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## Computer Oral History Collection, 1969-1973, 1977

**Interviewee:** John V. Atanasoff (1903-1995)

**Interviewer:** Henry Tropp

**Date:** May 24, 1972

**Repository:** Archives Center, National Museum of American History

### **TROPP:**

This is a continuation of my discussions with Dr. J. V. Atanasoff, today, at his home in - near New Market. And if the discussion is slightly slow it's because we just completed a marvelous lunch. [laugh] The - we spent the morning talking about the photographs and they're on another tape. The date is May 24, 1972. The first question that I was going to ask you, Dr. Atanasoff, was the one about weather forecasting. Did you and Dr. Mauchly have any conversations about weather forecasting, and if so in what context?

### **ATANASOFF:**

Well, yes. I discovered young Mauchly in the following way. I had gone to the AAAS meeting in the fall of 1940 at Philadelphia - you know in the fall, late fall, Christmas season of 1940. And at one stage of these meetings I was looking over the schedules of the program, and I saw a - I was always looking for projects on computation. And I saw a - on the program, a presentation by Dr. John Mauchly which involved some analog computations. More specifically, the analog computation involved the Fourier analyzer which he was using as applied to weather material. Now, I listened to this paper by John Mauchly on an analysis of weather data, by a homemade Fourier analyzer which he had, himself, constructed. And, of course, a Fourier analyzer is nothing but an analog computer.

### **TROPP:**

Strictly for Fourier series analysis?

### **ATANASOFF:**

Right.

### **TROPP:**

Is it an analyzer that you can describe in some limited detail, because it's not one that I'm familiar with.

### **ATANASOFF:**

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Well, I guess I can't, because after I got into it I wasn't very interested. It was an electrical analyzer which did not use - which did not use active components. It was an analog circuit, and there were some adjustable resistors, and in this way one performed the computations necessary to get out the Fourier harmonics. It's an electrical analog computer, something like a set up board that we used to use, analysis of electrical circuits which aren't used anymore - or relatively little today. And he had oriented this in such a way that he could - by setting up a number of dials, he could then read off the Fourier coefficient. And I know it had a resistors and flowing current in it, but it had no active components. And I heard this paper's end, and when he came to visit me the following - in 1941 in June - why, he gave another presentation of the same material at Iowa State College at my instance to some of the graduate students in Physics there during the summer. And I believe there were twenty people or so. Now, he, of course, was familiar with the differential analyzer at the time, and would like to have built one, but he was teaching in a small school and had not much in the way of facilities, but he was able to actually put together this harmonic analyzer and use it for obtaining the Fourier coefficients. Now this is only - this represents the only connection that I know of between John Mauchly and weather.

**TROPP:**

Well, his interest in weather is pretty well established. I guess what I'm more interested in is not his interest, but the kinds of conversations that you and he had, or perhaps your reactions to this approach to weather analysis both at the AAAS meeting, and then in particular in his visit at Iowa State, because we have documentation that indicates Henry Wallace had a similar interest in the early 1920's - approximately 1922 - 1923. And I guess I'm pushing your memory to see if --

**ATANASOFF:**

Well, the facts are that our conversations consisted of his work with Fourier analysis, and this was just represented just about all of the computing work that he ever told me about, was his work with the Fourier analyzer. Of course, I call that an analog computer, which it actually is. Any Fourier Analyzer of the old type was an analog computer.

**TROPP:**

Right. Was he knowledgeable, or did he indicate any interest in work in weather forecasting that had gone on at Iowa State?

**ATANASOFF:**

During those days he never raised any questions about weather forecasting, specifically. It was always analysis of weather. Of course, people who analyze weather always hope that this will lead to prognostication, but he never emphasized the prognostication aspect.

**TROPP:**

It was only in analysis that he was --

**ATANASOFF:**

Right.

**TROPP:**

So the forecasting aspect was not a part of, a focal point of this paper?

**ATANASOFF:**

Not at all. No.

