9/16/66

Verna:

Returned with thanks. Letter from Dr. Smyth and agreement are with Dr. Kaysen's copy of RO's memo to Mr. Buhler.

Liz

Computer

7 November 1966

Dear Colin:

Thanks very much for your two letters, on computation and Benzer. At the moment I am not yet ready to do anything more on the computation front. I would be glad to talk with you and Roald Buhler whenever it is convenient, however, and I will await your initiative on that. I will inform members about the availability of computing facilities at the University, but I doubt that we will get any immediate response out of this. I have passed a copy of your letter to Professor Oppenheimer.

I attach, for your interest, some material on Martin Greenberger, whom your computation laboratory might well look into. He approached me on hearing--erroneously--that the Institute might be going into a computation venture on its own. I told him, of course, that what I had in mind was a little different, and agreed to pass on his interest in moving from M.I.T. to the University. As far as I can understand, it is restlessness more than anything else which impells Greenberger to wish to move. I knew him when he worked with Guy Orcutt on the first of the items listed in his bibliography, and am quite impressed with his sharpness of mind and energy. I think he feels that he wants more stimulus and more room than he now has at M.I.T. Tony Oettinger at Harvard knows him well, and could add a recommendation if you are interested.

On Benzer, I will circularize the faculty and see what response I get, and let you know as soon as I can.

Cordially,

Carl Kaysen

Dean Colin S. Pittendrigh
The Graduate School
Princeton University
Princeton, New Jersey 08540

PRINCETON UNIVERSITY
THE GRADUATE SCHOOL
BOX 255
PRINCETON, NEW JERSEY 08540

OFFICE OF THE DEAN

October 31, 1966

Dr. Carl Kaysen
The Institute for Advanced Study
Princeton, New Jersey

Dear Carl:

I am writing you partly in response to Dr. Oppenheimer's letter to Roald Buhler and, in any case, to pursue further your own inquiries concerning the Institute's possible use of our computer facilities.

The transfer of the MANIAC to the University was a generous gesture on the Institute's part, but I am afraid that it turned into something of a disaster for us. We spent well over $100,000 on it and got very little useful computation out of it. It is now in the Smithsonian.

We are, as you know from earlier conversation, anxious to foster and develop our mutual relations and interests. I have high hopes that as your own plans for the Institute shape up we can find many ways in which your undertakings and ours can complement each other and usefully interact. It would, I am sure, be unwise for you to develop your own computer facilities at this juncture, given the existence of ours - now very substantial - and the plans we have for their further expansion. As of course you know, it is a frightening financial investment and a continuing burden. Our budget, now about $1.4 million, has doubled in two years, and present projections suggest it will be $4.5 million in 1970-71. To support and justify so large a venture, we will probably have to function as some sort of regional center. There are some straws in the wind, easy to understand, that federal support might increasingly demand such regionalization. Our general thinking on this at present focuses on the IBM 360-67 which is a time-sharing machine. We are thinking of input-output consoles scattered through the campus, and if we serve as a regional center, ultimately through the adjacent sections of New Jersey. Certainly we can think of consoles at the Institute coupled to our machine.

It would be useful for you to meet with Roald Buhler and me sometime to discuss our plans and anticipated development schedule in some more detail. Should the Institute's computation needs grow

and should you wish to meet them through our facilities, it might be that the search for support should be a joint venture.

At any rate, the Institute is most welcome to use the University Computer Center at any time. The machines now in use at the University and the rates we can offer you for their use are listed below.

Computer	Cost Per Hour	Overhead at 10%	Total Cost Per Hour
Engineering Quadrangle IBM 7094	$ 125	12.5	137.5
Engineering Quadrangle IBM 7044	100	10.0	110.0
Accelerator IBM Model 360/50	125	12.5	137.5
Plasma Physics IBM 1410	40	4.0	44.0
Jet Propulsion Lab IBM 1620	20	2.0	22.0
I.D.A. CDC 1604	35	3.5	38.5
P.C.D. IBM Model 360/67 (projected installation July 1967)	250	25.0	275.0

These rates are, incidentally, relatively low and reflect , among other things, our success in keeping down-time to a minimum. They need two qualifications or caveats however. First, actual rates vary from one billing period to the next as use of the machine and other variables fluctuate, but that variation is slight. Second, we are still - as of this year - funding our computer activities out of indirect costs, or "overhead," but next year we will probably be driven to direct charging by pressure from the DoD and AEC accountants. We must anticipate that under such a system use of the machines will, at least initially, drop and hourly rates accordingly rise. The figures I am quoting attempt to anticipate that rise, but we clearly cannot be sure of what is really the product of crystal-ball gazing. Nevertheless, the figures I list are those given to our own departments, and we cannot do better than that.

Please let me know whenever you are ready to pursue this further. All of us here worrying about the development of the Computer Center will welcome further understanding of your anticipated needs and plans.

With kind regards,

Sincerely,

Colin

Colin S. Pittendrigh

CSP:ln

PRINCETON UNIVERSITY
COMPUTER CENTER
PRINCETON, NEW JERSEY · 08540

ROALD BUHLER, *Director*

September 30, 1966

Dr. Robert Oppenheimer
School of Natural Sciences
The Institute for Advanced Study
Princeton, New Jersey 08540

Dear Dr. Oppenheimer,

Your memo and the material that accompanied it was very much appreciated.

The question of the Institute's access to Princeton's computer is, of course, a part of the general relationship between Princeton University and the Institute for Advanced Study. The matter is currently being considered by Dean Pittendrigh of the Graduate School.

Thank you again for sending this information to us.

Sincerely,

Roald Buhler

Roald Buhler

RB:JDM
cc:Dean C. S. Pittendrigh

Can one "consider" whether to keep his word?

R.

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY 08540

SCHOOL OF NATURAL SCIENCES

16 September 1966

Memorandum to: Mr. Roald Buhler

From time to time members of the Institute have problems of electronic computation, which it would be helpful to have solved at the University's computer establishment. In June of 1957, an agreement was made betwen the Institute and the University on the occasion of the transfer of our original computer to the custody of the University, copy of which is attached. I am also attaching an accompanying letter from Dr. Smyth. In the past, we have seldom had to raise the question of computations.

With good wishes,

R.

Robert Oppenheimer

cc: President Robert Goheen
Dr. Carl Kaysen

attachments

Computer

PRINCETON UNIVERSITY
BOARD OF SCIENTIFIC AND ENGINEERING RESEARCH
ROOM 111, PYNE ADMINISTRATION BUILDING
PRINCETON, NEW JERSEY

HENRY D. SMYTH
CHAIRMAN

May 28, 1958

Dr. J. R. Oppenheimer
Universite de Paris
Ecole Normale Superieure
Laboratoire de Physique
24, Rue Lhomond
Paris (V), France

Dear Robert:

About a week ago I called Mike Morgan and asked him to relay to you the message that we had decided we could not continue with the computer. Without going into the ups and downs of the fortunes of the Maniac in the last two months, I would like to report that the decision was unanimous on the part of all concerned from the university, including Maehly, Acton, Schwarzschild, and the Matterhorn group. Before making the decision final Wigner and I had a long talk with Bigelow who was, as always, optimistic. Yet both Wigner and I felt after the conversation that what Bigelow really was saying was that if he were to work several months more on the machine it would achieve a reasonable degree of reliability, but would probably still need his fairly frequent attention. This seemed to us not good enough to justify continuance.

I had hoped that it would not be necessary to bother you with any problems concerning this wind-up. However there are several questions that have arisen on which you should be consulted.

It is about Bigelow and his services that I am most concerned. My recollection of the conversation you and I had in December is that you had no objection to Bigelow's contributing his services if he was willing to do so. I do not think either of us realized how much time and effort he would put in. In the conversation Wigner and I had with him he suggested that the university might wish to compensate the Institute for an appropriate portion of his salary during the winter. Frankly I am very reluctant to do this and it seems to me contrary to the spirit of the conversation you and I had. Do you agree with this point of view? Relevant, but not determining, is the fact that the university may have to pay of the order of $50,000 in charges for the past year's operation which we cannot recover in contracts because of the small amount of computing which has actually been carried out.

On the other hand, it does seem appropriate to me that the university should give Bigelow some sort of a bonus for his work. Possibly the fact that he has continued to work hard for about two months since the Institute officially went on vacation offers a reasonable basis for such a bonus. Were he in the university his salary would probably be of the order

of $1,000 a month. On this basis we would propose to pay him $2,000 for his services. I would like your opinion on this suggestion.

We think there will be no difficulty in finding positions for all the mathematical and technical group and are in process of making such arrangements. We have not yet decided what is the best way in which to dispose of the computer itself. Our preference would be to return title to the Institute. Pending word from you we will explore all possibilities.

Needless to say we are all distressed by the way this situation has developed, but now that we have made the decision I find no one who does not concur in it.

I hope you and Kitty are having a fine trip and I regret that I have to bother you with these questions.

With warmest regards.

Sincerely,

H. D. Smyth

called 9/24, spoke to Stephen Kidd, who
was involved in preparation of this
memo. said we objected to word "now".
He said this had not yet been distributed;
they would redo this page and take word out.

Computer
ok now sk

PRINCETON UNIVERSITY
Princeton, New Jersey

To: Chairmen of Departments Date: September 17, 1957

From: Committee on Project Research and Inventions

Subject: Availability of the Digital Computer and Procedures for its use.

