

5 JUN 1952

Mr. H. P. Edmundson
Department of Mathematics
University of California
Los Angeles, California

Dear Mr. Edmundson:

Thank you very much for your note of 19 May 1952 and for sending me the quarterly report on Projects and Publications of NBS.

We get those reports regularly from NBS but I have not seen any of them until you sent me this one, which I find interesting.

I was glad to learn about the Conference on Mechanical Translation to be held at MIT from 18 to 20 June, and we are planning to have an observer attend. Thank you also for that bit of useful information.

With best regards, I am,

Sincerely,

WILLIAM F. FRIEDMAN
Consultant

Consultant (007)

UNIVERSITY OF CALIFORNIA

DEPARTMENT OF MATHEMATICS
LOS ANGELES, CALIFORNIA

19 May 1952

Dear Mr. Friedman :

After a period of inactivity the language translation study has resumed — see page 11 of the enclosed quarterly report. Additionally, Dr. Y. Bar-Hillel of the MIT Research Laboratory of Electronics heads a Conference on Mechanical Translation to be held at MIT from June 18 to June 20, 1952. Best of luck to you and AFSA.

Sincerely,

26 P Edmundson

H. P.

MEMO ROUTING SLIP

NEVER USE FOR APPROVALS, DISAPPROVALS,
CONCURRENCES, OR SIMILAR ACTIONS

1	NAME OR TITLE Dr. Kullback	INITIALS JK	CIRCULATE
	ORGANIZATION AND LOCATION Chief, AFSA-03	DATE	COORDINATION
2	Dr. Campargue Chief, AFSA-034	RCY Acting	FILE INFORMATION
3	Mr. Friedman OOT		NECESSARY ACTION
			NOTE AND RETURN
4			SEE ME
			SIGNATURE

REMARKS

1. Any comments?
2. Anybody else who should see this?

We regularly get this report. Also, from time to time we request copies of certain studies made by Bureau of Standards as reported in this quarterly report. RCY.

FROM NAME OR TITLE	DATE 2 June 53
ORGANIZATION AND LOCATION	TELEPHONE

NBS PROJECT

NBS REPORT
1461

Projects and Publications
of the
NATIONAL APPLIED MATHEMATICS LABORATORIES

October through December 1951



This report is issued for information purposes only. Publication, reprinting, or reproduction in any form, either in whole or in part, is prohibited unless permission in writing is obtained from the Office of the Director, National Bureau of Standards, Washington 25, D. C.

NATIONAL APPLIED MATHEMATICS LABORATORIES
October 1 through December 31, 1951

ADMINISTRATIVE OFFICE

John H. Curtiss, Ph. D., *Chief*
Edward W. Cannon, Ph.D., *Assistant Chief*
Olga Lausky-Thood, Ph.D., *Mathematics Consultant*
W. J. Youden, Ph.D., *Mathematics Consultant*
Myrtle R. Hollington, M.A., *Technical Aid*
Luis O. Rodriguez, M.A., *Chief Clerk*
John B. Tallentico, B.C.S., *Assistant Chief Clerk*
Margaret W. Dawson, M.A., *Secretary*
Elsie L. Huscan, *Secretary (Calif.)*
Jacqueline B. Jones, *Secretary*
Violet C. Jordan, *Secretary*
Evelyn L. Turner, *Secretary*

INSTITUTE FOR NUMERICAL ANALYSIS
Los Angeles, California

Derrick H. Lehmer, Ph.D., Director of Research
Vagnus R. Heaton, Ph.D., Assistant Director and UCLA Liaison Officer
Harry D. Huskey, Ph.D., Assistant Director for Mathematical Services
Gertrude Blanch, Ph.D., Assistant to the Director (Numerical Analysis)
Albert S. Cahn, Jr., M.S., Assistant to the Director (Administration)

