University of Illinois Student Life and Culture Archives

UI Centennial Project

Interviewee: William Schaller

Interviewer: Maynard Brichford

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Maynard Brichford: One, two, three, four. This is a tape-recorded interview of Mr. William F. Schaller, class of 1910 and master's degree at the University of Illinois in 1911 made-

William Schaller: 12.

MB: 1912. Master's degree in 1912. The interview was made in the university archives on October 6, 1967, by Maynard Brichford, university archivist. Mr. Schaller, you're presenting us with some of your class notes from the early years, well crucial years of development of the civil, uh the electrical engineering work at the university. Been rather interesting. And I wonder if you would care to say a few words about your coming to the university of Illinois. Did you intend to be a electrical engineering major when you came down or?

WS: Yes, from the start.

MB: The very start.

WS: Out of a little high school from Mendota, Illinois. There were only about 12 of us in the class but we had a tremendous grounding in mathematics and I was [inaudible].

MB: This was quite a new thing. I know in talking to Professor Payne he tells about how he made his first electric motor. I think he had to make a part by putting something on the railroad tracks and letting the train run over it. This must appeal to boys at this time, didn't it? Electricity being fairly new phenomenon.

WS: Well, there weren't too many students at that time. We had a class of about 31 in our senior class. And the interesting thing about it all is that it wasn't until toward the end of my course, that is my senior year, that engineering sort of took electrical engineering, sort of took a major step away from the slide rule and the handbook [again?] to the more technical applications such as the use of complex math- or complex quantities in mathematics and the development of the sales programs.

MB: This was at the university in your senior year here that this occurred?

WS: Dr. Berg came here in the fall of 19 nine.

MB: Nine.

WS: And to take over the department. And he immediately started us in the fundamentals of the Steinmetz type of engineering where we use the quantity R-JX where J is the square root of minus one. And that was the mathematical tool that we began to use. He tried to upgrade the qualities of the theses that were being done. And he was more interested in the jobs that we were going to go to and I believe he took ten men of our- 12 men- out of our class for the testing department of Schenectady.

MB: 12 of you who all went to Schenectady?

WS: Yeah, out of the-

MB: The same year?

WS: Out of the 31, we all, a whole group of us went and they did well too [laughs]. Most of them.

MB: After your graduation year then you were a testing engineer at?

WS: At Schenectady.

MB: Schenectady.

WS: And well part of the time at Pittsfield. And there, Berg's previous connection to Steinmetz became important because we had letters so that generally on Saturday evenings we would go out to Steinmetz house, and it got to the point where he began giving us a series of lectures that became one of the courses at Union a year or two later.

MB: Steinmetz taught this at Union?

WS: Yes. He was head of the department out there, at least consulting out there.

MB: I've been looking at these little biographies of Steinmetz and pictures of him. He must have been a rather magnetic personality too.

WS: He was terrible crippled. For instance, he had to keep one foot on a chair to keep his trousers in place. But he had an extremely friendly attitude toward us. He always had that stogie in his mouth. And you see, as he would never sit at a desk but rest on his elbows and he had tremendous callouses.

MB: On his elbows.

WS: Elbow.

MB: Was he able to mathematical formulas, was he a particularly skillful mathematician?

WS: Oh, [inaudible] as he could just start right off with something that was [raw?] and develop, bring it through. And he was interested, another thing, he was interested tremendously in the

boys, men that he knew. The development of the younger men. One time some years later after I finished my graduate work was in new York attending my first meeting of the American Institute of Electrical Engineers, Steinmetz was at the front of the room talking to some important people. Came through the door and he looked back, he pushed two of them aside and said, “There comes one of my boys.” [MB laughs]. So that he had a very human side. He lived with a man by the name of Hayden, J.L.R. Hayden, who had some job with the [tea?] company. I don’t remember, not very important. But Hayden had three youngsters and they [got?] assignments for them. He had an electric automobile a little later. They’d go to [Marmon?]. And then Steinmetz, you know, became a civic figure. He was mayor or had some city office in Schenectady and became quite important, very much interested-

MB: Was a socialist in his youth, wasn’t he, in Europe?

WS: Yes, left Europe under pressure, I guess.

MB: Certainly, his work at General Electric was the, as a testing engineer what ways were you associated with him? Were you studying or actually working with, the, in the laboratories, research laboratories?