. . . . . .

Princeton University has recently taken over operation of the electronic digital computer previously operated by the Institute for Advanced Study and known as the MANIAC. This computer is now available for use by members of the academic community. Copies of a bulletin outlining procedures and instructions for obtaining use of the computer are attached for distribution within each Department. Extra copies of this announcement are provided for posting.

The digital computer is located on Olden Lane, opposite the Institute for Advanced Study and is being operated under the direction of a Computer Committee with Dr. H. D. Smyth as Chairman. Dr. Hans Maehly is in charge of the computer and should be consulted if there are any questions concerning its use; he may be reached on University telephone extension 2158.

Those who have computation problems that are amenable to solution by a digital computer are encouraged to review the detailed "Procedures and Instructions" and to investigate further the possible utilization of this facility.

Raymond J. Woodrow

Raymond J. Woodrow
Executive Officer SK

Stephen Kidd

PRINCETON UNIVERSITY

September 17, 1957

Procedures and Instructions for Obtaining Use of the Princeton University Digital Computer

Arrangements have been made for Princeton University to assume operation of the electronic digital computer from the Institute for Advanced Study. It is intended that this facility shall be made available to the University Community on as widely diversified basis as possible for use by anyone with an appropriate problem. The transfer has been effected and the computer is in operation under the direction of the Computer Committee, Professor H. D. Smyth, Chairman, with Dr. Hans Maehly in charge of its operation.

Operation of the computer is being underwritten by joint sponsorship of several government agencies to cover the costs of a substantial fraction of the operating time. At present a grant has been received from the National Science Foundation and a contract from the Atomic Energy Commission, each supporting 1/3 of the anticipated use. Approximately 1/3 of the machine time has been allocated for computation problems that have funds available, as for example, other government sponsored research projects.

It is intended that any member of the Academic Staff of the University or the Institute for Advanced Study with an appropriate problem may have access to the Digital Computer through one of these three channels:

(a) For those who have no other financial support, a grant has been provided by the National Science Foundation. If the problem is appropriate and amenable to solution by the Princeton Digital Computer, financial support may be made available through application to this Committee.

(b) The Atomic Energy Commission has contracted for support and use of the Computer to the extent of 1/3 of its time. This time is available for the computation of problems submitted by any Princeton University research contract with the Atomic Energy Commission.

(c) Problems related to any sponsored research, (government, industrial or otherwise) for which the computation will be financed from the sponsor's funds, have been allocated approximately 1/3 of the computer schedule. This time has not been "underwritten" by specific sponsorship, but will be charged an hourly use rate as described below.

To arrange for Computer time, the following steps should be taken:

1. The problem should first be submitted to the Chairman of the Department involved, or the Project Leader, or the Director of the Institute for Advanced Study, for evaluation of its scientific and educational value.

2. The problem should then be presented to the Chief of the Computer Staff, for evaluation of the problem, for advice on the feasibility of solving the problem on the Computer, and an estimate of the Computer time required.

3. The prospective user should then complete the Computer Use Form (copy attached) indicating the source of funds to defray the estimated cost, and submit the Form to the Chief of the Computer Staff.

4. If approval is given, machine time will be scheduled with maximum consideration being given to the convenience of the user, always subject to change in case of machine failure or trouble.

5. Advice on mathematical and coding procedures will be provided, but it will be the user's responsibility to plan and code (including debugging the code) the problem.

6. While best possible estimates of the running time will be given to the user, these can be only estimates and the actual time will have to depend upon the progress of the problem. There can be no guarantee of total fixed dollar charges.

Machine Time Allocation and Charges will be handled in the following manner:

1. Approval of a problem will be noted on the Computer Use Form which will then be given to the Computer Maintenance Engineer to schedule machine time.

2. Requests for time should be made not later than Thursday 4 p.m. of each week. Weekly schedules will be established each Friday afternoon and posted on the Bulletin Board in the Computer Building. In view of the difficulty of reaching people on the Campus, the user should inquire about his schedule before Monday noon. NOTE: If the Computer should be unusable for any day, all runs scheduled for that day will, in general, be re-scheduled for the corresponding day of the following week.

3. If the user decides to cancel or reschedule his work, the allocated machine time will be charged unless the scheduled user can find a substitute user willing to take over time and charges. The same rule holds if less than the scheduled amount of time is used.

4. No charge will be made for:

   a. Engineering testing of the Computer.

   b. Testing general purpose subroutines.

   c. Time within any scheduled period when it is determined by the maintenance engineer that the machine is inoperable.

5. The Computer must be operated on a break-even basis. Total charges in any one year must be equal to the total cost of the computer operation. In order to accomplish this, a provisional charge of $80 per hour has been established. If, at the end of the fiscal year this rate proved to have been too high, credits will be made. If during the year it appears that the cost per hour is too low, it will be adjusted upward with due notice to all scheduled users, but in no instance retroactively.

National Science Foundation Grant

Present and future support of the Digital Computer through a grant by the National Science Foundation, is predicated upon the research and educational value of the Computer to the academic community. As evidence of this value, a report of the work accomplished under NSF sponsorship will be prepared annually as of June 30. In order to accomplish this, each investigator whose work is supported by the NSF will be required to prepare a report describing the computation problem and the work accomplished through the use of the Princeton Digital Computer. This information should be compiled annually, or upon the completion of significant interim accomplishments. Reprints of articles published in scientific journals will provide adequate reports, provided computation procedures are described. Eight copies of reprints are required.

9/17/57

PRINCETON UNIVERSITY
Digital Computer

PROBLEM #

APPLICATION
FOR USE BY:

Name _____ Title _____

Dept. _____ Project _____

Title of Problem: (Note:A detailed description of the problem together with computational methods proposed for its solution should be attached to this form.)

Starting Date: Scheduled _____

Completion Date: Scheduled _____

Total Computer Hours : Estimated _____

Amount $ _____

Funds for this computation have been allocated from Account No. _____

Date: _____ _____
Authorized Signature

APPROVAL OF
APPLICATION:

Use of the Princeton University Digital Computer is approved in the estimated amount of _____ hours during the Fiscal Year 1957/58, approximately as follows.

Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Hours												

This schedule is subject to change in case of unforseen developments of the problem or of the Digital Computer. It is understood, however, that such changes should be kept to a minimum by both sides in order to permit advance planning and that notice for necessary changes will be given as early as possible.

Date: _____ _____
Chief of Computer Staff

Dr. Robert Oppenheimer

With the Compliments of the

AMERICAN COMMITTEE
FOR THE WEIZMANN INSTITUTE OF SCIENCE

250 West 57 Street
New York 19, New York

Dec 1 Qu Computer
magnetic drum
?
ck with ih

September 19, 1957

Dr. Hans J. Maehly
The Institute for Advanced Study
Electronic Computer Project
Princeton, New Jersey

Dear Dr. Maehly:

May I thank you for your kind letter of September 17th, and tell you how grateful we are for the suggestions contained therein, whereby you will arrange with a packing company to crate the magnetic drum which has so kindly been given as a gift by the Institute for Advanced Studies to the Weizmann Institute of Science.

We shall be indeed most grateful to you if you will arrange to give all of the necessary instructions to the local packing company and forward the bill to us for reimbursement.

Our freight forwarder, Mr. J. Wechsler of Uno Shipping Company, 50 New Street, New York City, will handle all details of the shipment. If you will advise me what the name of the packing company is, I will arrange for Mr. Wechsler to contact them immediately to work out further arrangements about marking of the package and shipping instructions to New York pier. We are forwarding copy of your letter to Mr. Wechsler so that arrangements can be initiated.

For customs regulations, it will be necessary for us to have invoice from the Institute for Advanced Studies, including a statement that the magnetic drum is given to us without charge as a gift.

Be assured that we wish to be of all possible assistance, and trust that you will call upon us again.

With real appreciation of your interest, I am,

Sincerely yours,

ML:ps
cc: Dr. R. Oppenheimer; Mr. G. Dror; Mr. J. Wechsler

Martha Loewenstein

Computer 2
for transfer to Princeton Univ

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY

21 August 1957

OFFICE OF THE DIRECTOR

Dear Dr. Bloch:

It is with pleasure that I report to you that we are today arranging to crate and ship a drum, which at one time was useful in the operation of our electronic computer, to the Weizmann Institute in Rehovoth. The Institute for Advanced Study is glad to make this gift; we hope very much that it will prove useful in the developing work of the Weizmann Institute.

Very sincerely,

Robert Oppenheimer

Dr. Benjamin Bloch
Weizmann Institute of Science
Rehovoth
Israel

cc: Miss Martha Loewenstein
Weizmann Institute of Science
New York

21 August 1957

Dear Dr. Bloch:

It is with pleasure that I report to you that we are today arranging to crate and ship a drum, which at one time was useful in the operation of our electronic computer, to the Weizmann Institute in Rehovoth. The Institute for Advanced Study is glad to make this gift; we hope very much that it will prove useful in the developing work of the Weizmann Institute.

Very sincerely,

Robert Oppenheimer

Dr. Benjamin Bloch
Weizmann Institute of Science
Rehovoth
Israel

Dr. Maehley brought in the attached letter. Wonders if any formaly action has been taken, or if it should be taken by RO, or what--see item (1). Re item (3), he says we could have the packing done, but thinks that the Weizmann Institute should be responsible for the cost. Wants instructions from RO.