**TROPP:**

Well, as long as we're talking about Mauchly, it might be worth at least talking peripherally about these two contexts. During 1940 when you were at the AAAS Meeting, your prototype has been completed for just about a year, almost to the date --

**ATANASOFF:**

Well, no. --

**TROPP:**

-- The --

**ATANASOFF:**

Let's see, the prototype --

**TROPP:**

The prototype is done. --

**ATANASOFF:**

The prototype had been completed for a year, that's right. --

**TROPP:**

Right. And the chassis is built, and the --

**ATANASOFF:**

The ABC, the larger computing machine - the chassis was built, and the units were all constructed, and I told Mauchly something about it, and Mauchly's interest was immediately kindled.

**TROPP:**

Let's go back to your telling him about it. You're attending his presentation of a paper in which he's talking about --

**ATANASOFF:**

Fourier Analyzer. --

**TROPP:**

-- about Fourier Analyzer, and computational methods in relation to the Fourier coefficients, and this --

**ATANASOFF:**

After the meeting was over I went up and one or two people stopped for a quick question or two, and then I was talking to Mauchly in this room in Philadelphia -- I don't know exactly where the room was. I remember the room was a classroom. I remember the room was extremely dirty. There were benches and furniture piled up in the back of the room, and he and I stood there and talked about computing machines. And when I told him I was building a digital machine he was extremely interested in it. I was -- I didn't tell him much on this occasion as to what I was doing, but everything I said he was extremely interested in. He did not tell me of any interest in any activity on this part of a digital nature, at that time.

**TROPP:**

And subsequent, then, to this AAAS Meeting that you and he initiated correspondence during the coming six or eight months prior to his visit to Iowa State/

**ATANASOFF:**

Yes. And then he planned to come all spring, and finally came in June.

**TROPP:**

During the correspondence which, of course, I can read, so -- I'm only talking about it

from a surface point of view, did you discuss any technical aspects of computation, any problems, -- was there a mutual exchange of ideas or was it primarily concerned with prospects of visits?

**ATANASOFF:**

I don't exactly understand the question, will you repeat it?

**TROPP:**

Yes, I guess what I'm really asking is this is approximately November or December of 1940, he ends up visiting you in the summer of 1941, and there is a good deal of correspondence --

**ATANASOFF:**

Yes, there is an exchange of four or five letters during that period.

**TROPP:**

-- during this period. Is the correspondence primarily on the topic of computation and its difficulties, the problems? Is there, I guess, a mutual exchange of ideas on this topic of computational needs and ways of getting --

**ATANASOFF:**

Well, you understand that he wasn't active in work on computing machines at that time. After he visited me in 1941 he did become active in computing machines, but I did not know of his activity in computing machines until later, until I myself, went to the Naval Ordnance Laboratory and he came in and told me he was working a computing machine while I was at the Naval Ordnance Laboratory later -- a year or two later. But he did tell me that he was attending some classes, which were related to computing effort, and he wasn't, himself, active in it and had not much in the way of ideas during this interim between my seeing him in Philadelphia and his visiting us at Iowa State College, and I think the correspondence will speak to this point.

**TROPP:**

Right. I guess in terms of my memory it was either the summer of 1940, or the summer of 1941 that he attended a course at the Moore School. I'm not quite sure which of the two summers it was.

**ATANASOFF:**

Right. I think it was late in '41.

**TROPP:**

Was it '41?

**ATANASOFF:**

The fall of '41, I think. But my memory is a little obscure. It's in the record.

**TROPP:**

O. K. We'll get back to this topic in much more detail in a later discussion.

Let me really shift gears and get to the other question that I said I was going to ask you earlier. And this is the connection between yourself, the late Vice President of the United States, Henry A. Wallace, and your good friend Dr. A. E. Brandt. And I guess what I'm primarily interested in are the links between the three of you in terms of your mutual interests on the Iowa State Campus, both intellectually, and in terms of needs for Henry Wallace in agriculture, yourself, in order to solve some mathematical problems.