WS: Well, he had an office with about fifteen or twenty engineers, and I had a little accident. I was burned in a circuit breaker flash and sent home Schenectady over to Pittsfield. And one day, I forget the name now, one of his men who was closest to him went through there, saw me, and about a week later, orders came through transferring me to Steinmetz office. And I went into his office then and just had a desk there and the first thing I had to do was analyze some [solargraphs?] of an arc circuit. [Inaudible]. And he became, he later on then knew or through it was between him and Berg that it was decided I would come back here for a year of graduate work. And so Steinmetz had me put in about a half or third of my time getting ready for a thesis which I would do when I came back here. And one of the interesting things of Steinmetz history was the fact that he was enough interested in Illinois so that on one of his trips out here he came down and we initiated him into Eta Kappa Nu and I had the honor of escorting him down the hall. Another way that he showed his interest was in the following year sending out to us a 2000 cycle rotary converter which converts direct current into alternating current at 2000 cycles. The reason that’s interesting is because we had great difficulty in making our [cyclograph?] sensitive enough to record the wave shape that we got out of that machine. And then when I came back for the graduate work, one of the first things that was done was to work up the characteristics of that machine, to plot the curves and the [losses?] and so on. But Berg decided that was too simple a problem for a graduate thesis and so we dropped that and the thesis was finally done on the mathematical treatment of the hunting synchronous machines.

MB: Oh, I think someone following through on the history of electrical engineering-

WS: They better learn that already.

MB: How many, was there much other graduate work done here in electrical engineering before this-

WS: Not very, very little in fact. For instance, one of the notable things that was done here prior to that time was when [inaudible] Westinghouse, went to the Westinghouse Company later on [crosstalk] and [Trey Fiancon?] developed a silicon iron which has made the modern transformer motor possible. Trygvie Yensen, he had a little bit of an office in the basement of the old electrical building.

MB: Was he here when Berg was here or did he come later?

WS: Oh, he was here before Berg was here and kept on while Berg was here. [EJ?] had tremendous respect for [inaudible] ability.

MB: Two Scandinavians.

WS: That’s right [laughs]. Had something to do with it.

MB: I just was reading in the history that Professor [Baker?] wrote of the College of Engineering that when they brought Berg out in 19 nine that Dean Goss arranged for Illinois corporations to give him a retaining fee to get him out here because the university didn’t pay professors as much. And this I think shows some planning and design on the university to build up their department by getting a man they had to pay.

WS: Oh yes, it was obvious to bring in a man who is not only highly technical but a man who was acquainted with the field outside. You see, our previous professor, you take any one of these, even like Professor Payne, he had no experience particularly with the commercial side of the electrical work and Berg did because- Berg used to pay a lot of attention that at least some of us that knew him quite well can be in our personal attitudes. I mean the fact that how you should dress and the fact that sometimes it helps you to smoke and in my case-

MB: Even in Champaign-Urbana at this time [laughs]-

WS: In my case, the thing I ,one of the things that I learned from Berg was to like [Alice in Wonderlands?] [laughs].

MB: The Professor Brooks was here, wasn’t he at the time?

WS: Not at the time Berg was here. Professor Brooks was here until about, let’s see, my senior year is- he left about 1900 and seven or eight for a trip around the world. And professor, he was really a marvelous person. He was one of these technical engineers of the old type. He ought to go down in history as the inventor of the circle diagram for designing induction motors. He was interested, he, in summer he sailed boats up on Lake, up at Minneapolis on the lake there and he loved to demonstrate and plan how he could make a sailboat go faster than the wind.

MB: He taught instruments I believe as a course, or something related to instruments.

WS: Well, he had almost anything that came along. Although our faculty was quite specialized at that time.

MB: Professor Waldo was also-

WS: Waldo was a design man, Bryant handled the technical end and Professor Payne also between them. And our stuff got fairly technical so that we weren't entirely just arithmeticians.

MB: I imagine that Professor Berg, what was he like in appearance? I have the biographical information like where he was trained in Sweden, came to the United States in 1893 with General Electric making 94 to 99.

WS: Good things. Drove a Stoddard-Dayton roadster automobile and he lived well. I mean he was sophisticated as far as personal living is concerned.

MB: And then-

WS: [See?] the dollar cigars [laughs].

MB: I don't know if we have that on tape or not, but he did like dollar cigars. He did go back then in 1913 generally because he preferred the eastern and his family preferred to live in the east.

