Interview with Peter Stevens [S] on July 29, 1992
by Michael R. Williams [M]

[After some chit chat about some brochures that Peter had (which Williams later photocopied) the interview starts]

[M]: Tell me a little bit about yourself. Are you a local boy? When were you born? What sort of education did you get?
[S]: I was born in Hamilton [Ontario] in 1934, graduated U of T in 56 in Engineering Physics. Lived in the Toronto area all my life.
[M]: Went to school in Hamilton?
[S]: No, I went to school in Etibocoke - Etibocoke Collegiate, then U of T then worked in Toronto.
[M]: A lot of the people I have been speaking to went through that Engineering Physics course.
[S]: There was quite a bunch of us graduated in the 50s, and some of them went on to do some very good things like Alan Carswell, you will have heard of him. He has been on TV a lot, did a lot of research - his latest thing is this LYGAR (sp?) which is light radar, with a laser firing straight up and reflecting off the upper atmosphere. He has done a lot of work with lasers and is a well known person in the field of lasers and technical stuff. In that year there was a lot of people like that - technically advanced and successful financially.
[M]: I think about half of the people I have talked to on this project have come out of the U of T Engineering Physics program.
What got you in the Engineering Physics program? Were you always interested in Science or what?
[S]: I was - from the earliest I can remember I was totally involved in physics and electronics. I had my amateur radio license when I was 14 years old and was very much involved..
[M]: Still keep it up?
[S]: No. I was inactive for many years and so I let it drop. I always had a personal interest in electronics which just sort of naturally led me into the engineering world and Engineering Physics in particular - I wanted a broader outlook than, say, electrical engineering. Of course that is called Engineering Science now, and they are still turing out some pretty good graduates.
[M]: When you got through your Engineering Physics program, what did you do then?
[S]: I went directly to Ferranti. Remember that I listed a bunch of names before [on the telephone during a preliminary talk to set up the interview] and I guess the contact with Ferranti was through a classmate named Martin Taylor, who I suggested you might want to get in touch with (I gave you his phone number I think). His father, Kenyon Taylor, was brought over from England to set up the Electronics Division. Being my classmate, and one of the people I spent a lot of time with, ... there was actually quite a group of us from the 56 graduating year in Engineering Physics that went in 55, as summer students, to Ferranti - a marvellous experience. Ferranti was very progressive in the sense of hiring university students - this was well before the Waterloo program [the CO-OP program]. They had some nice fat research contracts with the Canadian Navy and things like that, so they were doing well and used to take on a good number of students every year. There was this group of us from the 56 graduating class that worked there in the summers, and then just went back there when we graduated.
[M]: These contracts with the Canadian Navy, would that be the DATAR program?

[S]: Yes. There were other - they had research programs into magnetic core logic - magnetic cores were used for memory but they were also usable (I don't know if they were ever commercially significant) for shift registers, counters - we built a full range of logic things using the threshold effect of the magnetic core. By using multiple windings they would be, effectively, like inputs to a gate and flip the core.

[M]: I can recall that logic being used in the English Electric KDF9, years and years ago.

[S]: That was an example of one of their more pure research projects, then DATAR - DATAR was substantially finished when I came on the scene - there were just bits and pieces left around that I saw, like bowling balls and things like that. It was quite an era for Ferranti, but it preceded me.

[M]: What did you do on that first summer?

[S]: The summer will be a little harder for me to recall, it was a long time ago. One of the more progressive features of Ferranti was that they had classes organized. Gord Lang, for instance (another name I gave you), was one of the more academic people there and he gave -- well they all gave lectures to the summer students, but he come to mind -- so it was almost like another school.

[M]: He lives in Bolton now!

[S]: That sounds right, but I don't have his phone number.

[M]: I actually got it from Fred Longstaff.

[S]: Longstaff and Lang we a couple of the key people - and Les Wood.

[M]: I have actually found him as well. I just found him this morning. He is in Mississauga, but apparently he is up in his cabin for the summer.

[S]: They are all good sources of information. The first project I started on, I am not sure if it was in the summer or as a graduate, is what was called the NRU reactor at Chalk River. It was one of the early reactors and Ferranti had a contract for building the control system. So it was operational amplifiers driving relays and that type of thing.