C O P Y

UNIVERSITY OF CALIFORNIA

Department of Engineering
Los Angeles 24, California

July 26, 1957

Dr. Hans J. Maehley
Institute for Advanced Study
Electronic Computer Project
Princeton, New Jersey

Dear Hans:

It is my understanding that the Weizmann Institute is still interested in obtaining the old drum and I suggest the following:

1. Have I. A. S. present the drum as a formal gift to the Weizmann Institute. It should be stated to be surplus equipment with just scrap value. Such formality is necessary in order for them to obtain the papers required for export.

2. Contact Miss Martha Loewenstein, American Committee for the Weizmann Institute, 250 West 57th Street, New York, N. Y. I am sending her a copy of this letter.

3. If it possible for I. A. S. to put the drum cabinets in a crate, it will be very helpful. If not, they will have to pick it up as is and move it to a New York warehouse for crating.

4. There are a number of accessory small parts associated with the old drum (i.e. spare heads, amplifier shields, etc.). Some of these were in file cabinet drawers in the office which I occupied nearest the laboratory. These should be gathered in a box and given with the drum cabinet.

How is everything in Princeton.....

Best regards to all our old friends.

Very truly yours,

/s/Jerry
Gerald Estrin
Associate Professor of Engineering

GE:ba

Computer

Transfer to Princeton University

PRINCETON UNIVERSITY

DIGITAL COMPUTER

PRINCETON, NEW JERSEY

Aug. 21, 1957

Dear Dr. Oppenheimer:

After various discussions of the subject and several revision of previous drafts the present form of the (enclosed) "TEMPORARY REGULATIONS FOR USE OF THE PRINCETON UNIVERSITY DIGITAL COMPUTER" has finally emerged.

There are two major changes, as compared with the "Golden Times" under the auspices of the I.A.S.:

(i) NO coding services will be supplied to the users - except that we shall prepare general purpose subroutines (the exact opposite used to be the case).

(ii) There will be a Computer Time bookkeeping, involving hourly charges and Dollars!

Item (i) is a direct consequence of the reduced size of our staff and, as a matter of fact, I do not deplore it. Accidentally: If the "user" is willing and able, he may, of course, hire a coder himself. (to supply funds)

Item (ii) is very sad. I would be the last not to deplore it, but according to the unanimous opinion of the "Project Research" office of the University, there seems ~~too~~ to be no other way.

I would appreciate very much if you would be good enough to look through the enclosed drafts and to let me know whatever objections you might have.

Yours very sincerely,

Hans J. Maehly

DRAFT 8/20/57

TEMPORARY REGULATIONS FOR USE OF THE PRINCETON UNIVERSITY DIGITAL COMPUTER

Any member of the Academic Staff of the University or the Institute for Advanced Study may have access to the Digital Computer to the extent their problems can be solved on the Computer, are of a research character, and time is available.

To arrange for Computer time, the following steps should be taken:

1. The problem should first be submitted for evaluation of its scientific and educational value to the Chairman of the Department involved, or the Project Leader, or the Director of the Institute for Advanced Study, or to their authorized representatives.

2. Any problem thus approved should then be presented to the Chief of the Computer Staff, or his authorized representative, who will advise on the feasability of solving the problem on the Computer and will estimate the Computer time required.

3. Based on this estimate the sponsoring department or project should then complete the Computer Use Form indicating the source of funds to defray the cost.

4. Forms should be submitted to the Chief of the Computer Staff who will present the problem to the Computer Advisory Committee for approval.

5. If approval is given, machine time will be scheduled with maximum consideration being given to the convenience of the user, always subject to change in case of machine failure or trouble.

6. While advice on mathematical and coding procedures will be given to help the user, the responsibility for planning, coding and running of the problem will be his.

7. While best possible estimates of the running time will be given to the user, these can be only estimates and the actual time will have to depend upon the progress of the problem. There can be no guarantee of total fixed dollar charges.

Machine Time Allocation and Charges will be handled in the following manner:

1. When a problem is approved this will be so noted on the Computer Use Form which should then be taken to the Computer Maintenance Engineer for scheduling of machine time/

2. Weekly schedules will be established each Friday afternoon. Requests for time should be made not later than Thursday 4 p.m. of each week. The weekly schedule will be posted on the Bulletin Board in the Computer Building. In view of the difficulty to reach people on the Campus, the user should inquire about his schedule before Monday noon.

3. If the Computer should be unusable for any day, all runs scheduled for that day will, in general, be re-scheduled for the corresponding day of the following week.

4. Machine time thus allocated must be charged unless the scheduled user can find a substitute user willing to take over time and charges. The same rule holds if less than the scheduled amount of time is used.

5. No charges will be made for:

   a. Testing ~~time~~ of the Computer even if the user's code is employed for this purpose.

   b. For testing general purpose subroutines.

   c. For time within any scheduled period when it is determined by the maintenance engineer that the machine is inoperable.

6. According to contractual agreements the Computer must be operated on a break-even basis. ~~Hourly~~ Total charges in any one year must be equal to the total cost of the computer operation. In order to accomplish this a charge of $70 per hour has been established. This is slightly in excess of estimated costs. At the end of the fiscal year appropriate adjustments will be made. If during the year it appears that the cost per hour is too low, it will be adjusted upward but only with due notice to all scheduled users.

7. Present and future support of the Digital Computer depends upon its research and educational value to the academic community. As evidence of this value, results of the work accomplished must be reported. ~~These should be~~ in:

a. Monthly Reports typewritten in duplicate, indicating briefly the status - coding, testing, productive running, etc. - of the problem and, if indicated, revision of the previous estimate of machine time required for the final solution of the problem. These reports should, in general, not indicate any mathematical details.

b. Technical Reports should be issued at least quarterly, or whenever a specific phase of the work has been completed or when results of general interest are obtained, or when computing work on the problem must be interrupted for an extended period of two months. Each report should give a complete description of the problem and the solution and should be submitted in a form specified by the Chief of the Computer Staff.

H.M.

HJG:hg
Carbon copy to:
H.D.Smyth
R. Oppemjeo,er
E.Frieman,
F. Acton

PRINCETON UNIVERSITY
BOARD OF SCIENTIFIC AND ENGINEERING RESEARCH
ROOM 111, PYNE ADMINISTRATION BUILDING
PRINCETON, NEW JERSEY

HENRY D. SMYTH
CHAIRMAN

June 25, 1957

Dr. Robert Oppenheimer
Director
Institute for Advanced Study
Princeton, New Jersey

Dear Dr. Oppenheimer:

In connection with the transfer of title to the University, effective July 1, 1957, of the Institute's automatic electronic computer, you have asked us for some expression of intention with respect to the use of a computer which the University might construct or acquire in the future as a successor to the computer now being transferred.

The transfer agreement provides in part that if the University subsequently transfers the existing computer to a third party and thereby receives a credit against the price of a new computer, the Institute will receive either a right of use of the new computer as described in the agreement, or an equitable share of the credit received by the University. The agreement gives the University the right of election between these alternatives. This letter is to advise you that if such a situation arises, and if the University is in a position in which it can elect to give the Institute the right of use as described in the agreement, the University intends to do so. However, the University may be unable to do so because of restrictions imposed by a government agency or other organization which may be involved. If the new successor computer is acquired otherwise than on a "trade-in" as just described, the University also intends to give the Institute a right of use as described in the transfer agreement, subject to the same qualification.

Sincerely yours,

H. D. Smyth

June 20, 1957

Mr. Ray Woodrow
Project Research
Princeton University
Princeton, New Jersey

Dear Ray:

Pursuant to our recent conversation regarding the joint occupancy of the Computer Building by University and Institute personnel during the coming fiscal year, I wish to set down my understanding of our respective responsibilities:

1 - The Institute will pay for

a. Fuel
B. Light
c. Gas
d. Water and sewer
e. Insurance, for building and contents, including Computer
f. Minor maintenance

2 - The University will pay for

a. Janitorial service
b. Housekeeping supplies.

The total costs of the above named items paid by the Institute and by the University will be pooled and a quarterly adjustment will be made so that the University is bearing 2/3 of the total cost and the Institute 1/3.

If this is your understanding of our working arrangement, will you kindly sign one copy of this document and return it to me.

Cordially yours,

Minot C. Morgan, Jr.

Minot C. Morgan, Jr.
General Manager

ACCEPTED . . . Ray Woodrow

Ray Woodrow

copies to Mears & Leidesdorf

PRINCETON UNIVERSITY
BOARD OF SCIENTIFIC AND ENGINEERING RESEARCH
ROOM 111, PYNE ADMINISTRATION BUILDING
PRINCETON, NEW JERSEY

HENRY D. SMYTH
CHAIRMAN

June 15, 1956

Dr. J. Robert Oppenheimer,
Director,
Institute for Advanced Study,
Princeton, New Jersey.

Dear Robert:

I promised you that I would try this spring to bring the University to a decision, at least in principle, as to whether or not it would take over the operation of the Institute computer not later than a year from now.