Research Staff

Forman S. Acton, D.Sc., Mathematician
Charles L. Africa, Jr., B.A., UCLA Research Associate
Leonard M. Blumenthal, Ph.D., Mathematician
B. Vivian Bowden, Ph.D., Consultant (Engineer)
George E. Forsythe, Ph.D., Mathematician
Jerry W. Gaddum, M.A., Mathematician
Tom Kilburn, Ph.D., Consultant (Engineer)
Cornelius Lanczos, Ph.D., Mathematician
Richard H. Lawson, M.A., UCLA Research Associate
Theodore S. Motzkin, Ph.D., UCLA Research Associate
Victor A. Oswald, Jr., Ph.D., Consultant (Linguist)
Lowell J. Paige, Ph.D., Mathematician
David S. Saxon, Ph.D., Physicist
Isaac J. Schoenberg, Ph.D., UCLA Research Associate
Eduard O. Steifel, Ph.D., UCLA Research Associate
Marvin L. Stein, Ph.D., Mathematician
Wulfgang R. Masow, Ph.D., Mathematician
Maurice V. Wilkes, Ph.D., Consultant (Mathematician)

Graduate Fellows

Stephen G. Gastrowitz, M.A. (UCLA)
Robert M. Hayes, M.A. Urs De Hochstrasser, M.A. (UCLA)

Mathematical Services Unit

Arnold D. Heaton, Ph.D., Mathematician
Frederick H. Hollander, Ph.D., Mathematician
Marvin Howard, M.S., Mathematician
Roselyn S. Lipka, B.A., Mathematician
Robert H. Reynolds, M.S., Mathematician
Thomas H. Southard, Ph.D., Mathematician
Everett C. Yowell, Ph.D., Mathematician

Computing Staff

Leonus T. Batista, B.S. (UCLA)
Patricia B. Bremer, B.A.
Leola Catler, B.A.
Edward D. Fisher, B.S.
Alexandra I. Forsythe, M.A.
Lillian Forchel, B.A.
Gladys P. Francis, B.S.
Emma M. Henderson, M.A.
Ruth B. Horgan, B.A.
Verry M. Kruse, B.S.
Thomas D. Lakin
Norma Logel, B.S.
Shirley L. Marks, M.A.
Deza H. Wock, B.A.
Elmer E. Osborne, M.A.
John A. Postley, B.S.
Nan M. Reynolds, M.S.
LeVerne E. Richard, M.A.
Albert H. Rosenthal, B.A.
Jerome A. Schneck, B.A.
M. Winifred Smith
Louise M. Straus, M.A.
Lindley S. Wilson, M.A.

Machine Development and Electronic Laboratory Staff

Ragnar Thorenson, Ph.D., Electronic Scientist
Biagio F. Ambrosio, B.S., Electronic Engineer
Edward Lacey, M.S., Electronic Engineer
Blanche C. Kidem
John P. Francis, B.S. (UCLA)
Gaylord W. Jones
Louis E. Juatice, B.S.
Norman F. Loretz, B.S.
Howard K. Marks
Edward D. Martinovich
Kenneth J. Mullikan (UCLA)
Charles A. Mitchell, II
Lyle E. Mitchell
Wallace J. Moore
John L. Newberger, B.A.
Eugene W. Rector, B.S.
James W. Walsh

Administrative Unit

M. Evelyn Michaud, Administrative Officer
Dora M. Madelf, Administrative Assistant
Gertrude Z. Bender, Administrative Clerk
Jean S. Booth, Administrative Clerk
F. Patricia K. Peed, Librarian
Madeline V. Youll, B.A., Library Assistant
Velma R. Huskey, B.A., Information and Editorial Clerk
Eva Cassirer, B.A., Translator (UCLA)
Earle W. Kimball, Property and Stock Control Clerk
James R. Walker, M.A., Miscellaneous Office Machine Operator
Albert H. Feldman, Miscellaneous Office Machine Operator (UCLA)
Mark H. Hennes, Miscellaneous Office Machine Operator

Secretarial Staff

Harratt W. Cotton
Mildred L. Dalton
Betty E. Dean
Gloria E. Estes
Vendia H. Gordanier
Margaret W. Gould
Dorothy M. Hibbard
Lucy A. Moore
Ruth A. Stafford
Reve J. Vineyard

