory, Figure Utility and Insurance Bills, An Aid to Oil-Well Drillers, James P. Thurber, Jr., The Wall Street Journal, 29 July 1953 (p. 1, 15).
Box 5, Folder 25  Electronic Brains: Computing Machines Help Build Airplanes Faster and Cheaper: Tell How Many Rivets to Put On a Wing; Steal Work of Wind Tunnels, Test Pilots; Year's Job Done in Minutes, Walter H. Oxstein The Wall Street Journal, 14 August 1950 (p. 1), West Coast developments.

Box 5, Folder 25  2150 A.D. **Preview of the Robot Age: Machines that think and do the hard work will free men to develop their real talents, Edmund C. Berkeley, New York Times Magazine, Sunday, 19 November 1950 (pp. 19, 68f).


Box 5, Folder 25  Tiny 'Brain' Robot Not So Very Dumb: 'Simple Simon' Proves That He's Clever Enough to Know Own Limitations, New York Times, Friday, 19 May 1950 Berkeley's 'Simple Simon' photo: "Mechanical 'Brain' Demonstrated At Columbia"; Berkeley, Vall and Jensen (builders) and 'Simple Simon".
Series 8: Periodicals and Brochures, 1950 - 1953

Box 5, Folder 26
Table of Contents "Grace Hopper's Files - Periodicals and Brochures, Early 1950's. Two Pages.  
Image(s)

Box 5, Folder 26
UNIVAC FAC-TRONIC SYSTEM by Remington Rand, Inc., Eckert-Mauchly Division (18 pages) post-31 March 1951.  
Image(s)

Box 5, Folder 26
Ordnance Unit 4-3 Boasts of Expert 4ND Naval Reserve News Training and Information Bulletin, June 1953; (page twenty-six) a biography of Grace Hopper and photo.  
Image(s)

Box 5, Folder 26
Bell Laboratories Record, Volume XXXI Number 4, April 1953.  
Image(s)

Box 5, Folder 26
Systems for Modern Management

Box 5, Folder 26
Volume XIV, No. 6 June 1950 "Electronic Accounting" by John W. Mauchly and J. Presper Eckert, pages 10-11, 27.  
Image(s)

Box 5, Folder 26
Volume XIV, No. 7 July, 1950 (2 copies) "Electronic Actuary: How UNIVAC, Remington Rand's new high-speed computing system, is being applied successfully to the complicated problems of life insurance policies and studies." by Dr. Grace M. Hopper as told to Marika Hellstrom (pages 10, 29).  
Image(s)

Box 5, Folder 26
Volume XIV, No. 8, August, 1950 "Solving engineering problems fast by UNIVAC", by Dr. John W. Mauchly (pages 20-21).  
Image(s)

Box 5, Folder 26
Image(s)

Box 5, Folder 26
Image(s)

Box 5, Folder 26
Volume XVI, No. 12, December, 1952 "UNIVAC Beats Statisticians on Election Night" by A.C. Hancock (pages 4-5).  
Image(s)

Box 5, Folder 26
Volume XVII, No. 3, March, 1953 "Announcing...A Forward Step Towards Automatic Process Control the "ERA 1103" Electronic Computer".

Volume XVII, No. 4 April, 1953 "Getting Facts Faster: A glimpse at some of the inner workings of the UNIVAC, and what it can do towards solving complex business problems." by Robin Leatherman (pages 7-8).

Volume XVII, No. 7 July, 1953, "Computing the Nation's Potential" by H. Burke Horton (pages 16-17).

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Series 9: Humor File, 1944 - 1953

Box 5, Folder 27 Bugs, by Grace Hopper July 26-28: half sheet of unlined three-hole paper Table worm, July 27; Kitchie Boo Boo Bug -He who goes around loosening relays. July 26; NRL Bug -He who sends wrong data. July 28; He who brings good data (also two xerox copies of same).

Box 5, Folder 27 Humor File - From Grace Hopper. Table of Contents. Four Pages.

Box 5, Folder 27 Cartoon by Grace Hopper: graph paper, three-hole punched "I am elusive" This way to the buss via Out Relay.

Box 5, Folder 27 Cartoon by Grace Hopper unlined paper, two holes at top: "What counter shall I go to?"

Box 5, Folder 27 PROBLEM L by Grace Hopper unlined paper, two holes at top. Note bottom: "Computed, designed, coded, babied, nursed, pleaded with and mothered by" Grace Hopper. Middle: "Errors in mathematics and tape bugs pursued and captured by Ensign Bloch and Ensign Campbell".

Box 5, Folder 27 Sympathy Chit (3 x 5 file card) signed by I.M. BROADSHOULDERED, LT (j.g.), USNR, Chaplain Striker.

Box 5, Folder 27 Grace Murray Hopper Collection Finding Aid--Page 48

Box 5, Folder 27 Cartoon by Stan MacGovern and Jay Nelson Tuck, newspaper clipping: "987654321012345678 OR: Harvard University Unveils World's Largest Calculating Machine --Scientific Marvel of the Century!" The Yuk-Yuk Department (no date, paper not known).