I have now recommended to President Dodds that the University should plan to assume this responsibility and I am further recommending that we should take over before the end of the coming academic year, on the assumption that the contracts you have could be transferred to the University. My own hope would be that the transfer could take place not later than January 1, 1957. My recommendation is based on three conclusions that I have reached in the course of the Spring: first, that there is at present an increasing need for a high-speed computer in this community; second, that the Institute computer can solve this need; and third, that the University can probably find the necessary financial support. Implicit in my conclusion is the competence and availability of the present staff along the lines we have discussed, in particular, Dr. Maehly, Mr. Keefe and the more junior personnel.

Mr. Dodds has accepted this recommendation in principle, although pointing out that there are a number of important considerations still to be discussed. Among these, of course, the financial problem is of first importance. Although I have reason to feel optimistic about this, more detailed discussion is necessary within the University before we can make any guarantees. Further details as to space, title, terminal arrangements et cetera, of course remain to be worked out, but I should think could wait until Fall.

I very much appreciate the attitude of the Institute in this matter and your patience in allowing us time for full consideration.

With warmest regards,

Sincerely yours,

Harry

Henry D. Smyth,
Chairman.

HDS/mg
cc: Pres. Dodds.

PRINCETON UNIVERSITY
BOARD OF SCIENTIFIC AND ENGINEERING RESEARCH
Room 111, Pyne Adminsitration Building
Princeton, New Jersey

June 15, 1956

Henry D. Smyth
Chairman

COPY

Dr. J. Robert Oppenheimer,
Director,
Institute for Advanced Study,
Princeton, New Jersey.

Dear Robert:

I promised you that I would try this spring to bring the University to a decision, at least in principle, as to whether or not it would take over the operation of the Institute computer not later than a year from now.

I have now recommended to President Dodds that the University should plan to assume this responsibility and I am further recommending that we should take over before the end of the coming academic year, on the assumption that the contracts you have could be transferred to the University. My own hope would be that the transfer could take place not later than January 1, 1957. My recommendation is based on three conclusions that I have reached in the course of the Spring: first, that there is at present an increasing need for a high-speed computer in this community; second, that the Institute computer can solve this need; and third, that the University can probably find the necessary financial support. Implicit in my conclusion is the competence and availability of the present staff along the lines we have discussed, in particular, Dr. Mashly, Mr. Keefe and the more junior personnel.

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Sincerely yours,

/s/ Harry

Henry D. Smyth,
Chairman.

HDS/mg
cc: Pres. Dodds

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

OFFICE OF THE DIRECTOR

26 April 1956

Dear Harry:

Yesterday I had for the first time an opportunity to describe to the Board of Trustees of the Institute recent developments with regard to the work in meteorology and electronic computing. I also told the Board of our sense of obligation to attempt to provide for the community, and primarily for Princeton University, an orderly transition to a computer facility suited to present and future needs. The Board fully shared this sense of obligation, and approved the plans for operating the computer during the coming academic year along the lines agreed on in the conference which you attended with representatives of the Government agencies. I have every expectation that the necessary funds will be provided for the year July 1st, 1956 to July 1st, 1957.

The Board instructed me to attempt to transfer management of the computer--or perhaps, more generally, of a computer--to Princeton University not later than July 1st, 1957. They asked that I seek an arrangement whereby scientists at the Institute could have limited but adequate access to the computer, as they now have, and as members of the University Faculty should have in future. They further instructed me to seek a commitment to this effect by the first of the new year; failing that, they asked that I make suitable disposition of the computer, if possible by sale, and make such special arrangements for computation as I could. They expressed the hope that our present machine, and, if desirable, the rooms in which it is now housed, could play a useful part to the University, to us, and to the Princeton community, as long as the machine was not rendered wholly obsolete by new developments and new needs.

As you know, I have responded negatively to all enquiries, formal and informal, for acquiring the computer in the near future. I shall continue to do this until you and I can agree on what we ought to do, subject only to the Board's decision.

Very sincerely,

Robert Oppenheimer

Professor Henry D. Smyth
Princeton University
Princeton, New Jersey

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

OFFICE OF THE DIRECTOR

26 April 1956

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Very sincerely,

Robert Oppenheimer

Professor Henry D. Smyth
Princeton University
Princeton, New Jersey

3ND-ONR-3

OFFICE OF NAVAL RESEARCH, NEW YORK
346 BROADWAY
NEW YORK 13, NEW YORK

IN REPLY REFER TO

L4-2/IAS/JL:fgr
Ser 2193

30 March 1956

Dr. J. Robert Oppenheimer, Director
Electronic Computer Project
The Institute for Advanced Study
Princeton, N.J.

Re: Proposal for Providing a Computational Facility in the Princeton area

Dear Dr. Oppenheimer:

We are pleased to acknowledge receipt of the above proposal. This proposal has been endorsed and forwarded to the Office of Naval Research in Washington.

You will be notified promptly as soon as a decision is reached.

Very truly yours,

Jack Laderman

JACK LADERMAN
Scientific Department

Copy to:
Dr. H.H. Goldstine, IAS
Dr. M. Morgan, Jr.

ONR (432)

THE INSTITUTE FOR ADVANCED STUDY
ELECTRONIC COMPUTER PROJECT
PRINCETON, NEW JERSEY

March 2, 1956

Office of Naval Research, New York
346 Broadway
New York 13, New York

Attn: J. H. Levy

Gentlemen:

Dr. J. Weyl of your Washington office and I have had a conversation regarding the possibility of entering into a future contractual arrangement with your office for the purpose of providing a computational facility for the Princeton scientific community. On the basis of this conversation, I understand that you will be willing to entertain a proposal by us to this end.

I accordingly make the following firm proposal on behalf of the Institute for Advanced Study: For the sum of $61,000 for the period 1 July 1956 through 30 June 1957, the Institute proposes to maintain and to operate its electronic computer on such problems of general scientific interest as arise in the community and seem worthy of solution. The Institute proposes to provide its machine, together with a maintenance and operating staff, as well as a small group of programmers, to assist in the preperation of problems.

On the attached sheet I give a detailed cost breakdown. You will, I am sure, understand that this breakdown is only approximate and is intended in the main to give you a picture of our present estimate of how our costs will be distributed. The precise allocation of funds will in all likelihood vary, depending upon our needs as they become apparent to us.

The Institute for Advanced Study represents that it has not employed nor retained a company or person (other than a full-time employee) to solicit or secure this contract; and agrees to furnish information relative thereto as requested by the Contracting Officer.

Yours very truly,

J. Robert Oppenheimer, Director
Institute for Advanced Study

HHGesg
cc: ONR/NY (5)
J. Weyl
H. Morgan, Jr.

COST ESTIMATE FOR PROPOSED CONTRACT

MACHINE MAINTENANCE & OPERATION	1 engineer 2 technicians 1 IBM keypunch operator	Salaries	$21,000
		IBM rental	8,000
		Supplies & repair materials	11,800
		Power	5,000
		Supplies, communication & travel	2,000
		Insurance	1,200
PROGRAMMING	2 mathematicians		12,000
TOTAL			$61,000

The Institute for Advanced Study
Electronic Computer Project
Princeton, New Jersey

C O P Y

March 2, 1956

Office of Naval Research, New York
346 Broadway
New York 13, New York

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Institute for Advanced Study

HHGesg
cc: ONR/NY (5)
J. Weyl
M. Morgan, Jr.

PRINCETON UNIVERSITY
BOARD OF SCIENTIFIC AND ENGINEERING RESEARCH
ROOM 111, PYNE ADMINISTRATION BUILDING
PRINCETON, NEW JERSEY

HENRY D. SMYTH
CHAIRMAN

February 7, 1956

Dr. J. Robert Oppenheimer, Director
The Institute for Advanced Study
Princeton, New Jersey

Dear Robert:

I promised that I would reduce to writing the views that I have expressed to you about computational facilities here over the next five or ten years.

I have held a series of conversations with the various people on the Campus who are competent or concerned and have had one or two group discussions.

From the point of view of the University, it is clear that there should be some instruction and some instructional facility in the general field of high speed computation and there seems to be general agreement that a machine of about the size and nature of the Datatron or International Business Machine's 650 would fill this role very satisfactorily. It is felt that such a machine would also have general use as a research facility for members of many departments. It is recognized that such a machine will not satisfy the needs of Schwarzschild and his graduate students, of Project Matterhorn, of some of Wigner's students and presumably of other more complex computational requirements that may arise in the future.

The University is very grateful to The Institute for Advanced Study for the generosity with which the Institute has helped Schwarzschild, Wigner and others by giving the use of the big computer. The University hopes very much that the big computer at the Institute can be maintained and operated and can eventually be replaced by a new machine of greater speed and power. We will do everything we can to support the Institute's efforts to solicit funds either in the form of grants or contracts for the continued operation of the machine. We would be offering this kind of help both out of our desire to cooperate with the Institute and because of the strong interest of certain members of the faculty in having a large computer available for their work. We think it is very important for the health and vigor of the scientific community in Princeton to have such a machine here and available.

PRINCETON UNIVERSITY
BOARD OF SCIENTIFIC AND ENGINEERING RESEARCH
ROOM 111, PYNE ADMINISTRATION BUILDING
PRINCETON, NEW JERSEY

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The University is hoping to obtain funds for the moderate size computer mentioned in my third paragraph. We feel that this is the extent of the direct financial effort that we can undertake at this time. Consequently, we shall have to limit our support of the Institute's machine to the kind of cooperation I have described.