COMPUTATION LABORATORY

John Todd, B.S., Chief
Evans L. Ait, Ph.D., Assistant Chief
Milton Abramowitz, Ph.D., Mathematician
Hutch K. Anderson, M.A., Mathematician
Francis B. Bauer, Ph.D., AL* Research Associate
William H. Durfee, Ph.D., Mathematician
Carl-Eric Fröberg, Ph.D., AL* Research Associate
Andre N. Gieyzal, Ph.D., Mathematician
Peter Henrici, AL* Research Associate
Alan J. Hoffman, Ph.D., Mathematician
John V. Holberton, M.A., Mathematician
Donald O. Larson, B.S., Mathematician
Joseph H. Levin, Ph.D., Mathematician
Murray Mannus, Ph.D., Mathematician
Michael S. Montalbano, B.A., Mathematician
Elliott W. Montroll, Ph.D., Consultant
Leon Nemerever, M.S., Mathematician
Morris Newman, M.A., Mathematician
Fritz Oberhettinger, Ph.D., AL* Research Associate
Philip Rebinowitz, Ph.D., Mathematician
Herbert E. Salzer, M.A., Mathematician
Daniel Sokolowsky, M.A., Mathematician
Leland W. Sprinkle, B.A., Mathematician
Irene A. Stegun, M.A., Mathematician
Charles J. Swift, Ph.D., Mathematician
Joseph H. Wegstein, M.S., Physicist
Norman A. Wiegman, Ph.D., Mathematician
Heimat Wielandt, Ph.D., AL* Research Associate

Computing Staff

Onaida L. Baylor
Hans O. Bremer, B.A.
Rella L. Brooks, B.S.
Robert B. Bryce, B.A.
William F. Cahill, M.S.
Ruth E. Capuano
Kathryn Christoph, B.S.
Anne R. Cock, B.A.
Natalie Coplan, B.A.
Benjamin F. Cron, B.S.
Melchior J. DiCarlo-Cottone, B.S.
Ira C. Eshpe, B.S.
Lancelo O. Dufford, M.A.
Mary M. Dunlap, B.S.
Frances R. Fereberger, B.A.
Anne M. Futterman, B.A.
Leon Gaimen, B.S.
Lessa F. Garrett, B.A.
Billie H. Gall, M.S.
Elizabeth F. Godefroy
Allen A. Goldstein, M.A.
Lester H. Gordon, B.A.
Wanda P. Gordon, B.A.
Stanley D. Grant, Jr.
William G. Hall, B.S.
Helen V. Hammar, B.S.
Genevieve Hawkins, B.S.
John Herzhberger, M.S.
Viola D. Hovsepian, B. S.
Fence Jasper, B.A.
Dorothea H. Jirsach, M.A.
Lambert S. Joel, B.A.

Marlee E. Johnson, B.S.
John A. Jordan, B.A.
Terry W. Ledley, M.S.
Norman Levine, B.S.
David S. Ljepman
Samuel Mallos, M.A.
Ethel C. Yarden, B.A.
Frank B. Yeek, M.A.
Theodore R. Mikell, M.S.
Kermit C. Nelson
Peter J. O'Hara, B.S.
Mary Orr
Donald S. Park, B.A.
Maxine L. Paulsen, B.S.
Anabelle W. Phelps, M.A.
Solomon L. Pollock, B.S.
B. Stanley Prusch
Donald J. Rubin, M.S.
Warren M. Russell
Ruth C. Shepard, B.S.
Wallace R. Soderquist, M.S.
Milton Stein
Otto T. Steiner, B.A.
Frank J. Stockmll, B.A.
Gretchen Stolle, M.A.
Ellen V. Stubblefield
Sally Tsingou, B.S.
George E. Turner, B.S.
Bernard Urban
Edna M. Vienop, B.A.
Mary L. Warden, B.A.
Bertha H. Walter
Ruth Zuckel, B.A.