[M]: Was this a long term relationship between them and Chalk River, or was this just a one off deal?

[S]: It was relatively long, not in my participation, but I know there were people going back and forth. Don McQuirk, he is colourful character - he is a Rolls Royce nut, he has more Rolls Royces - I remember he used to be going up to Chalk River all the time. There was some continuing activities, but nothing continuing like the Air Canada or the FP 6000 projects. It wasn't really a computer, it wasn't digital it was all analog - to my recollection. It didn't do any computation.

[M]: At that time Ferranti was probably one of the largest electronics people around?

[S]: They had the capability

[M]: They would be a natural to deal with that kind of high-tech functions.

[S]: That was one of the early projects. Some time around ... Ferranti got into a bit of trouble. In 1957 - if you look at my CV you see I went there from 56-57, and was full time on nuclear reactor control systems. I had been there as a student in 55. You will notice that I went off to Westinghouse in 57. A lot of us did disburse at that time because they did get into a financial bind at that time and they had to lay people off.

[M]: They still continued in existence at that time did they not?

[S]: Oh yea, they hadn't cut back quite that much. They helped us all find jobs and everything. It was like one big family. So I went off for two years to Canadian Westinghouse and then I came

back to Ferranti. That was when they went on to work on the FP6000. In between there were other projects they worked on. One was ... I can't remember the name, but if you talk to Gord Helwig he knows all about it ...

[M]: Les Wood told me this morning that he lived in Tavistock, but I can't find any record of him there in the phone book or anything.

[S]: I don't have anything. Ted Strain will probably know how to get in touch with him. Ted Strain had this reunion a few months back and Gord Helwig was there.

There was a project - ultra top secret for the Canadian Military - a communications system involving something, I think, like spread spectrum techniques or something equivalent to them. For that time it was a highly secure technique that involved frequency hopping type of radio, with all digital control type of systems.

[M]: For the Navy?

[S]: I think so, because I think it went to Halifax. Gord Helwig was the project manager on it, and I was just an engineer. My memory is not too good on that. I was more in a non-technical capacity - coordinating with manufacturing and things like that.

In between was, of course, the Federal Reserve Bank job. I guess that is what I did first when I went back in 59.

[M]: Let me get this straight now, you worked that summer of 55, came back from 56 to 57. The projects you worked on during 56-57 were ...

[S]: The only thing I noted here (on his CV) was the reactor control system.

[M]: That was just general engineering work.

[S]: Yea.

[M]: Then you left and went to work for Westinghouse. What did you do for Westinghouse?

[S]: That was an interesting period of time. Their electronics division was on Longwood Road. They, too, had military contracts, but that was a separate area. I was in the Industrial products area. One of the main things they were involved in was using automated machines to cut steel plate with gas torches. They would drive the torch around according to a pattern. Linotrol (sp?) they called it.

[M]: For ship building?

[S]: All kinds of metal - cutting stuff like heavy metal plate. They tried to follow that development into a new area and control milling machines. The idea was to make the milling machines work on a similar process where they would follow a pattern - you would draw out on a piece of paper the shape you wanted. It was an optical line-following device then servo-controlled device to move the tool around while it is cutting, allowing for the offset from the head and so on. It worked quite well. I did a fair bit on the design on it. It never became a commercial product.

[M]: There was something I came across from that era called a UMAC 5 or something.

[S]: That name rings a bell. I can't really correlate them. The thing I worked on never became a commercial product.

[M]: I am not sure that that one did either.

[S]: We decided we would also make it numerically controlled, so it was probably one of the earliest numerically controlled milling machines. It had a servo drive, x and y drive, on the milling machine table. It had a scanning head mounted on the table too. Of course that followed the pattern. It had a rotating photocell - became it was rotating it would give angular, as well as centering on the line - so it could tell if the line was turning and follow it. A neat little system. It

would follow the pattern.

[M]: Was the control system analog or digital?

[S]: It was analog. In fact that was some of the first solid state.

[M]: Was that here or Montreal?

[S]: Hamilton. Then we decided to include numerical control as well. Using the same drive controls we had transducers mounted in the x and y directions so the table position could be fed back. It was electromagnetic type transducers that had a long coil, and it would count the turns as it went by. It had paper tape input - I think it used a Ferranti paper tape reader, but I am not sure. The tape had to be laboriously prepared with all the increments.