Speaking personally but in terms of what I have learned in the last few weeks, my hope would be that the University might eventually be able to accept some of the financial responsibility for a big computer. This is based on the assumption that our needs and competence in this field will grow. Perhaps if the Institute can manage to keep the present machine going for a few more years, our two groups could then cooperate to get an entirely new computer as a replacement.

Finally, we do not feel that we want to set up a computer development group in any of our departments at the present time. We recognize that such a group would be entirely appropriate in an engineering school but we do not give it as high a priority as some of the other additions that we think are important.

I think that the position that I have described is in accord with what I have said on the telephone but it is probably desirable to make it a matter of record of the University's position at this time. Naturally, I am always available to discuss this question or any others of mutual interest.

Sincerely yours,

Harry

Henry D. Smyth,
Chairman.

HDS/mg
cc: Pres. Dodds
Dr. Acton
Dean Elgin.

Inst ECP transfer to Univ. (new folder)

CROSS REFERENCE

FILE: Computer Closing documents

RE:

LETTER DATED: June 1957

SEE: bottom drawer, safe-file, Business Office

TRANSFER CORRESPONDENCE WITH OTHER THAN PRINCETON UNIVERSITY

ECP

IBM

590 Madison Avenue
New York 22, N. Y.
Telephone: Plaza 3-1900

International Business Machines Corporation

April 4, 1962

Mr. Minot C. Morgan
General Manager
Institute for Advanced Study
Princeton, New Jersey

Dear Mr. Morgan:

I thought you would like to have an advance copy of the press kit describing Dr. Bryant Tuckerman's work on the historical ephemeris. It will be released to the press on Tuesday, April 10th.

Thank you for your help.

Cordially,

Howard K. Janis

HKJ/vs
Enclosure

Howard K. Janis
Manager, Press Relations
Scientific & Technical Information

For information call:

Howard K. Janis
Scientific & Technical Information
IBM Corporation
590 Madison Avenue
New York 22, New York

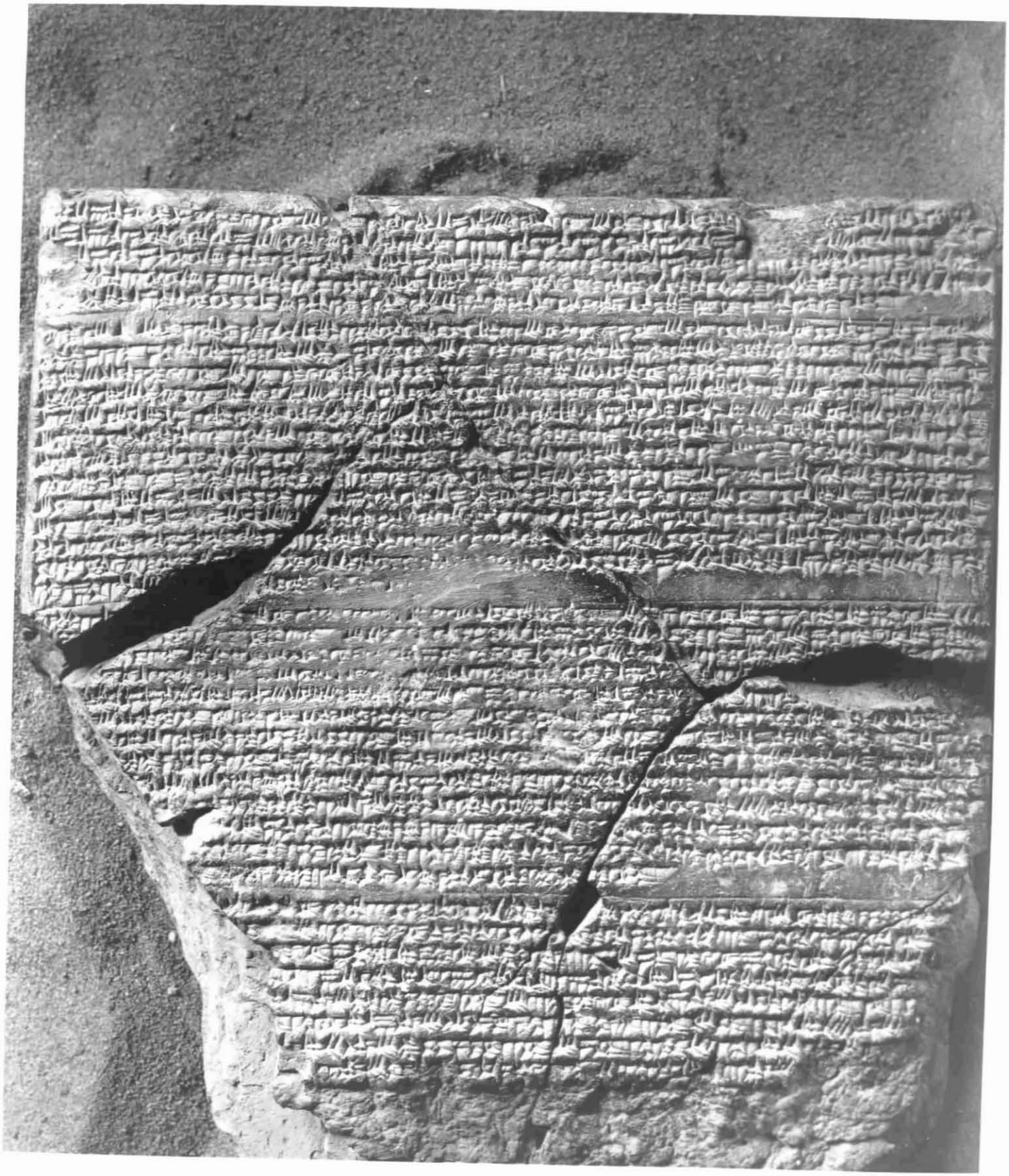
PLaza 3-1900
Extension 3592

*By permission of the Trustees of the British Museum

This is one side of a Babylonian clay diary which contains astronomical observations made in the first six months of Year 234 of the Seleucid Era -- that is, 78 B. C. Clay tablet fragments like these, from which the dates frequently have broken off, are being dated by means of the astronomical information on them through the use of tables produced by an IBM mathematician and an electronic computer. The tables give the positions of Mars, Saturn, Jupiter and the Sun at 10-day intervals, and the positions of the faster moving Moon, Mercury and Venus at 5-day intervals for the years 601 B. C. to A. D. 1 -- all for 7 P. M. Babylon time. Dating of fragments will then date any nonastronomical information on them and may help provide scholars with new insights into the civilization immediately preceding the Christian era.

*The credit line above is requested if you should reproduce this photograph.

4/10/62



For information call:

Howard K. Janis
Scientific & Technical Information
IBM Corporation
590 Madison Avenue
New York 22, New York

PLaza 3-1900
Extension 3592

*By permission of the Trustees of the British Museum

Here are nine of the 1, 300 Babylonian clay tablet fragments in the British Museum, of which about 450 have been dated. Of the fragments shown above, five have been dated: lower right corner, 257 B. C. ; upper right corner, 189 B. C. ; upper left corner, 186 B. C. ; small piece in middle, 87 B. C. Clay tablet fragments like these, from which the dates frequently have broken off, are being dated by means of the astronomical information on them through the use of tables produced by an IBM mathematician and an electronic computer. The tables give the positions of Mars, Saturn, Jupiter and the Sun at 10-day intervals, and the positions of the faster moving Moon, Mercury and Venus at 5-day intervals for the years 601 B. C. to A. D. 1 -- all for 7 P. M. Babylon time. Dating of fragments will then date any non-astronomical information on them and may help provide scholars with new insights into the civilization immediately preceding the Christian era.