Guest Workers

Enso L. Aapo
M. R. Arnette
Dickson H. Call
Secretarial Staff
M. Charlotte Case
Lillian Sioane
*American University
Dino Danelli
Jerold Mathews
Michael Tikhon
Ethel Litvsky
Marjorie E. Young

MACHINE DEVELOPMENT LABORATORY

Edward W. Cannon, Ph.D., Chief
Karl Goldberg, M.A., Mathematician
Edith T. Norris, B.A., Mathematician
Ida Rhodes, M.A., Mathematician

STATISTICAL ENGINEERING LABORATORY

Churchill Eisenhart, Ph.D., Chief
Joseph M. Cameron, M.S., Assistant Chief
Lola S. Deming, M.A., Technical Aid
K. L. Chung, Ph.D., INC* Research Associate
William S. Connor, Jr., Ph.D., Mathematician
Edgar P. King, Ph.D., Mathematician
Julius Lieblein, M.A., Mathematician
Eugene Lukacs, Ph.D., Mathematical Statistician
Mary G. Natrella, B.A., Mathematician
Frank Proschan, M.A., Mathematician
I. Richard Savage, M.S., Mathematician
Dan Teichrow, M.A., INC* Research Associate
Marion T. Carson, Computer
Yvette Bernardon, Secretary
Shirley C. Schleiter, B.A., Secretary
Virginia E. Sweeney, Secretary
*University of North Carolina Institute of Statistics

Status of Projects

11.

dihedral and trihedral angles in a tetrahedron," by J. W. Gaddum; submitted to a technical journal.

LANGUAGE TRANSLATION STUDY
Task 1101-21-5104/52-1

Origin: NBS
Sponsor: The Rockefeller Foundation
Full task description appears in Oct-Dec 1951 issue.

Status: CONTINUED. Work continued on the investigation of word frequency both in Spanish and in German, under the direction of Dr. Bull and Dr. Oswald respectively. In Spanish, the analysis of the Set I Vocabulary has been completed, and demonstrative charts for all examples have been made. Analysis of the Set I Vocabulary indicates that, with the present state of the computer art, it is unrealistic to consider translation of general subject articles by means of a single fixed vocabulary. In German, the construction of a restricted German technical glossary (for the field of brain surgery) has almost reached completion. It is planned to attempt to ascertain the number of nouns required in the vocabulary in order to "understand" any technical article in this field.

During the quarter Dr. Y. Bar-Hillel, of the Massachusetts Institute of Technology, visited the project in order to exchange orally ideas in the field of mechanical translation. Several group and individual conferences were held between Dr. Bar-Hillel and Institute for Numerical Analysis personnel, with RAND personnel also participating in the group conferences.

3. Development

NATIONAL BUREAU OF STANDARDS WESTERN AUTOMATIC COMPUTER (SWAC)
(Previously listed as Air Material Command Computing Machine)
Task 1101-34-5103/49-1
(formerly 11.1/22-49-1)

Origin: Flight Research Laboratory, Wright Air Development Center, USAF
Sponsor: " " "
Full task description appears in Apr-Jun 1949 issue.

Status: CONTINUED. The accelerating voltage in the cathode-ray tubes of the Williams' tube memory system of the SWAC has been lowered in hopes of decreasing the effect of blemishes on the tubes which will not store dashes. This decrease in the accelerating voltage has improved flaw conditions but has also given an accompanying increase in spillover. Under these circumstances the stock of cathode-ray tubes had to be re-sorted to obtain the best usable tubes. Several 3KP1 tubes have been used in the computer on an experimental basis. These have given good performance with respect to spillover. In an experimental test unit a defocus-focus system (combined with the dash system now in use)

12

Status of Projects

is being tried out. In the few units tested this system decreases the effect of the flaws markedly and, although there is an increase in spill-over effects, this may not be too great to preclude the use of the system. However, additional experiments will be made before a change is made to this new system.