WS: Well yes, he was, he immediately went right back to the head of the consulting board. I might illustrate that a little bit in this way. I told you that the thesis that I did for my graduate year. Well, my senior thesis was to have measured the lighting in the [John Garr?] Library which was the first installation of totally indirect light, which was supposed to be the lighting of the future. And Jerry [Stair?], one of the naughty people was the engineering head of the, [Kirk, what was, the Curtis Reflector Company?] but anyhow, my first job offer was National [x-ray reflector company?] in illuminating engineering as a result of that thesis. And Berg said, "No you must reach farther than that. You must get into power engineering and I'm gonna send you this [connection?] for it." So there you can see how we took a step from the simpler aspects of engineering into the more technical.

MB: He was able to push or propel students into more difficult lines of work.

WS: That's right, and I believe that's one of the reasons that he came out here.

MB: Was he better in physics and mathematics or paid more attention to these subjects-

WS: Yes.

MB: Then some of the other faculty members?

WS: Yes, yes definitely because he was more interested in those things [than?] design. But also, I would like to say at that point in the year that I was away on test, the engineering, the faculty in electrical engineering just came right up to Berg's standards. Like Professor Payne and the rest,

they were able to carry right on from the point that he had dropped them with that new concept. Which I think of as a new concept of engineering. More sophisticated, more technical. Kept right on as though there had never been an interruption and I understand that when Professor Payne took over the department after Dr. Berg left that it went right straight on, and boy it’s grown ever since.

MB: [Inaudible] bigger department. You had a fellowship when you came back for your year of graduate work. Was it called a Illinois?

WS: I think it was the College of Engineering-

MB: College of Engineering. So how much was that for? The value of that scholarship?

WS: Well, it was [750?] for the year. And I was supposed, I was not supposed to do any teaching, but I was thesis advisor for about six or eight fellows, something like that. And they were, Berg, to illustrate how that consulting idea worked in, they were having trouble with a generator in the Urbana Light Plant and Berg comes in one day and he said, “Run out there and see what’s the matter.” And from my testing experience, I found what was the matter. It didn’t take long. And so he says, “Now write a report.” I wrote the report, and then a couple days later he says, “Did you send them a bill?” [Laughs]. What for? Well, he says, “You made a trip out there, you found out what the trouble was with the machine, son.” [Well last?] I hadn’t any idea. Well, he says, “Don’t make it less than 25 dollars.” [Both laugh]

MB: Part of the educational process.

WS: Part of the educational process.

MB: Let’s see, after getting your degree here you went to New York [crosstalk]

WS: Brooklyn Edison

MB: Brooklyn Edison. Assistant superintendent of power for the New York-

WS: New Haven

MB: Railroad.

WS: Yeah, well there’s something interesting on that point, which does not have anything to do with the school here. But when I was with Brooklyn Edison, we started trying to do a little intensive work on improving the boiler room. And you know that was the year that, or in those few years, that efficiency engineering became fashionable. And I knew H.L Gantt [ever since?] in New York those days, and we had started some technical work to systematize the operations for the boiler room. And at the end of that two years, I went with the New Haven Railroad and to join a Russian by the name of [Polikov?] who had done the first efficiency engineering in boiler rooms. And we at that time the New Haven was in dire financial straights, and the idea was to make power cheaper in [inaudible]. You know that New Haven was electrified. And I revamped

[cleaning?] the boilers, making a number of changes in design and so on. We very substantially cut the pounds of coal per kilowatt ratio. Indeed, a shorter time in the first six months. That’s how I happened to go to New Haven.

MB: So, you moved around to several jobs and wound up in the army in World War I. Did you find any outlet there for electrical engineering in the army or was that-

WS: Well, it was not electrical, but it was all engineering. I was commissioned directly, I was in the engineering supervision company at that time, and they operated the about thirty private plants around New York. I was commercial manager. And we tried to operate a private plant more economically than you could buy from power from the Edison Company. So the ordinance department organized an ordinance-based depot in France to do all kinds of ordinance repair work and employ about 26,000 men. And I went down there as one of the power plant engineers. But we didn’t do any power plant engineering because the power was all bought from one of the French utilities so I was head of the construction and maintenance division, section, of the [delta shops?] and schools. And then later on after the Armistice became a military reserver and that led to all kinds of things.

MB: After the war did you go back into electrical engineering work? I’m not sure what you’ve done since then [laughs]. I don’t think you had to go over in detail but in general where was your-

WS: That’s very quickly answered. I decided then I wanted to get into some kind of a smaller enterprise. One sort or another.