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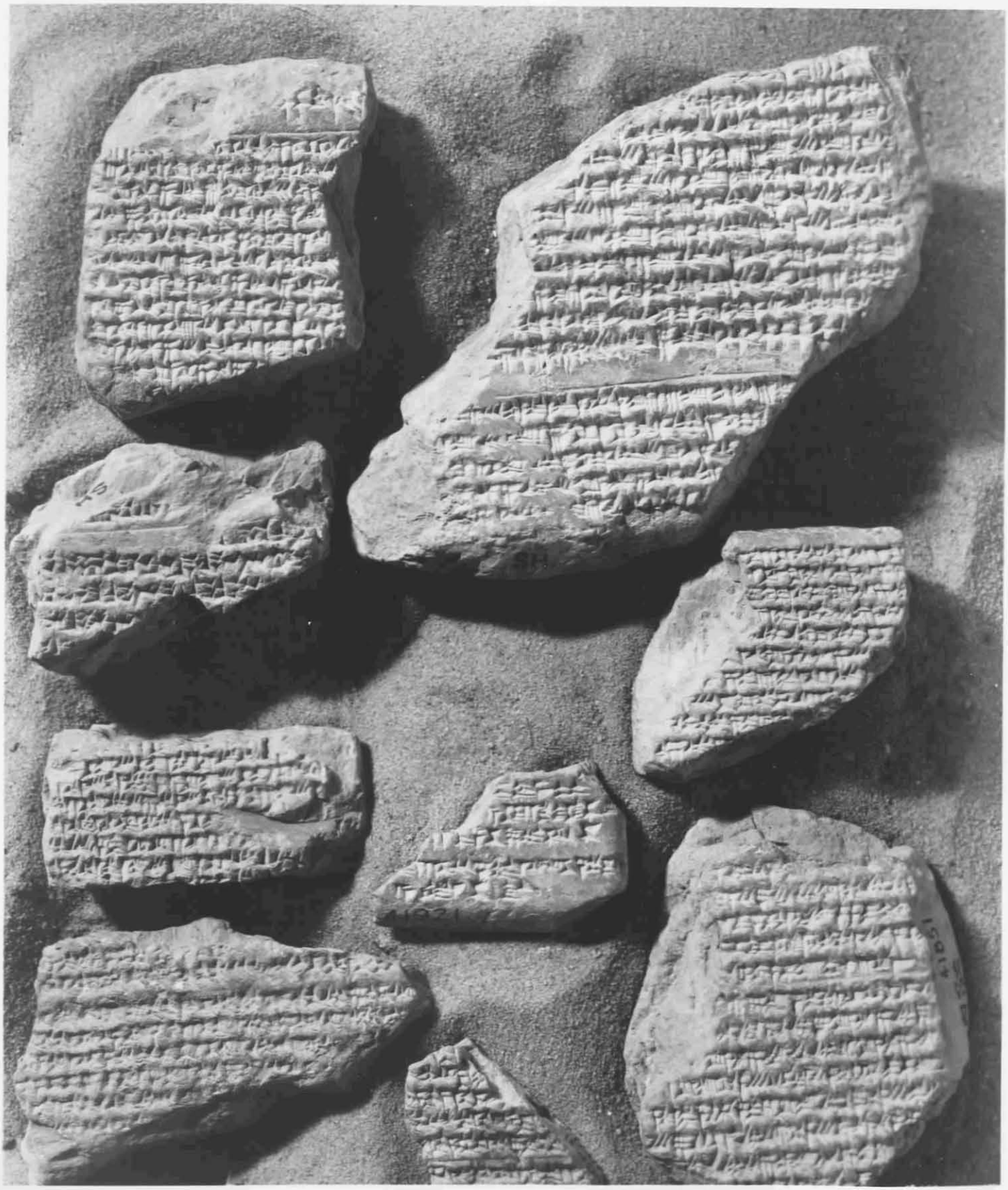

For information call:

Howard K. Janis
Scientific & Technical Information
IBM Corporation
590 Madison Avenue
New York 22, New York

PLaza 3-1900
Extension 3592

*By permission of the Trustees of the British Museum

This Babylonian clay tablet, pieced together out of three separate pieces, as the visible cracks indicate, dates back to 183 B. C. Tablet fragments like these, from which the dates frequently have broken off, are being dated by means of the astronomical information on them through the use of tables produced by an IBM mathematician and an electronic computer. The tables give the positions of Mars, Saturn, Jupiter and the Sun at 10-day intervals, and the positions of the faster moving Moon, Mercury and Venus at 5-day intervals for the years 601 B. C. to A. D. 1 -- all for 7 P. M. Babylon time. Dating of fragments will then date any nonastronomical information on them and may help provide scholars with new insights into the civilization immediately preceding the Christian era.

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4/10/62

For release:

Tuesday A.M.'s & P.M.'s
April 10, 1962

From

IBM

International Business Machines Corporation
590 Madison Avenue
New York 22, New York

Howard K. Janis
Scientific & Technical Information
PLaza 3-1900 - Extension 3592

IBM ASTRONOMICAL COMPUTATIONS AID SCHOLARS IN DATING BABYLONIAN HISTORICAL TABLETS

NEW YORK, N.Y., April 10 -- A research mathematician with International Business Machines Corporation has used an electronic computer to compile astronomical tables that are being used in dating and piecing together ancient fragments of Babylonian clay tablets, it was disclosed today. Dating of information on the tablets may provide scholars with new insights into the civilization immediately preceding the Christian era.

The astronomical tables, along with a description of their construction and use, will be published later this month as Volume 56 of the MEMOIRS of the American Philosophical Society, Philadelphia, under the title, "Planetary, Lunar and Solar Positions, 601 B.C. to A.D. 1, at Five-day and Ten-day Intervals." The author, Dr. Bryant Tuckerman of IBM, began his work with contract support from the Office of Naval Research while at the Institute for Advanced Study in Princeton, N.J., and continued it under IBM sponsorship.

- more -

IBM ASTRONOMICAL COMPUTATIONS AID SCHOLARS
IN DATING BABYLONIAN HISTORICAL TABLETS

Professor Abraham J. Sachs of the Department of the History of Mathematics, Brown University, Providence, R.I., is already using the IBM tables in dating fragments of clay tablets written in Babylonian cuneiform script. Astronomical observations recorded on a tablet can be "looked up" in the newly computed tables which give the positions of the Moon, Sun and planets for the 600-year period. In this way the possible dates of the observations are found. If there are observations of enough bodies on the same tablet, only one date will be common to all. This pinpoints the date of the tablet. The fragments have been kept at the British Museum in London since the 1880's. Professor Sachs has made several trips to London but works largely from photographs of the tablet fragments supplied by the Museum.

Dr. Tuckerman's novel computer project was initiated at the suggestion of Professor Otto E. Neugebauer, chairman of the department at Brown, who had earlier worked with astronomical predictions from the same era. It points up the potential support high-speed electronic computers can give to the tradition of academic scholarship in the study of ancient civilizations.

Dr. Tuckerman's program took over 40 hours to run on an IBM 704. It would have been an enormous and impractical job without the computer. The tables give the positions of Mars, Saturn, Jupiter and the Sun at 10-day intervals for the 600-year period. For the faster moving Moon, Mercury and Venus, positions were computed for five-day intervals. All positions were computed for 7 P.M. in Babylon. Using this data, interpolations can be made readily for any intermediate day and hour, or for locations other than Babylon.

IBM ASTRONOMICAL COMPUTATIONS AID SCHOLARS
IN DATING BABYLONIAN HISTORICAL TABLETS

How the tables were constructed

Dr. Tuckerman's analysis and computer program for constructing these tables were based on modern mathematical theories describing the motions of the planets, together with improvements based on ancient observations. The "theories" were developed by the astronomers Leverrier, Hansen and Gaillot. They are the mathematically derived consequences of applying Newton's laws of motion, together with modern observations, to the interactions of the bodies of the solar system. Their general validity, over a long period, is not in doubt.

Past comparisons have shown good but not perfect agreement between these theories and previously available ancient observations. Consequently, astronomers have added to the theories a few extra mathematical terms, called secular accelerations, whose values have been chosen to reduce the discrepancies. The terms are generally ascribed to the slowing of the earth's rotation by tidal friction.

Positions are given in Dr. Tuckerman's tables to an accuracy within a few hundredths of a degree for most bodies, somewhat less accurate for the Moon and Saturn, but the equivalent of only about an hour in dating.

IBM ASTRONOMICAL COMPUTATIONS AID SCHOLARS IN DATING BABYLONIAN HISTORICAL TABLETS

Historical background of the Babylonian cuneiform tablets

There are some 1,300 clay tablet fragments, containing historical information and astronomical observations in Babylonian cuneiform script, but frequently the dates have broken off. About 450 have already been dated by Professor Sachs during the last several years. Although years of scholarly work remain, he can now save himself laborious hand computation and can look up a reported configuration in the new tables to find the corresponding date. For a "good" set of Babylonian observations -- such as the simultaneous positions of the Moon and several planets, to reasonable naked eye accuracy -- the exact date can be determined. The dating of the tablet will then date any other nonastronomical information on it.

Such regularly recorded information as prices of barley, oil, dates, spices and wool -- in terms of quantities that could be bought per shekel (1/60th of a pound) of silver -- can be graphed to show long-term fluctuations in Babylonian commodity prices. Other historically valuable information includes weather reports (clouds, rainstorms, floods and river levels), references to epidemics, raids by nomadic Arabs, and military events. In addition to dating such ancient information, the comparisons of observed and computed astronomical phenomena should eventually be useful to modern astronomers.

IBM ASTRONOMICAL COMPUTATIONS AID SCHOLARS IN DATING BABYLONIAN HISTORICAL TABLETS

According to Professor Sachs, systematic astronomical observation probably originated as a result of the preoccupation of the Babylonians with omens. For thousands of years, minute details of situations preceding both favorable and unfavorable events were recorded in attempts to make available abundant information on which to base predictions for future important events. This mass of information included, for example, the state of the internal organs of sheep offered for sacrifice, the actions of various animals, occurrence of meteors, and so forth.

About the middle of the eighth century B. C., there occurred an unusual conjunction of planets of a type which could not be found among the older records of omens. The need for more records led to the beginning of systematic astronomical observations about 750 B. C. This observational activity continued without interruption over the next six centuries.

Historians are also interested in studying the connection between the Babylonian records and the Greek civilization. Ptolemy, who lived around 150 A. D., is known to have made use of records of eclipses and other observations which came from Babylon. The earliest record he used dates back to the eighth century B. C.

Years of research still lie ahead of Professor Sachs despite the great computational time-saving afforded by the IBM tables. He expects eventually to publish his complete findings in three volumes as a reference work for scholars.