The incorporation of the magnetic drum into the computer system is well under way. A new flipflop using a 2C51 tube with output levels clamped between 0 and -40 volt levels has been developed on a plug-in unit for use in the magnetic drum circuitry. The other logical gating circuitry has also been redesigned so that it can be placed on simple plug-in units. The plug-in units and the panels for the drum system are in the process of construction. Initial circuitry on the drum will utilize a pulse frequency of approximately 60 to 70 kc. which will give a distinct advantage in that it will simplify the circuit design. The system being constructed initially will give a memory of about 5000 words with an average access time of approximately 500 microseconds per word. This low access time will be obtained by transferring a sequence of numbers during one revolution, starting the actual transfer at any arbitrary word and stopping at the end of one revolution. If later the pulse frequency is increased to about 125 kc., the maximum memory will be close to 10,000 words with an approximate access time of 250 microseconds per word.

The new motor generator set which had been on order for nearly a year was delivered and installed at the end of the quarter. There is no operational data as yet as to the effect of this new power supply on the performance of the SWAC.

LOGICAL NOTATION AND BLOCK DIAGRAM SYMBOLISM FOR A.D.C.M.

Task 1101-34-5103/49-2
(formerly 11.1/22-49-2)

Origin: NBS

Sponsor: Flight Research Laboratory, Wright Air Development Center, USAF
Full task description appears in Apr-Jun 1949 issue.

Status: CONTINUED. Distribution continued of the preliminary lists of terminology and block diagram symbols to be used in connection with automatic computing machines.

Publications: The preliminary lists mentioned above are obtainable in manuscript form from the Institute for Numerical Analysis.

MATHIEU FUNCTIONS II

Task 1101-53-1101/45-1
(formerly 11.1/2-45-1)

Origin: Applied Mathematics Panel, NDRC

Sponsor: Flight Research Laboratory, Wright Air Development Center, USAF
Full task description appears in Apr-Jun 1949 issue.

Status: INACTIVE. For status to date see Oct-Dec 1950 issue.

424 North George Mason Drive
Arlington 3, Virginia
18 May 1951

Mr. Harold P. Edmundson
4553½ West 18th Street
Los Angeles 19, California

Dear Mr. Edmundson:

Thank you for the brochure on SWAC. I have passed it to the appropriate offices for their information.

With reference to your former associates whom you mentioned, Mr. Callimahos and Mr. Duin are presently employed by this Agency, and I have obtained their home addresses, in order that you may contact them there, if you wish:

Mr. Edgar C. Duin
1525 Tyler Avenue
Falls Church, Virginia

Mr. Lambros D. Callimahos
1524 Roosevelt Avenue
Falls Church, Virginia

In regard to your request for a SIGVAN, I am sorry to have to tell you that there is at present no authority for distributing material on a RESTRICTED level to civilians outside channels; therefore this publication is not available for sending to you. Perhaps you can obtain other statistical studies which will serve somewhat the purpose you had in view.

Sincerely yours,

William F. Friedman

30 April 1951

Mr. William F. Friedman
Armed Forces Security Agency
Washington 25, D.C.

Dear Mr. Friedman:

It was most kind of you to comment so encouragingly about the problem of a language translation machine in your last letter. ~~The fact that these difficult times must impose~~ a heavy work load on you makes me all the more appreciative. I feel sure that my superiors at INA concur..

At the risk of further monopolizing your time I will ask two questions. The first one concerns two former comrades in arms of World War II- namely, Lambros D. Callimahos and Edward C. Duin. I last understood that they were working for you. Do you know of their whereabouts? Secondly, could you send me a copy of the publication which went by the short title SIGVAN? Dr. Kullback recognized my interest in statistics when I served under him, and made one available to me. I would like to study it again to maintain my state of readiness.

I have enclosed a small brochure on our machine called SWAC. Also, I would like to mention that Miss Gertrude Kirtland of AFSA has sent me some employment forms which I have completed and returned. It seems that Mr. William G. Bryan of the Amer. Cryptogram Assoc. had suggested my name.

Sincerely yours,

Ronald P. Edmundson

Edmundson
son