MB: After living in New York City and-

WS: Yes and having had this experience with a big company. So, I went with William [Schwanke?] Company, they’re a heavy machinery manufacturer in Moline. I was there for two years, and then one of the bankers that had some money with an automotive engineer got me to come over there and I was business manager for him. And during the time I was there, that was the year 1922, approximately, we developed the design for a front drive automobile and built eight of them by hand. But they sold so much stock that they went broke, so that never got anywhere although the [court?] they run was designed around the principles. Then in 1922, I came to Chicago with Paul [inaudible?] who would organize a power surge gear business, and I was in that until they finally sold.

MB: Probably knew lots of Illinois electrical engineering graduates over the years-

WS: Oh yes.

MB: Come up to Chicago to-

WS: Lots and lots of them.

MB: One thing Professor Payne has mentioned Trygvie Yensen, and I think you mentioned him briefly. He was a good friend of Ernest Berg. Was he a similar type of person? He was here throughout this period and also went to Westinghouse later.

WS: Yes. Well Trygvie, I don’t know how many years he spent here but I know he was here quite a number of years. And he apparently was very poor financially. I’m sure that the man denied himself almost everything, but he was totally and completely wrapped up in this iron project that he was working on. Somehow, he made-

MB: Silicon and iron?

WS: Developing an iron which would have a low [history?] of loss. That was the object. And then he worked with different alloys in order to produce that kind of an iron, and they finally got it. And I believe there-

MB: Were there a patent case involved here between the university and Westinghouse?

WS: I wouldn’t be surprised. I think that there, you could find some literature on that. I’m sure that the engineering experiment station got out some [books?] on that iron. But I’ll tell you it should’ve made Trygvie rich. I don’t know whether, how well he was treated because I never met him after he went to, after he left here.

MB: As a student here, you had Dr. Crathorne in mathematics. You thought he was a good lecturer. Was he-

WS: Wonderful, wonderful teacher of mathematics.

MB: Professor [Goodenall?] is a name that comes up quite a bit in mechanical engineering. You had him too, did you?

WS: Yes, [Goodenall?], I had to come back for that extra year in order to get a class with him. Mr. [Goodenall?], but I don’t think there was a better loved man in university unless it would be [George Help?] or Dean Clark.

MB: He was the engineer’s counterpart-

WS: Everybody loved him. He was just- did you ever see him?

MB: I’ve seen pictures not-

WS: [Inaudible] He’d sit up there and he never had to raise his voice, and when he wanted to he could go just way beyond the capacity of the class [could?] keep up with him. That course that I had him in was an advanced course in kinematics, and I don’t know why they gave it to him, an electrical engineer. But Dean [Kinley?] enrolled me in it so there I was.

MB: Who was your graduate advisor?

WS: Paul [inaudible?]. [Crosstalk]

MB: Was your advisor. I noticed in some of these courses like electrical engineering 17 on advanced alternating currents you had notes in 1910 and then 1912. In other words, both as an undergraduate you took the course and then when you came back you were-

WS: I took an advanced version.

MB: Version. Same course.

WS: Yes, because as an undergraduate we didn’t have all the assignments and books available. And then when we came back for graduate school, it was just in that period of those few years that [what] turned out this wonderful series of electrical engineering books. And they were not, oh, they were still being proof read when I got to Schenectady and I helped on one of them, and then on a simple one I did all of them. That one I think was on lighting if I remember right. [Steinmetz?] did you notice that the steam path through the turbine, the mathematics of the steam path and the steam turbine? I don’t know, I’m not sure that it was there but that is just an example of the kind of things that Steinmetz could do. He was not only in electrical engineering, he could do anything in the mathematics [line?]. And wouldn’t he have loved the computer?

MB: [Laughs] You had personal contacts with him. I noticed these books mention he had a place out on a lake or river or-

WS: Yeah, out on Lake Mohawk.

MB: And he had a little house there where he used to do computations, so forth-

WS: That’s right and when, you know I told you that his interests here. When I was definitely going back, when it was definitely understood that I was going to come back here, I was out there with him one time, [Cass Davis?], that was this man’s name who was really sort of his personal assistant. Came up to me one morning, he says, “The doctor wants you to come out to cabin this afternoon.” So I said, “Well all right.” We sat on the porch. He said, ‘Schaller, you’re going back to Berg aren’t you next year? What’s your thesis gonna be?” I haven’t an idea. Well, he said, “Why don’t you do this. Why don’t you work on, up this business of the [inaudible] of the machine. And treat the damping out like you would a spring that’s coiled and supported on one end and then the other end vibrates. You could start with a fundamental equation about like this.” [Crosstalk]

MB: He gave you the initial equation.