[M]: It didn't just go from point A to point B then.

[S]: No, it would interpolate, but the accuracy of the interpolation was based on the accuracy of the servos so it was short interpolation - you had to have a point at least every inch or half inch or something, more if you were having curves.

        Then they sent me off to Buffalo. I worked down there on operational amplifier design and things like that. Then things at Ferranti started to pick up, and I always liked it at Ferranti - it was more my type of place, so I went back there in 59.

[M]: When you first left, you were let go entirely? This was not just a temporary lay-off?

[S]: No, I was let go.

[M]: The working conditions were such that it was a friendly place and you wanted back?

[S]: You see it was ... the reason that a lot of people from Engineering Physics and such things flocked to Ferranti was that it was really the only place that was doing fundamental R&D in electronics. They were the very first users of semiconductors. It was just at that time that the first semiconductors were brought in - there was nobody else doing computer development - CDC [Computing Devices Canada] came along after that period.

[M]: CDC didn't do all that much anyway, they tended to sell Bendix machines etc...

[S]: Yea, I think so.

[M]: OK we have got back to 59. Was this again through Martin Taylor that you got the job?

[S]: Not really, no. By that time I knew Ferranti (I still knew Martin, but he went on to - he didn't stay there as an employee very long, in fact I think he only stayed there in that one summer, I don't think he even went as a full time employee - he went on to study for his doctorate in psychology, he ended up in the Defense Research Medical Laboratories).

[M]: Right, I remember somebody telling me that - in fact it was probably you.

[S]: I am not sure where he is now. He was very academic.

[M]: It might have been Lyman Richardson that mentioned that to me.

[S]: Yes, he knew the Taylors very well.

[M]: So what happened in 59?

[S]: Remember that my timing and sequencing of there projects may not be accurate.

[M]: Oh yes. That was 30 something years ago.

[S]: My memory is like a sieve. I mentioned the frequency hopping secure radio system. There was another project which I did not work on, preceding that bit, which might have let to that called the JANET (sp?) system. Which is the meteor scatter radio system. It was a very significant effort on Ferranti's part. The interesting thing is that, just recently I have heard of the concept being resurrected as a method of communication. Ferranti were very much pioneering in this. The system was digital and you stored information then made use of the ionization trails - that meant that you just had a burst of transmission. You kept monitoring this channel from two

points via VHF radio, and as soon as you got a channel open you dumped your data as fast as you could. You were limited by dopler effects and things like that. It was very sophisticated technically - you had to take into consideration the nature of the transmission channel characteristics - Gordon Lang, I think, was one of the key people on that.

[M]: This was basically for communication in the North for military?

[S]: It was for military, but not necessarily in the North. There were trials run out near the airport, on highway 50. We had a station set up with antennas etc. I personally didn't work on that project, but others of my age group did. It was for the military so there was no commercial application, so I guess it was dropped. That project may have been in the late 50s as apposed to early 60s. When I came back to Ferranti in 59 that was long since gone. The main job I got involved with was this Federal Reserve Bank cheque sorting computer.

[M]: Do you recall what time of year it was when you came back?

[S]: I think it was ... [here he is looking through his computer files for info]

Herman Reddering [spelling OK] was the project manager. He went on to the photo survey company up on O'Conner Drive - an electronics company associated with that aerial mapping.

[M]: Is he still around somewhere.

[S]: Yea, I ran into him a year or so ago. He wasn't at any of these reunions, so I don't know how to get in touch with him. He was a bit older than I am so he is probably retired.

He was the project manager for the cheque sorting machine for the Federal Reserve Bank of New York. I call it a computer, but it did not have a stored program, so it was not a computer in the real sense.

[M]: Did it have digital logic inside?

[S]: It was all digital. Solid state - very early plug-in cards with discrete surface barrier transistors.

[M]: Why should Pitney-Bowes or the Federal Reserve Bank come to a Canadian company?

[S]: The story, as I recall, was that the Federal Reserve Bank wanted this cheque sorting system. They went to tender. I think there were five bidders - there was IBM, NCR, Ferranti, Burroughs, and probably GE.

[M]: That was a separate bid from the cheque sorter itself? This was just a bid for the control?