Box 5, Folder 27 Cartoon by Yardley in the Baltimore Sun "As One Haavad Man To Another, How's Chances?" reprinted in Harvard Alumni Bulletin: War Summer Vol. 47, No. 1, 23 September 1944.

Box 5, Folder 27 Poem (anonymous, 2 tissue paper copies) "Immediately to the right of the main entrance is a classroom seating 59 students. --HAB 14 December 1946".

Box 5, Folder 27 Description of BINAC (Anonymous); typed on bond paper; "The Binac contains 835 electronic vacuum tubes, most of which lit all of the time." and so on.

Box 5, Folder 27 Diploma of Dr. Grace M. Hopper, "Has graduated with full honors from "Logical Blocks’ And is hereby award the degree 'In Univacology'”, date 1949 when join Eckert-Mauchly computer Corp., according to Grace Hopper.
ROUND ROBIN LETTER (Anonymous, typed on 2 sheets tissue paper). Attributes of people at Eckert-Mauchly, includes such as: Most Promising: Gen. Groves (He is always promising something)

Cartoon by Grace Hopper (pencil on plain paper). The Evening Bulletin Alternate Thursday x002 "The EMCC celebrated the completion of UNIVAC today. After nearly a century of donuts, coffee, ulcers and swimming parties, the obsolete digital computer is now ready for production."

Report Card of Grace Murray Hopper, 8 June 1950) "Tact -A+++++ **Spoke very nicely to Dresch".

Publicity Release of the Joint Development Board (typed both sides 3 x 5 card dateline: NYT, Jan 1/51). Subject: HOMIAC. HOMIAC "named for Admiral Hopper and General Mitchell" "An observer, as passionately fond of mathematics as the HOMIAC, opines that there may be some resemblance to MARK I, MARK II, MARK II, EDVAC, ENIAC, EDSAC, BINAC, SEAC, and UNIVAC, but that this resemblance is doubtless coincidental."

Quote of J.M. Keynes. "Too large a portion of recent "mathematical" economics are mere concoctions, as imprecise as the initial assumptions they rest on, which allow the author to lose sight of the complexities and interdependecies of the real world in a maze of pretentious and unhelpful symbols"--according to Grace Hopper, circulated around EMCC.

Cartoon by Collinge "A strict diet of simple algebra --and NO calculus." The Philadelphia Inquirer Magazine, June 1, 1952

Cartoon (copyright by Field Enterprises, Inc.): "We've eliminated the last 'bug', gentlemen... the human element"... it'll now do an income tax return without blowing a fuse!", March 23, 1952 a Philadelphia paper.

Cartoon (copyright by Field Enterprises, Inc.): "It's some Senate committee, professor... they're investigating the 'Brain's' loyalty." with "Gil" written in on one of the committee, "Herb" on the professor 1953 (from copyright) paper: San...

DP DEFINITIONS by W.S. Roth (page 81) ACM(?) year(?) included such as: "DEBUGGING--Removing the needles from the haystack." "MEMORY DUMP -- Amnesia."
Box 5, Folder 27  

DP DEFINITIONS by Shirley Marks. ACM date: month after ACM's 11th anniversary includes such as: "Conversion Routine --Missionary work among the Decimals." "Simpson's Rule --Evaluate an integral as you would have an integral evaluate you."

Box 5, Folder 27  
The "Electronics" Prayer by "Who'dedmitit" (carbon copy on tissue). Top corner: 26 May 1950 CC-5 "Our UNIVAC, which art in Philadelphia,..." (also four xerox copies of same).

Box 5, Folder 27  
Slip of Paper with Writing "Hopren Bioq P - Photo". Undated.

Box 5, Folder 27  
PSALM TO THE FAREWELL STATE (Author Unknown, carbon copy on tissue) "The government is my shepherd, I need not work."... (3 copies).

Box 5, Folder 27  

Box 5, Folder 27  

Box 5, Folder 28  
Captain Marvel and the Incredible Calculator, (Captain Marvel Adventures Vol. 9 No. 53) 1 February 1946 Fawcett Publications Inc. 1100 W. Broadway, Louisville, KY perhaps the first comic book to contain a computer, according to Grace Hopper.
Series 10: Machine Tape, undated

Box 6

Problem L Tape

Image(s): Paper machine tape (3 5/8" wide), punched holes "Problem L Tape RR 3A"

Includes four machine tapes: Problem L Tape R4H; Problem L Tape R3A; Problem L Tape 4A; and Problem L Tape RR3A.

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Series 11: Audio Visual Materials

3 videocassettes (u-matic)

Computer Resources: Possible Future's, Hardware, Software, People, Part I, undated
1 videocassettes (u-matic) (TRT: 52:55)

Computer Resources: Possible Future's, Hardware, Software, People, Part II
1 videocassettes (u-matic) (TRT: 39:15)

Computer Resources: Possible Future's, Hardware, Software, People, Part III, undated
1 videocassettes (u-matic) (TRT: 22:15)