**ATANASOFF:**

You see, Henry Wallace came from a family who was a very important family in Iowa. And his uncle, I guess it was, founded a publication in Iowa called Wallace's Farmer, which used to be a great farm newspaper in the Mid-west. And then his uncle, I believe it was, that had been Secretary of Agriculture of the United States -- they're a family with great agriculture interests. Now I did not know Henry Wallace in my early era at Iowa State College. I had not met him at that time. I only met him briefly on one occasion, and I only shook hands with him then. I didn't have the possibility of any correspondence -- I mean of any communication with him. But, nevertheless, his whole being and existence hung like a spectra, or saint over the whole operation at Iowa State College. Now it came about in the following way. He had an interest in statistics which he found necessary in exploring a topic that was very dear to him. He was interested in the production of new kinds of seed corn, and you know he founded a company called Pioneer Seed Corn Company. And this company owed its beginning to Henry Wallace. Of course there was -- simultaneously with this activity of Henry Wallace, there were activities in the Department of Agriculture and the Iowa State College in the development of a new kind of seed corn called hybrid seed corn. Altogether he encouraged ... to become active in statistics, and ... made this Statistics Department at Iowa State College. ... was a man who was teaching in the Mathematics Department at Iowa State College. He had had a degree from some institution in Louisiana in engineering -- electrical engineering, I believe. As a consequence of this, why, Wallace and ... wrote a book on statistics, a short introductory text. There was none at that time. They wrote an introductory text on statistics. And this made ... a famous worldwide statistician, that was famous worldwide. And ... had the advantage of having tapped an activity which

could gain monetary support at Iowa State College. Most activities at Iowa State College were very under financed at that time. But ... was determined to get ahead and this activity pleased him because he could always get the money and additional staff members from some electorate, and he applied all these devices in order to advance it.

Now, in ... department, there, there had come to be one A. E. Brandt who, I believe, originally had a degree in Agricultural Engineering. And A. E. Brandt became interested in statistics, and A. E. Brandt knew .... And A. E. Brandt and ... once had a -- I believe they once had a seed corn company in which they were going to develop hybrid popcorn. And I don't know how the popcorn company really came out or whether somebody else usurped the popcorn project or what happened to it, but I've heard rumors of that kind. And he saw ... on occasions, and a good deal of what I know about ... came by way of Brandt. And Brandt thought ..., thought that Wallace was one of the more -- did I use the word ... before? I meant to say Wallace. At any rate my knowledge of Wallace came to be largely by way of Brandt.

**TROPP:**

So Brandt is the link, then, between, the tenuous link between you and Henry Wallace?

**ATANASOFF:**

Right. Not, and of course ... was such a link, too, not nearly as clear a link as Brandt.

**TROPP:**

Do you remember Brandt commenting at all upon Wallace's interest in weather forecasting, and any realization or any projects that developed along that line?

**ATANASOFF:**

No I do not. I remember that Brandt told me that Wallace was interested in weather forecasting, but I can't seem to probe my memory any deeper than that.

**TROPP:**

Brandt's still living in Florida?

**ATANASOFF:**

Yes, he is in Gainesville. And he still, although he is eighty years old or so, he is -- let's see -- he's eleven years older than I, he's eighty, just about eighty. He is still -- has a desk, has two desks with his names on them, with his name on it, at the University of Florida and goes over and if anybody wants to talk to anybody about statistics and he doesn't have enough prestige to interest anybody else, why, he's always had Brandt go

and talk to. And as a matter of fact Brandt is one of the more useful people in statistics at the University of Florida today.

**TROPP:**

Mhm. Well you saw him just recently and --

**ATANASOFF:**

Yes, I saw him two or three months ago --

**TROPP:**

-- and perhaps I'll use your good offices if I can get to Florida to talk to him about this --

**ATANASOFF:**

Why sure. He'll be delighted. And Brandt said, "Do you remember the paper we once wrote on complex spectra?"