[S]: No I think it was combined. IBM, for instance, had their own cheque sorter and their won computer. NCR also used the Pitney-Bowes cheque sorter that Ferranti used. Burroughs had their own I think. GE was, I think, the originator of the MIRC technology, with the funny shaped letters on the bottom. The idea of that shape was a magnetic pulse - each one gives a unique pulse. The character reader than we got from GE had an array of electronics that went into the bottom of the cheque sorter that converted the magnetic signal coming through the read heads from the cheque into numbers.

[M]: Can you recall how many read heads there were per character?

[S]: That is the point. There is only one. It is just a slit. If you study the letters on your cheque some time you can see that, if you imagine the slit, each one with the strange thickness and thinness of the characters is such that each character has a unique signature. Bear in mind that it is the rate of change you are picking up - it is not an optical thing, it is the magnetic flux.

The story, as I recall,...I don't know how Ferranti got the original chance to bid,.. but bear in mind that Ferranti was a real leader in computers - special purpose computers - not a big company but (Les Wood would know all this cold, he was sort of the management side). I heard

that the Bank couldn't make up its mind, so they decided to award the contract to all of the bidders. Lots of money I guess. They started out to get a system and then they figured they would get all five, have them set up in different parts of the country and evaluate them against each other. We had the good plum location in New York City - just down the road from Pitney-Bowes in Stanford (sp?) CT. - I spent quite a bit of time at Stanford CT in the early days because that is where we first moved the computer. When we got it going in Toronto we moved it to Stanford CT to get it going with the cheque sorting equipment before we moved the whole lot to New York. It worked quite well - it was working there. It was a high pressure job, it was may first experience with that sort of thing. I used to get phone calls at 2:00am to get on the next plane to come to New York and fix it. It was processing millions of cheques. There is a picture of a room full of people, working 24 hours a day, coding these cheques and stuffing them through - it was a clearing house you see.

[M]: There is one cheque sorter in this picture, you would need a couple at least wouldn't you?

[S]: It did. I remember the organization - everything was organized in three phases .. it was an entirely special purpose computer, there was one phase of operation for one machine - it could control three. I think there were three, but this picture only shows one but I think there were a couple more in that room.

[M]: If one sorter had a problem the others could take over, but if that computer had a problem then you really had a problem.

[S]: Right. There is a story that I often use even to this day, about training. One of the last jobs I had was to hire a technician and train him to take over so that I could come back. I thought this was impossible because this machine was the weirdest thing, totally special purpose, and marginal. Everything was magnetic drum memory and the unfortunate thing was that the read amplifiers were placed at quite some distance, in a different cabinet, from the heads. So you had all these twisted wires with microvolt signals running from the heads to the read amplifiers. The slightest bit of noise and the signal levels went right down and threshold levels trying to pick out these ones and zeros, it was tough. The read amplifiers were using transistors as analog devices - the whole thing was very marginal - it worked but ...that and the fact that the logic was all special purpose, it just seemed to me that it would be almost impossible to train somebody to repair and maintain it. We advertised and interviewed people and eventually hired. I was very concerned, I though I would spend my life down there. One day there was some important thing, perhaps it was a high volume day and we were behind, all the brass were there and the thing wouldn't work. It was a real tense situation. I had the drawings spread out. Being an engineer, and design oriented person, I would try to analyze, look at the symptoms and try to figure out logically what would cause it. I was really straining myself to figure it out, then this technician said 'I think I know what it is'. I thought to my self that I had designed this thing and he couldn't possibly know what it is. He wanted to try replacing a certain card. Basically to humour him I let him change it, and it worked! I said 'how in the heck did you ever know that?' He said 'It is the same thing as last time!'

  I never forgot that, it is a lesson learned.

[M]: What did you use the drum for?

[S]: Storage. All the routing codes. All the cheques had to be routed to different pockets in the sorter according to their code (the bank etc). This drum was 10 inches in diameter and a foot high.

[M]: A standard Ferranti drum?

[S]: Well they had a range of them, so call it standard. It had air bearings - that was a big part of their business - compressors and all that sort of overhead, a water break system so that if the air failed it squirts in water to slow it down and stop it so it wouldn't be ruined. The first drums, before I came, - they had a pit in the floor with an iron door on the top where they would test these drums because they were afraid they would fly apart. I don't remember what the storage capacity of that drum was, but it was probably only a few kilobytes. I remember one product they had, they had these neat little drums that they put in a Hydro watt-hour meter - they were just about that (showing his fingers - see the video tape for detail) big around and I think they stored about 300 bytes.