# # #

ADDITIONAL TECHNICAL DETAILS

The computation project was planned, analyzed, coded, and carried out on electronic computers by Dr. Bryant Tuckerman, a mathematician at the IBM Thomas J. Watson Research Center, Yorktown, N.Y. He began it at the Electronic Computer Project of the Institute for Advanced Study in Princeton, N.J., with contract support from the Office of Naval Research. The first part of the analysis was done there, and provisional outputs were obtained on the IAS computer. When he joined IBM he was invited to complete it on an IBM 704 computer. After additional analysis and programming, the production was done in some 40 hours on the 704. It would have been an enormous and impractical job by hand computation.

Prior to the availability of the IBM tables, known to scholars as an historical ephemeris, dating of the fragments containing astronomical data was possible only by a sequence of trial calculations, each tedious and lengthy. Even with the help of the useful auxiliary tables "Tafeln für Sonne, Planeten und Mond" of P. V. Neugebauer -- which abstract and simplify the portions of the classical theories which are appropriate to naked-eye observations, but do not give positions directly -- the hand computation of a single planetary position is a laborious process, and the dating of a record would require several or many such computations. All this labor now has been relegated to the computer, and the resulting positions made permanently available, by the computation of these tables.

The computation of the tables was based upon the classic mathematical theories of Leverrier, Gaillot and Hansen, with some modified elements (due to Schoch). Such theories are based upon Newton's laws of physics, fitted primarily to the telescopic observations of the past few hundred years. To the extent that the laws, theory and observations are satisfactory, the theories should supply computed future or past positions, as well as present-day ones, in satisfactory agreement with the actual (or observed) positions. Even without modification, these theories are known to fit ancient observations (back to several hundred years B. C.) fairly well, so that a "good" set of ancient observations from the period would be sufficient for dating to the exact day, and an "ideal" set (of modern accuracy) from the period, to within a few hours.

Detailed comparisons some years ago, by astronomers and historians, of some of the few accurate ancient observations with positions computed from the theories, have shown some small systematic discrepancies, which are principally described by a few mathematical terms called "secular accelerations" of the various bodies, and are now believed to be due principally to the slowing of the Earth's rotation by the friction of the tides. These terms are still imperfectly known; but by incorporating good estimates of them, such as Schoch's, as has been done in these tables, the agreement of the theories, and hence of these tables, with ancient observations is improved, so that the uncertainty in dating an "ideal" observation would probably be a fraction of an hour in the era being considered.

- more -

The precision required of the tables depends on the nature of the observational material, which was with the naked eye and without precise time measurements. Units of a tenth of a degree were originally suggested, and would be adequate for dating purposes. However, to make sure of a sufficient precision, the tables have been uniformly generated to an additional decimal place, that is in units of a hundredth of a degree (except for the rapidly moving Moon, where units of a tenth of a degree were used). A hundredth of a degree is about the apparent diameter of Venus at its brightest, or one-fiftieth the apparent diameter of the Moon.

To accomplish precision of this order, numerous small effects (perturbations) were included. However, in order to conserve the time of the analyst and of the 704, without sacrificing usefulness, certain smaller perturbations were omitted, leading to small differences between the tables and the exact theories. These amount to less than 2-1/2 units in all cases except Saturn (where they are less than 16 units). Neither these omitted terms, nor the uncertainties in the secular accelerations should affect the dating of an "ideal" set of observations by as much as an hour.

The originals of the tables were prepared directly on the off-line printer of the 704 computer. In order to keep the number of pages as small as practical, and also to display the full information for all the bodies for each ten days on a single line, the pages of output were designed to be the full width of the printer, 120 columns, and a corresponding length, about 100 lines, to make a properly shaped page.

There resulted 301 pages, each covering two years, and giving the celestial longitude and latitude of the Moon, Venus and Mercury at 5-day intervals, two per line, and of Saturn, Jupiter and the Sun at 10-day intervals, one per line. These large pages (12" x 17") were photographically reduced about 2:1 for publication but the reduction still permits legibility.

The same computer program could be used to produce similar tables for other periods of time, earlier or later. However, the period just covered is one of greatest interest. According to Professor Neugebauer, no other pre-modern period has a comparable number of observations extant.

Schols & Dist - E.C.P.

ROBERT SERRELL
39 LOVERS LANE
PRINCETON, NEW JERSEY

Professor J. Robert Oppenheimer
Director,
The Institute for Advanced Study
Princeton, New Jersey

Dear Professor Oppenheimer:

On the occasion of its fiftieth anniversary next year, the Institute of Radio Engineers has asked me to prepare a paper on "The Evolution of Computing Machines and Systems"(together with co-authors Astrahan, IBM San Jose, Patterson, University of Pennsylvania and Pyne, Princeton University). With our discussion of the Institute for Advanced Study Computer, we would like very much to include the photograph attached (which was supplied to me by Alan Richards). *

If, as I hope, we may have your permission to do so, a short word to this effect on the attached copy of this letter will suffice. Many thanks!

Sincerely,

Robert Serrell

11 September 1961

Permission granted: V.H. 9/13/61
for Dr. Oppenheimer

* returned with signed cc. (Prof. von Neumann standing by machine)

ECP

5/25/60

Call from Mr. Boberg, IBM patent department in Poughkeepsie. (This is the call that Montgomery told us we might expect, of which he had been told by Goldstine). Boberg would like to come down and look at the computer records. He is interested in the Snyder Schhutz work on magnetic core memory, about 1947-48. We made a date for him to come down Friday, probably arriving a little after one. I am to call him back if you object, GLobe 4-1000. ext 5172

Checked with Betty Gorman, who has charge of the Computer files. She will have to look at what there is, but I suggested that she wait until I had told you of this.

RO no objection. Gov. has non-exclusive license on all patents.

UNIVERSITY OF CALIFORNIA

RADIATION LABORATORY
BERKELEY 4, CALIFORNIA

Berkeley
August 21.

Dear Robert

I have talked about Nehly to the people here. There is interest in the field — a 704 will be set up on campus — they need people. We have talked to Abe Taub and Herman Goldstein. It is my understanding that the people involved would now like to talk it over among themselves and take it from there

Bruno

CROSS REFERENCE

FILE: Computer - Inst. Gen.

RE:

LETTER DATED: 12/19/57

SEE: Member - Neugebauer

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WESTERN UNION TELEGRAM

1959 SEP 12 PM 12 36

1201

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SYMBOLS

DL = Day Letter
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PA047 SYC081

SY ND373 GOVT NL PD=TDN PWS MOFFETT FIELD CALIF SEP 11:

=INSTITUTE FOR ADVANCED STUDIES=

PRINCETON NJER=

=ATTENTION VERNA HOBSON SECRETARY REURTEL MONTHLY PROGRESS REPORT REQUESTED WAS WRITTEN BY DR. H. MAEHLY REGARDING METHODS OF APPROXIMATION. REFERENCE WAS MADE IN JUNE 1958 ISSUE OF RESEARCH AND DEVELOPMENT IBM CMA ARTICLE BY E. G. KOGBETLANZ=

4400

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.

RECEIVED
TELEPHONED
TIME 909A
BY VC TO BE

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

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to Institute for Advanced Study, from Moffet Field, Cal. rec'd 9/11/59

Urgently need the monthly progress report October 1956 for use by our scientists.

National Aeronautics & Space Adm.
Ames Research Center
Lucille D. Baker

to above

We do

Institute for Advanced Study does not issue monthly progress reports. Cannot identify report requested in your telegram.

Verna Hobson
Secretary
Institute for Advanced Study

sent 9/11/59

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

Just fyi ECT

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from Moffet Field, Cal. received 9/14/59

Regarding your telegram monthly progress report requested was written by Dr. H. Maehly regarding methods of approximation reference was made in June 1958 issue of Research and Development IBM CMA article by E. G. Kogbetlanz.

National Air and Space Administration

referred to Maehly

Educational Testing Se

Dr. Goldstine:

pls return to J.O.

10 March 1956

Dear Dr. Chauncey:

This is to acknowledge and thank you for your letter of March 8th, which has arrived during Dr. Oppenheimer's absence for a few weeks vacation in the Caribbean. We shall hold your letter for Dr. Oppenheimer's attention on his return to Princeton before the end of this month.

Sincerely yours,

(Mrs. Wilder Hobson)
Secretary to the Director

Dr. Henry Chauncey
Educational Testing Service
Princeton, New Jersey

EDUCATIONAL TESTING SERVICE

PRINCETON, NEW JERSEY

OFFICE OF THE PRESIDENT

March 8, 1956

Dear Oppie:

Our people have studied the Institute's computer and its suitability for our needs. It is their conclusion that it does not match very closely our requirements and that we would be unwise to acquire it. I appreciate very much your thinking of us and also the time that Mr. Goldstine gave to discussing the matter with members of our staff.

I might add that if the computer does continue to be operated in this area, it is likely that we would have some use for it, but the amount of use that we would make of it would be far less than necessary to support more than a small proportion of the operating costs of the machine.

With all good wishes...

Sincerely yours,

Henry Chauncey

Dr. Robert Oppenheimer
Institute for Advanced Study
Princeton, N. J.

Electronic Associates

THE INSTITUTE FOR ADVANCED STUDY
ELECTRONIC COMPUTER PROJECT
PRINCETON, NEW JERSEY

March 16, 1956

Dear Robert:

I just had another call from the manager of the Electronic Associates group on the highway. As you will remember, this organization showed some interest in buying the machine. They have called again to express their interest, and to say that they would like to send a man here to learn more about the machine so that they can lead up to making the Institute a proposal. I told him we would be glad to give them reasonable assistance.

