**DYNATREND, INC.**

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June 22, 1978

Prof. Donald Knuth
Computer Science Department
Stanford University
Stanford, CA 94305

Dear Don,

Thanks for your letter answering some of my questions some months ago. In various attempts to straighten out the historical accounts of "who did what" my time for research on problems like the traveling salesman have been severely restricted. In answer to your query about examples of "short code", I have made inquiries of some of the UNIVAC programmers but so far none of us can supply specific examples.

In the meantime, I'm not sure that I have fully provided you with some of the historical material which has been at hand since the time that we were all together at Los Alamos for the history conference. To make sure that you have access to some of these things, I enclose the copy of the disclosure for a magnetic calculator which was found among the legal papers in the Minneapolis trial but has not as yet been given any real publication. This January 1943 document which Eckert typed and which I witnessed as to date and so forth, was lost in the files of the Moore School for years so far as we can determine. Yet, such was the thoroughness of the M-H lawyers that they included this disclosure among the papers which were collected for that trial, and thus, it eventually became available to us. It is, of course, the very document which was referred to in an EDVAC report which in turn was used in the paper which Metropolis and Worlton used in 1972 to try to correct the mistaken notion that VanNeumann was the author of the stored program idea. I believe the finding of that paper or disclosure makes it at last possible to settle what seemed to be a very moot question as to the authorship of the idea of stored program.

(1944)

Even though U.S. postage rates have gone up, it appears that distribution of this document and other historical corrections may turn out to be faster and cheaper by mail than by waiting publication of proceedings which may be converted into books. As an added piece of interest, I enclose a recent

clipping from "Creative Computing" magazine, in which a reader's letter very neatly sums up some of the difficulties with the decisions made by Minneapolis Judge Larsen regarding ENIAC and Atanasoff.

If I can be of any help to you,let me know.

Sincerely yours,

John W. Mauchly

Enclosures: Magnetic Calculator Disclosure (Jan. 1943)
Tursich's letter "Round Two" ,re Atanasoff

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Creative Computing
Morristown, N.J.
2X N/A.

## Inventor of the Computer (Round Two)

Dear Editor:

This is in response to Michael Ham's letter to *Creative Computing*, Nov-Dec 1977 (page 12), wherein he says John Atanasoff is the real inventor of the electronic digital computer. He bases his claim solely on Judge Earl Larson's decision in the 1971 court case of Honeywell vs Univac on the matter of royalty payments by the former to the latter.

Actually, Judge Larson vacated the Eckert-Mauchly claim of royalties due their patent assignee, Univac, on the technicality of an excess interval of time between first public disclosure of their patentable product and the date of formal application for their landmark patent. Having thus overridden the 25-year standing of the Eckert-Mauchly patent, and having ignored four prior court tests (including IBM's) of this same patent in which the Univac claim had been legally upheld and royalties awarded to Univac, Judge Larson then usurped powers vested in the Bureau of Patents and unilaterally bestowed fatherhood of the computer on Prof. Atanasoff.

During that trial in Minneapolis in the Spring and Summer of 1971, Honeywell introduced over 25,000 documents in evidence, and Univac added almost 8,000 other trial exhibits. Besides the letter Mr. Ham mentioned concerning Mauchly's visit to Atanasoff to see the latter's "computer," other letters produced in court showed clearly that Atanasoff was unable (on the occasion of Mauchly's visit) to demonstrate the "Device" to Mauchly after trying for several days. Hence that device can in no way be called a computer (a device which computes). Another exhibit presented during the trial was a letter from Atanasoff to Mauchly congratulating the latter for having succeeded where he (Atanasoff) had failed.

Judge Larson also neglected to account in his monumental decision for John Atanasoff's failure, during the 28 years since the original Eckert-Mauchly computer's successful operation at the University of Pennsylvania in 1943, to make any public claim of prior invention of the computer until the issue was raised by Honeywell during this trial in Minneapolis. Since Atanasoff was not entitled to any royalties because he had not patented this idea, his only benefit from Judge Larson's unprecendented decision was a big ego trip, undeserved as it is.

Ernest J. Tursich
818 Forest Ave.
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To Don Knuth June 21/7

# Disclosure of Magnetic Calculating Machine

A simplified method of constructing a numerical calculating machine is proposed in which some of the mechanical features of an ordinary mechanical calculating machine are retained and combined with certain electronic and magnetic devices to produce a speedier, simpler machine as well as providing additional features of utility, ruggedness and ease of repair.