The cheque sorter drum would not store anything like programs, it would store routing codes.

[M]: It would take info from the cheque and ...

[S]: Yes, and there was a paper tape reader that you could use to load up this drum.

[M]: ...then compare it with routing codes on the drum and file it in different pockets?

[S]: That's right. I forget who, out of that trial, got the contracts but of course - well NCR certainly went on for years in the cheque sorting business. I guess there was enough business to go around. But Ferranti was out of it - they did not get a carry on contract. That was a special purpose job, they were paid for it, and I hope they made money.

[M]: Do you remember who else was involved in the design and construction of the computer?

[S]: Well there was some technicians.. Herman Reddering was the project engineer. He was the main man. I did some of the design, but I did not have the overall responsibility. I had the responsibility for everything in the field, getting it going at Pitney-Bowes, keeping it running in New York etc. If I got stuck Herman Reddering would help me out.

[M]: He was very definitely the senior man?

[S]: Yes. Of course this was back in 59 or 60, so I was only out of school four years. Then I went on to work, in more of a project management capacity, with this secure communications system. I think Brian Ovenell (sp OK) was on that project too. I think I mentioned him to you on the phone, he was one of the ESE people - he is still there at ESE (now Motorola (sp?) Communications). I mentioned Ted Strain, Don Richie was the president of ESE and the other founders were Gord Lang, Fred Longstaff, Brian Ovenell. Richie left ESE and it was taken over-sold to Motorola, long after I left, and Ten Strain went on to be the president of the whole Motorola operation, and is certainly a key person to talk to. Ted was about my age, perhaps even younger. I knew him well because he and I were in England, along with Gord Helwig - I will come to that in a minute - just before the FP 6000.

[M]: Ted Strain was president of Motorola - that was the division here?

[S]: Yea, I am not sure of the proper name of the division. It is still active in a relatively new building up on Airport Road, north of Steeles - the Communications Division or something. Brain Ovenell, Fred Longstaff, Gordon Lang, all went to work at Motorola. (here they check the spelling of Ovenell - this is Peter's best guess). I am not sure if Ovenell if still at Motorola. Ted Strain left. Any of those old Motorola people, like Fred Longstaff, would know all that.

[After some administrative chat, the interview continues.. During the course of this chit chat, Peter mentioned that the Ferranti people used to have a photo taken of all the 'guys' from time to time - this might be worth following up - see him for more information]

[S]: Ok, we are back in the early 60s in Ferranti. My first project was as the design engineer working on the Federal Reserve Bank project, under Herman Reddering who was the project

manager. After that I was in more of a management role in the military communications project. I was not involved in the logic design or anything like that - more with the liaison with the manufacturing group. I am note sure of the exact reason why but Ferranti in England needed help designing a new computer they were designing over there - was it the Orion? [see the interview with Ian Sharp for more on this]. I can't remember exactly, but Les Wood would be a good man on this too. In any event, I was one of a team of three that went over to work as design engineers on that project.

[M]: In Manchester?

[S]: No, in Bracknell (sp OK) which is West of London, which is were Ferranti had one of their many divisions that was doing electronics work. It was a delightful experience. There way myself, Gord Helwig and Ted Strain. Three of us went over and we did different chunks of the design of this machine. They carved it up - I remember working on the shift register design and things like that. It was a general purpose machine, but I think it was a time sharing machine too. I think it was one of the earliest multi-processor machines.

[M]: Do you remember the year this would have been.

[S]: Yes, I keep a diary in a database....(1 June 1955, started summer work at Ferranti; 1 May 1956, started at Ferranti; 1 Jan 1957, started at Westinghouse; 1 Sept. 1959, started back at Ferranti; 1 Oct 1961 I went to Ferranti in Bracknell (sp ok) in England, I came back 1 March 1962 back to the Toronto Office from Bracknell). 1 Oct 1963 I was appointed Chief Engineer in the Computer Systems Department at Ferranti. 1 May 1965 I was appointed Chief Engineer of the Electronics Division. 31 July 1966 I resigned from Ferranti-Packard.