WS: Yeah. Think of a fella like Steinmetz taking the trouble to have a dumb young test engineer to talk to him like that. And it was that thing that led finally to the engineering master’s thesis that I did. The next morning [Cass Davis?] came to the desk and he said “Schaller, the doctor says you better get started on that thesis.” I said “Well where do I start really. He gave me the fundamental equation.” Well, he says, “You’re gonna have to take some high frequency measurements.” And so on, so forth. And [LP?] Robinson was head of the instrument department at Schenectady and said, “Go and talk to him about metering high frequency current.” You know,

we couldn’t meter high frequency currents because we couldn’t produce them, and we had [crosstalk]. Yes. And then of course we started doing some fundamental stuff by the use of that 2000 cycle converter that we had out here. That machine must still be over here.

MB: The popular mind sees Steinmetz as the man who made lightning jump across the room and so forth. I suppose this is just a very superficial thing. What was his basic contribution? Was he actually training people-

WS: I would say-

MB: Or basic research?

WS: He was very much interested in lightning because he made the first studies. And he had a table like this or a little bit bigger and had a transmission line set up in there, and he had some models of [houses?] that would be six inches high or something like that. And we used to duplicate lightning, the effects of lightning and the protection you could get from rods on the house and things like that. Then out at Union he had what I believe is the first, they may have had one at Westinghouse, but I don’t believe it, he had the first artificial transmission line. Which occupied a whole room, and it had coils of wire which were arranged in such a way that you’d get the three elements: the resistance, the inductance, and the capacity of the transmission line. And they could be buried. And there was a very brilliant young engineer by the name of Peak who wrote a series of technical papers for the American Institute of Electrical Engineers. And Peak was the fellow who ran the laboratory work for Steinmetz out there, and I used to go out once in a while and help him.

MB: Was part of this in setting up these experiments, he set them up in such a way so that you could measure various things?

WS: That’s right.

MB: And these measurements, he then-

WS: And study the [transmissions?] and find out how the peaks, how high the peaks went when trouble developed on kind of the ground or [kind you’d siphon on in electrical stroke?]. The shape of the peak and so on. And then that was the information that the highly technical engineer uses in designing such things as insulators for transmission line or the end turns in a power transformer so that the coils don’t break down at the end as a result of the transfers that take place. That is a word that I should’ve used when I talked about the complex [inaudible] because we never, we knew there were transfers but we didn’t know how to measure them, we didn’t know what to do with them, and finally we did find out. But the transfer of course is the fact that when you close a switch you get a rush of current through there, and that makes a curve like that and it comes down that way.

MB: Finishing frequency

WS: Y=E[high?] minus ZR over T. I think that was the fundamental equation.

MB: You said ten of you went there that first year-

WS: Well about twelve.

MB: Did the university continue that every year or was that just the first-

WS: Well, that's because Berg was in charge here.

MB: Did Berg do that every year that he was here, send a group?

WS: Yes, he sent groups, but I don't know to what extent. Whether he sent a large group. But we eventually had a good representation of the university there and some of those men as they said went way up.

MB: This pry put Illinois in the-

WS: Chandler Prince for instance whose father was a surgeon over here at Springfield became a vice president of the company.

MB: This probably put Illinois in a favored position in the field of electrical engineering. His contact with-

WS: He did an awful lot for the university.

MB: Was Abbott the trustee involved with this, the Commonwealth Edison man in Chicago? Was he the trustee at the time?

WS: I believe that W.L. Abbott, no at that time he was still consulting engineering. But Peter Junkersfeld was really his chief technical man. But there was another thing that I might've missed speaking of this. The first steam turbines that were installed in the [inaudible] went into the Commonwealth Edison in that plant out on [inaudible]. Well anyhow, the first original Edison plant, those were GE turbines, they were vertical turbines. [crosstalk] But anyhow the turbine was just coming into its own, and that's one reason for the mathematics, and the steam passed through the turbine and was work done by Berg and Steinmetz at that time.

MB: Well, this is all very interesting. I, we're interested in the history of science and we've had people writing about history of science in the earlier century, the 19th century, Faraday and oh, mind [crosstalk] but these people are discovering basic scientific principles. But one of the areas that doesn't get attention is the American contribution, which is largely the technological application of this new electricity. I think that here we have Steinmetz and through Steinmetz to Berg to our Illinois graduates which is the transmission of this scientific knowledge and the application of it to industrial use. American contributions are largely technological rather than basic theory, which is for Europeans, and this is our-

WS: This thing is [showing?]. Is this still running?

MB: It’s still going. You want, we can stop.

WS: Oh, shut it off. I’ll tell you something [inaudible].