**TROPP:**

This was in 1936, I remember the paper.

**ATANASOFF:**

Yes. Well he and I wrote this paper, and I believe it's recorded somewhere else in these memoirs here. And he says, "You don't happen to have a copy of that around?" Well, as a matter of fact I have a number of copies and so I - after my return, I thanked him for his kindness. He kept us overnight - Kept Alice and I over night. And then I sent him a couple of copies of that paper which he and I had written together so long ago.

**TROPP:**

Well, are there any other thoughts that you have in terms of Henry Wallace? We've talked about this earlier, too, but we're approaching it from a different direction, now. Do you have any other thoughts about Wallace's role, both in terms of the statistical needs and the machines which he was now able to make available on the Campus, the funding and the kinds of interest? --

**ATANASOFF:**

You know Wallace was an extraneous -- strictly speaking an extraneous element on the campus. He was never a member of the faculty, I believe. Or if he was it was just a casual member for a short period of time. But he, but his influence was always strong



with the Dean of Agriculture at Iowa State College, and when he told the Dean of Agriculture that statistics was an important matter, why the Dean of Agriculture leaned in that direction and immediately commenced supplying funds. I have no doubt that his, that the funding of statistics at Iowa State College was improved a great deal by the actions of Wallace.

And then I remember too, I suppose I recorded it somewhere else, but on the day that Wallace was elected Vice President of the United States, and this was at the time when Roosevelt was being elected --

**TROPP:**

This was 1940.

**ATANASOFF:**

-- 1940, why I was listening in the home of Dr. -- Professor R. A. Buchanan. Professor R. A. Buchanan had been Dean of Agriculture, and Dean of the Graduate College, and Director of the Agriculture Experiment Station. At that time he was Director of the Agriculture Experiment Station, and Dean of the Graduate College, both, and he told me that on this occasion there was elected to high office in the United States one of the best Vice Presidents that had ever been elected to high office in the United States. And I am sure, from what I know of Henry Wallace's career, that this is true. And this is all said in spite of the very nasty connotation that Wallace's name brings up in many people's minds who have a memory of the era.

**TROPP:**

Well, we might change the subject entirely for a few minutes, and get back to the Mauchly visit to your campus sometime in the summer of 1941. Now this has been discussed in other tapes, it's been discussed in the trial, let's ignore the documents that are available and just sort of have an off the cuff, as you remember it now, kind of recall of that visit.

**ATANASOFF:**

Well, he arrived at my place, and by a specie of calculation I had determined that he arrived there on the 17th of June, 1941. And he had driven, he'd driven all the way out from the East Coast. What kind of a car he had -- well, a nondescript car of dark color. My imagery tells me it's a dark color, and my imagery does not tell me what kind of a car it was. He arrived with his son at my house, and he arrived just at dusk. I can remember this -- this comes to me from memory. And it was on a Friday evening, I believe - or Saturday evening. I can't be quite sure, but it was towards the end of the week. And during the weekend he and I had the discussion -- I'd decided that I wanted, that I needed somebody to talk to -- and it was hard to develop an issue. You can't, if you're not old

enough to remember the era, you can't judge the difference in interest between computing machines as of that time and as of today. But Mauchly had a burning interest in computing machines after I told him about my committee, and we talked about the computing machine, and we made at least -- during the weekend -- at least one visit over to my computing laboratory, and he saw my computing machine for the first time. He did not see it in operation. I wasn't quite courageous enough to put it in operation. You know when a man has an assistant working on the machine, and the assistant arranges the handles in a certain way, and the man who had invented the damned machine and knows more about it can't figure out where the handles are.

**TROPP:**

[laugh] In that summer of '41, going back to the photographs we looked at earlier today, the chassis was complete, the logic elements were on, the shaft was there, the synchronization was part of it, the power supply seems to have been on the chassis, the memory drums are constructed.