Herman H. Goldstine

HHGesg

Dr. J. Robert Oppenheimer
Institute for Advanced Study

Illinois, Univ

29 March 1956

Dr. Kruger, University of Illinois, telephoned to say that the Associated Universities (Midwest) would like to buy our computer. I passed the call along to Dr. Goldstine, and he tells me that Kruger wanted to settle the whole thing on the telephone. Goldstine told him that the University had first crack, and that it would not be possible to settle anything that rapidly. He told Kruger to write to you.

Illinois, Univ of

9 April 1956

Dear Professor Kruger:

Thank you for your good letter of April 6th. It is true that the Institute is shortly planning to discontinue some aspect of its program in the development and use of electronic computers; it is also true, though less certain, that we would like to disengage totally from the operation of the computer now here. During the time that it has been here, members of the Institute, and members of the faculty of the University of Princeton and some of their students, have come to depend on it as a facility. We do not believe that we can or should remove this facility from Princeton if we can possibly help it. We have therefore undertaken to maintain it for the coming fiscal year, and hope that in time a more suitable management can be found. I would expect to know whether in fact this will be possible by the end of this calendar year. If it is, then I think we should be well advised to keep a reasonably adequate computer facility in the Princeton community; if not, we shall reluctantly transfer the computer to whoever then wants it.

From your letter, I would assume that your interest in having it, though high at the moment, would not long be maintained. Nevertheless, if you wish I shall let you know when our future is a little more certain.

With all good greetings,

Robert Oppenheimer

Professor P. Gerald Kruger
Physics Department
University of Illinois
Urbana, Illinois

Copy to Professor Smyth + copy of Kruger letter + Rolland note.

MIDWESTERN UNIVERSITIES RESEARCH ASSOCIATION

Physics Department,
University of Illinois,
Urbana, Illinois,
April 6, 1956.

Professor J. R. Oppenheimer, Director,
Institute for Advanced Study,
Princeton, New Jersey.

Dear Professor Oppenheimer:

I understand that the digital computer which is at the Institute is not going to be used there in the future. If this is correct, I would like to ask if it would be possible for the Midwestern Universities Research Association to acquire this computer either as a gift, a loan, or on a purchase basis.

During the past year or two we have made more and more use of the Illiac at the University of Illinois and at the present time are using about one-third of its total computing time. This is about as much as one can reasonably expect the University to donate to MURA since many other departments in the University have use for it. On the other hand, this amount of computing time, which has been very valuable and will continue to be valuable in the future, is not sufficient to take care of the computing which needs to be done during the final design and construction of the midwest accelerator.

If some arrangement suitable to you, the University of Princeton, and MURA could be made to acquire this calculator, it would be of great value to us especially during the next year when heavy computing demands will have to be met and when it is unlikely we will be able to buy an IBM Model 704 or perhaps even rent one.

I shall appreciate it if you will give this your serious consideration and let me know shortly what the possibilities are. To be of most use to us we would like to install the computer in the laboratory at our site sometime within the next two or three months.

------ 2

Professor J. R. Oppenheimer April 6, 1956.

At this time we are submitting a proposal for our accelerator to the Commission and I am sending Milt White a copy which you might like to borrow and look over.

Greetings and best wishes,

Sincerely yours,

P. Gerald Kruger.

PGK: tr

Int. Bus. Mach Co.

COPY

INTERNATIONAL BUSINESS MACHINES CORPORATION
World Headquarters: 590 Madison Avenue, New York 22, N. Y., Telephone Plaza 3-1900

November 18, 1955

Dr. Herman H. Goldstine
The Institute for Advanced Study
Electronic Computer Project
Princeton, New Jersey

Dear Herman:

Thank you for your letter of November 9. I appreciated learning something about your visit to Europe.

I have it high on my priority list to come down to Princeton both to say hello to Dr. Oppenheimer and to visit you. In the meantime, should you be in New York on other business, please telephone.

This brings my best wishes and regards.

Cordially yours,

/s/ Cuthbert Hurd

Cuthbert C. Hurd, Director
Electronic Data Processing Machines

CCH:GS

THE INSTITUTE FOR ADVANCED STUDY
METEOROLOGY PROJECT
PRINCETON, NEW JERSEY

March 16, 1956

Dear Robert:

I enclose a copy of a letter from a friend in Michigan; this might be of some interest.

Dr. J. Robert Oppenheimer
Institute for Advanced Study

Michigan, Univ of

C O P Y

C O P Y

UNIVERSITY OF MICHIGAN . ANN ARBOR
COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS

DEPARTMENT OF PHILOSOPHY

March 12, 1956

Dr. Herman Goldstine
Institute for Advanced Study
Princeton, New Jersey

Dear Herman:

I have heard rumors that your computation center may move. If there is any truth in this, and if you would consider moving it out here, I should like to investigate the possibility further.

There are many people on the campus interested in establishing a computation laboratory here, and if there is any possibility of your machine and group moving, I shall take the matter up with them. I can't speak officially for the University, of course, but there is enough chance of success there to make an attempt worthwhile.

Best regards to Adele and you.

Sincerely yours,

ART (signed)

Arthur W. Burks

THE INSTITUTE FOR ADVANCED STUDY
ELECTRONIC COMPUTER PROJECT
PRINCETON, NEW JERSEY

Professor Arthur W. Burks
Department of Philosophy
University of Michigan
Ann Arbor, Michigan

Dear Art:

Many thanks for your kind letter of March 12 about the computing lab here. It is quite true that the Institute is planning to disband the computing laboratory. We think that the day of the university in the engineering phase is gone and, therefore, that it would be in the best interests of everybody if our engineers were "freed up" to go to industry.

The meteorology group is also disbanding and what is left is primarily a service center. Whatever else one can say, it seems unreasonable for the Institute to provide service facilities for the Princeton community.

My own plan is to return to more conventional forms of mathematics at the Institute. (At the present I plan to read Leray and Schwartz work on hyperbolic equations and distributions and to proceed in this direction.)

The fate of the machine, plus some of the group, is still in doubt. I am therefore taking the liberty of forwarding your letter to Dr. Oppenheimer to see when he returns the latter part of the month. When I hear from him, I will let you know.

Adele joins me in sending our best regards to Alice and to you.

Sincerely yours,

Herman H. Goldstine

HHGesg
cc: Dr. Oppenheimer

Michigan, Univ of

THE INSTITUTE FOR ADVANCED STUDY
ELECTRONIC COMPUTER PROJECT
PRINCETON, NEW JERSEY

April 2, 1956

Professor Arthur W. Burks
Department of Philosophy
University of Michigan
Ann Arbor, Michigan

Dear Art:

Dr. Oppenheimer has now returned from his trip and I have discussed with him your letter of inquiry regarding the computer.

The Institute has agreed to give Princeton University first crack at the machine. Henry Smyth of the University is now working on the problem and we hope to have a definite statement from him in the finite future. If this should be in the negative, then I am sure Dr. Oppenheimer would be willing to take up your suggestion.

Adele joins me in sending our best regards.

Sincerely yours,

Herman H. Goldstine

HHGesg
cc: Dr. Oppenheimer ✓

New York University

THE INSTITUTE FOR ADVANCED STUDY
ELECTRONIC COMPUTER PROJECT
PRINCETON, NEW JERSEY

February 13, 1956

Mr. John R. Pasta
Division of Research
U.S. Atomic Energy Commission
Washington 25, D. C.

Dear John:

Many thanks for your kind letter of February 9, 1956. I am very appreciative for your comments and your counter example.

Shortly after our talk, I told Dr. Oppenheimer generally of our conversation regarding the Institute machine. Since receiving your letter this morning, I again spoke to him and am glad to say that he showed interest in the proposal with respect to New York University. He is at the moment negotiating with Princeton University and hopes to hear one way or other within the next several weeks. He probably will know the University's intentions by about the time that Courant returns from Europe. If he has not made other arrangements by March 1, I feel certain that he would like to take up the New York University matter.

Adele joins me in sending our very best regards.

Sincerely yours,

Herman H. Goldstine

HHGesg
cc: Dr. Oppenheimer

Pennsylvania, Univ of

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 4

The College

DEPARTMENT OF MATHEMATICS

February 1, 1956

Professor Robert Oppenheimer
Institute for Advanced Study
Princeton,
New Jersey

Dear Professor Oppenheimer:

Following the telephone conversation which I had with you recently, I presented to the Computing Center Committee your gracious and thoughtful suggestion that the University of Pennsylvania may wish to avail itself of the opportunity to submit a proposal to the Institute for Advanced Study regarding the future disposition of the Electronic Computer Project. This Committee gave careful consideration to your kind invitation and formed the opinion that only one large-scale computer would be the optimum number of big machines for the prospective Computing Center at Penn. Since the University of Pennsylvania has received definite, though oral, assurances from Sperry-Rand that a Univac will soon be turned over to the University for instructional and research purposes, the Committee feels that the problem of establishing the machine nucleus of the Center has been solved.

The Committee conveys to you their deep appreciation of your kind suggestions.

Sincerely yours,

W. H. Gottschalk

W. H. Gottschalk, Chairman
Department of Mathematics
For the Computing Center Committee

WHG:bm