A continuously rotating shaft called the time shaft, driven by an electric motor, has at least some of each of the following discs or drums mounted on it:

A) Discs or drums which have at least their outer edge made of a magnetic alloy capable of being magnetized and demagnetized repeatedly and at high speed. Suitable coils and other apparatus are provided to convert electrical pulses or other wave shapes into spatially distributed magnetized sectors on the periphery of these discs, the position and/or phase of these magnetized sectors providing a method of storing, in some usable code, those characters or digits which must be used later or indicated. It should be noted that the direction of magnetization of the sectors is unimportant and may be in any direction relative to the motion or a combination of directions, this being a well known technique. This is analogous to the use of a magnetic tape to record sound except that here linearity is of little importance.

B) Discs or drums having edges or surfaces engraved in such a way as to cause voltages to be induced in a coil arranged near the disc. In any case either the disc or pole piece of the coil should be a magnet. This disc would generate such pulses or other electric signals as were required to time, control and initiate the operations required in the calculations. This is similar to the tone generating mechanism used in some electric organs and offers a more permanent way of storing the basic signals required than would be afforded by the alloy discs referred to above.

C) Discs or drums carrying characters, usually the digits 0 to 9, which can be illuminated by a light modulating device, say a neon gas discharge lamp, and so arranged that at any desired phase of the rotating shaft, corresponding to the positions of the characters, they can be flashed thus making one of the characters on the disc visible. This stroboscope principal is to be used as the high speed indication device in this calculator.

Addition, subtraction, multiplication and division would be carried out by processes of sucessive addition, such as is well known in mechanical calculation machines. The alloy discs or an auxillary alloy tape could be used to store function data such as a sine table. A multiplication table might be included in this manner to appreciably speed up the process of multiplication by the method of accumulation of partial products used in mechanical calculators.

The original was classified CONFIDENTIAL

The original data or numbers might be put into the machine by means of the usual keyboards, tape or cards. These same types of tapes or cards could be used to record the calculated results.

In the above operations some means must be provided to switch the various signals from one circuit to another. This can be done rapidly by using electronic tubes and switches. A great economy in the numbers of these switching tubes can be effected by putting all the digits of a particular number on the same disc and taking them off serially through the same switching tube. This is to be contrasted to taking the n digits of a number off through n pick-up coils and through n switching tubes.

It has the advantage of reducing the number of tubes required but slows down the operation and may require the mechanical shaft system to be extended so that the alloy discs rotate slower and in syncronism with the indicator discs to allow any of the numbers on the discs to be indicated concurrently or serially. In addition to the above switching operations electronic tubes will be used to count and/or discriminate the pulses used in the system to allow composition of pulse groups from two or more sources and their deposition into other channels. Clearly the power circuits for such a system may be electronic tubes, selenium oxide rectifiers or similar devices.

The use of the binary number system is favored by such an apparatus since the switching circuits are no more complicated and the required pulse groups for representing the number are simpler. The counter circuit is also simpler and more reliable. Either discs of the etched or alloy type may be used to remember combinations required in the conversion from the decimal to the binary system and the reverse if such a system is used.

If multiple shaft systems are used a great increase in the available facilities and for allowing automatic programming of the facilities and processes involved may be made, since longer time scales are provided. This greatly extends the usefulness and attractiveness of such a machine. This programming may be of the temporary type set up on alloy discs or of the permanent type on etched discs.

The principal virtues of such a machine are largely due to the alloy discs which allow numbers to be stored indefinately and to be put on and taken off by a conveniently controlled electric circuit, and that none of the mechanical parts have to accelerate or decelerate during the operation of the machine. The advantages of the electric control are not only that it allows rapid operation but that the design is simplified and capable of more readily being extended and interconnected to other apparatus.

Several economies of operation result. It should be cheaper to build, because the precision of the electric parts is much smaller than the equivalent mechanical parts. Maintenance should be reduced because of the reliability and long life of the electric parts, the residual mechanical parts having only very simple bearing surfaces capable of giving long life. The coil structure used to magnetize the alloy discs may be separate from those used to reproduce and demagnetize them, although in the interest of simplicity it should be possible to produce all these operations with the same coil assembly. An economy over card and tape machines may be effected since no materials are normally used up in the operation of the machine, only electric power is consumed.

J. Presper Eckert, Jr.

Copied on February 1, 1945
from three typewritten sheets
dated January 29, 1944
— J.W. Mauchly witnessed that Jan. 29/44 was the date when he had first seen this

The original was classified CONFIDENTIAL

Plaintif's Trial Exhibit Numbers
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