**ATANASOFF:**

All the logic elements had been constructed and had been tested, and were operable at the time he arrived; and the base ten card reader was constructed. But my first memory was of Mauchly looking at the parts of the base ten card reader. I mean one early memory -- let's don't say my first memory -- but one early memory of Mauchly at the time was Mauchly looking at the parts of the base ten card reader. And at that moment it was not on the machine. I had after, mulling over the thing, I suddenly had an image of Mauchly watching a card process through the card reader on the machine, and I am more or less led to the conclusion that during Mauchly's stay there the base ten card reader was applied to machine for the first time. And this was a jury-rigged hookup, obviously. It wasn't the final wiring, it was a jury-rigged hookup by Clifford Berry. And Mauchly saw the machine operating by some kind of jury-rigging again, and we were able to put numbers into the machine, and let the machine do an arithmetic operation, say multiply by itself or add it to itself or whatever, and then we were able to -- no, wait a minute may I correct this -- we were not doing multiplication at the time because we had not the program elements to do multiplication. We could only add and subtract, but at any rate the machine could add a number to itself or add it to a different number, and we were able to test that the machine was adding and subtracting correctly. And all the carrying mechanisms and all was in place, and we were able to see the machine do these operations. I believe it was partly jury-rigged at the time Mauchly was there, though.

**TROPP:**

Mhm. What were some of his reactions, some of his comments as you may remember them?

**ATANASOFF:**

Well, of course, Mauchly was ecstatic. When I read later that Mauchly is, was, he has said in his speeches that I didn't see much, and that nothing was in operation, when I see him say that, why either his memory was defective, either motivated by a forgetfulness or by self-interest, I don't know which. This is getting to be a little controversial --

**TROPP:**

Well, I realized that we are on a controversial point, but --

**ATANASOFF:**

-- But the facts are, but the facts are Mauchly was, on all occasions, absolutely ecstatic. He thought it was the last word and the final thing. He thought nothing was going as well as this was. He thought that this was the foremost project of the world.

**TROPP:**

I'm going to ask you, again, you talked about the controversy where you're obviously referring to the litigation, but I can ask questions --

**ATANASOFF:**

Not, not really --

**TROPP:**

-- but I can ask questions, here, that --

**ATANASOFF:**

No, just merely the fact that he said this later, nothing to do with the litigation.

**TROPP:**

But I can ask question that courts can't ask because we're not taking evidence, in the sense of a courtroom, we're trying to probe for ideas. And much as I ask you the motivations for constructing computational equipment, and you indicated the problem of large systems of equations which students working with you needed to have solved, you're only contract with Mauchly had been in relation to computation relative to weather problems --

**ATANASOFF:**

Yes

**TROPP:**

Was he, in '41, when he saw computational equipment, was he still thinking in terms of that kind of problem, or was he thinking about something else?

**ATANASOFF:**

I heard no more about the problem. I had him talk about this because this was something he could talk about while he was down on the visit to me, and he talked to graduate students for half an hour and it started, oh, maybe an hour all told including discussions afterwards, and as far as I remember this is the only discussion that we had about weather at that time.

**TROPP:**

O.K. Well, let's forget the weather then, and think in terms of his comments or reactions to your machine and its computational potential. What kinds - did he ever comment to you about the kinds of problems that he was interested in in terms of machine or computational ability of this type?

**ATANASOFF:**

No, I think that, I think that at this period he was thinking only in terms of a machine and how one would construct them, and how one would advance computing art. I, I heard no more about weather, and later on I heard that the ENIAC had been used for, had been constructed with the purpose of doing ballistic computations, and I had never heard of any interest in ballistics computations on the part of Mauchly at that time, either.

**TROPP:**

Of course Mauchly wasn't involved at that point in time in any war time effort -- Pearl Harbor was still a few months off, and there weren't many people who at that period in time were concerned about ballistics tables.

**ATANASOFF:**

Right. We were at the time working on a war project there under my direction at Iowa State College, you know.

**TROPP:**

Was it computationally oriented?

**ATANASOFF:**

Well it was, it had to do with extrapolation for anti-aircraft purposes, so it was computationally oriented.

We, the question has often been raised with me, did you think about using your computing machine in that application? The problem with anti-aircraft computation is that, is the inaccuracies of extrapolation.

**TROPP:**

Because extrapolation is always a difficult problem --

**ATANASOFF:**

Yes. And it was a difficult problem there, and there are various reasons why extrapolation was difficult. Partly because the pilot of the airplane that you're shooting at hadn't made up his mind yet, so you had to do, so you had to, in effect, attempt to duplicate what he was going to, what his mind was going to have in it during the next twenty seconds or so, and there's no way in the world of doing that. And so extrapolation was an inexact art. We never thought about, we built original circuits for extrapolation. Circuits of a kind which had not been duplicated since, involving in extrapolation in terms of, in terms of series which take on partly the complex of the generalized Taylor expansions, incidentally. But we never thought of using a digital computer for that, because digital computers were not fast enough, but even more important because accuracy of a digital computer wasn't needed, an analog computer was far more accurate than the accuracy of extrapolation.

**TROPP:**

Mhm. Because you were really trying to, you were really working with more of a simulation problem than you were with a probabilistic prediction problem from that point of view.

**ATANASOFF:**

You understand, we had abstracted and we felt that we were dealing with a problem in extrapolation, and we were attempting to mechanize the problems of extrapolation with good accuracy. The picture in my mind seemed clear, but it's always seemed to me the picture in many people's mind was not clear at this time, but the basic problem that it really didn't matter how accurately you made the apparatus, it wouldn't improve your extrapolation an important amount, because the errors in extrapolation were those errors which were inherent in the extrapolation process. Now, the -- if at the moment you fired the bullet the aviator could change his mind, if he changed his mind, why there was nothing in the world that you could do to recover that shot. The shot just erred too much for effective anti-aircraft control. In the typical anti-aircraft problem the time of flight of

the projectile was too great, you were extrapolating too far, and you didn't make a very good record.

**TROPP:**

When did this project begin at Iowa State? Was it before Pearl Harbor?

**ATANASOFF:**

Yes, it was before Pearl Harbor, yes. And Pearl Harbor was --

**TROPP:**

December of 1941. --

**ATANASOFF:**

All right. Yes, it, the project had been running a number of months before Pearl Harbor, and I believe eight months, although I would have to consult my files in order to tell exactly when the project began. I think I could reconstruct it from the data which I have.

**TROPP:**

Was this a project that was done within the Physics Department?

**ATANASOFF:**

Yes, it was being done under my direction at the Physics Department, and under a NDRC grant -- National Defense Research Committee grant. And we can attempt to get that date if you're --

**TROPP:**

Right, that's fairly easy to locate. I guess the other question then, that's of a general nature in terms of computation, you went to mathematical meetings, you went to meetings of AAAS, you went to various society meetings, what contact were you having in the early '40's, in this 1940-'41 period in particular, with other computational programs that were underway? For example, were you the least bit knowledgeable about the work that had been done at Bell Labs for three or four years, the work that Howard Aiken --

**ATANASOFF:**

Oh, I knew about the --

**TROPP:**

-- was doing at Harvard.

**ATANASOFF:**

When was the machine at Bell Labs completed?

**TROPP:**

Well, the complex calculator is 1937.

**ATANASOFF:**

The complex calculators. At the time the complex calculator was completed, I had read of it, I'd read an article on the subject. Subsequently I went to Bell Laboratories downtown in New York, where it was located at the time, and discussed this, but I can't give you the exact date of my visit there.

**TROPP:**

Were you, by any chance, at that Dartmouth meeting in 1940, where this machine was demonstrated?

**ATANASOFF:**

No, I was not, but I read about it.

**TROPP:**

So you did have some --

**ATANASOFF:**

Yes.

**TROPP:**

-- limited knowledge about --

**ATANASOFF:**

Yes, I knew that this --

**TROPP:**

-- the relay calculating devices that were available, and their operation in the binary system.

**ATANASOFF:**

Right, right.

**TROPP:**

How about Howard Aiken's work at Harvard?

**ATANASOFF:**

Well, I can't tell you the exact date that I first became aware of that work. I would think it was, it would be sometime in '41. It was in existence before that time, wasn't it?

**TROPP:**

I don't think it was built before '42, but it was being built in '41.

**ATANASOFF:**

Well, maybe I was aware that it was being built in '41, or something of the kind. I knew it was a little later. We're talking about Carl Aiken's work?

**TROPP:**

Right, this was the electro mechanical machine that's now called the Aiken or the Harvard Mark I.

**ATANASOFF:**

Right. Mark I.

**TROPP:**

The predecessor to the relay machine which was the Mark II that followed.

**ATANASOFF:**

The Mark II was a relay machine out and out, was it?

**TROPP:**

Yes.



**ATANASOFF:**

Did it follow Bell Telephone principles?

**TROPP:**

I don't think so. I think, again, the way Mr. Aiken operated, he pretty much had his own conceptual ideas, and designed his own machine.

**ATANASOFF:**

You have to talk --

**TROPP:**

Now the reason I asked you about the Mark I is because there are, again, some minor and trivial similarities -- not major conceptual ones -- I'm thinking in terms of the drive shaft, which determines the size of the machine --

**ATANASOFF:**

Oh well, you know I fought the drive shaft very hard. I wanted to build a machine with purely electrical characteristics. Now in order to have something I pulled in my horns, as it were, and built a machine with a mechanical clock, which is mechanical drive shaft, for synchronization purposes instead of using electrical clock. I saw no other way that I could gather together the where-with-all money wise, or equipment wise, to put device of another kind. I realized that the, after I got the concept in the fall of '37 or the spring of '38, as to the electronic digital logic circuits, I knew that they would operate much much faster if they were redesigned. And I realized that the controlling speed in my machine, as I planned it subsequently, would be that mechanical timing apparatus. I knew I could speed it up, perhaps by a factor of ten. But you understand that I still carried the burden of the data in and data out. And I made some calculations at the time, and it didn't seem as if speeding up the computations beyond that of mechanically timed or mechanically clocked machine would be much worthwhile, because by data in and data out was in such horrible shape. There's no way to overcome that that I could envision.

**TROPP:**

Another question about Mauchly's visit that just occurred to me, was Clifford Berry around during that time?

**ATANASOFF:**

Oh, yes. Now Mauchly had said that the machine was kept under a cover, I know the

cover was snatched off at a brief interval of time for him to allow him to see it, but he wasn't told anything about it. Subsequently, he has admitted that he saw more than that more than that of the machine, I believe. But Dr. Sam Legbolds(?) remembers, very sharply, an incident which I do not remember although I certainly saw it too, of him coming into the room and seeing John Mauchly with his coat off and his sleeves rolled up helping Berry assemble parts of the machine. He was -- Clifford Berry -- while John Mauchly was there Clifford Berry was there all the time. And Sam ... was in the room from time to time. They both came to know him pretty well, and subsequently when he wrote me a letter he added a note of giving his regards to the boys.

**TROPP:**

Who was Sam Leipolds(?), I've seen the name...

**ATANASOFF:**

Sam Leipolds was another man who was working for me. He was working on this military project. He was not, strictly speaking, working on the computing machine, but Sam Leipolds is a knowledgeable man. He's now Professor of Physics back at Iowa State University. He, I believe he's a full Professor back there now. And he was generally familiar with the machine, but never really understood the details, even in that time. However, he knew John Mauchly and he swore in Federal Court that he saw John Mauchly in his shirt sleeves working on the machine.

**TROPP:**

Let's see how we're doing on - I guess we can turn this off at the moment.

**[End of Tape]**