We went over to England to work on the development of this computer. I wish I could tell you more of the architecture of it, I believe it was one of the first timesharing machines but ...of course Fred Longstaff, although he was not over there, was the driving force behind Ferranti in terms of the architecture concepts in terms of what you needed for timesharing. I remember one of the main things that was on his mind was that if you were going to have a timesharing machine you needed hardware protection so that a bug in a program would not allow one person to mess up another's work. We used to have separate registers so that each task would have a fixed offset in memory for its work. I never, at Ferranti, was that much in the architecture side. I would be working on a shift register for I/O or something like that. I did a lot of logic design, but I didn't have the overall picture.

[M]: Now, had the FP6000 already been produced at this time?

[S]: No, no; this is what resulted in the FP 6000. This trip was ... that's where it was born, because of this trip over to England. We, collectively with Fred Longstaff being the brilliant guy behind it, could see the potential for designing a really good computer. We thought we could design one a lot better than the one they were working on over in England.

[M]: Fred wasn't with you?

[S]: No, he wasn't, but when it comes to the architecture, I would say he was very much a part of it although he wasn't there. gord Helwig was the senior person, not in terms of position but he was the oldest with a lot of experience at Ferranti. I was one of the youngest, Ted Strain was young too - very bight, a lot brighter than I am. He would probably have been much more aware of the architecture concepts than I was at that time. 1 March 1962 we came back, finished over there and ready to start on the design of the FP600 here.

[M]: There wasn't any order or anything that Ferranti could expect to sell on the FP6000 immediately?

[S]: No, I think the idea was first, then the orders came. It started on spec., but I think there were some orders pretty early in the game. I have no idea ... I know where the original ones went, but I don't know in what sequence or in what time. There was the Sask-Power machine, the Toronto Stock Exchange, Air Canada (TCA), - of course I didn't work at TCA...there was the whole system they did including the card readers that Lyman Richardson was involved in - I went on to work at T-Scan which was formed out of the concept of that box - I was the only employee initially -- that's why I left ESE, but we are getting ahead of ourselves. At Ferranti the customers were also in Dartmouth ...

[M]: Was that the Navy?

[S]: I thought it was the University....boy I am straining my memory here. There were a number--there were five or so, which was quite good for the only company in Canada that was developing a solid state multitasking computer. They were riding pretty high then - they set up a division at Malton which is now the United Aircraft Building on Aircraft Road - half of it was the Ferranti computer division at one time. That is where the machines were built and that is what I eventually became Chief Engineer of Computer Systems in Oct 1963 - eventually I worked up to Chief Engineer of the whole electronics division. I did very well by Ferranti, in every way.

[M]: Yea, it seems like a nice relationship the way you speak about it.

[S]: Oh yea. Technical knowledge I gained, the rewards I got in terms of my position etc. They treated me well. It was a good experience.

The development of the FP6000 ... you can undoubtedly find more technical information from other people because we are now getting more recent and lots of people worked on it. There machines were built and they worked, more or less on time. I was not involved with the actual production schedule and testing. I remember that one technique I used was to build in hidden slack. I would build in something hidden that nobody knew about except me, so when something came in late you could take it out. So things were done relatively successfully in terms of the timing, and the machines were pretty reliable - a lot more than that cheque sorting machine in New York.

I guess Ferranti got grandiose ideas - this is a broken record because I know so many companies go through this - they decided that they wanted to expand their sales. They decided that they don't have a good sales manager. What these companies do is bring in a big guy. Ferranti brought in one from UNIVAC. The story was that he knew what to do, we didn't, we were just engineers. This hot shot guy from UNIVAC was going to do the selling. They spent money like crazy.

[M]: Was this UNIVAC in the States of UNIVAC here?

[S]: Canada, I think. I am not positive he was from UNIVAC, it just pops into my mind. I have been talking about the hardware side, but of course the software side was Ian Sharp as I mentioned on the phone to you. He will fill in that other side completely.

I don't know when ... you see I resigned 31 July 1966, but well before that ESE was started. I don't have the founding date for ESE. It was very disillusioning for the people involved. All this when I remember sitting around when President Kennedy was assassinated.

[M]: Everyone was disillusioned for ...

[S]: Well everyone was very proud of what they developed with the FP6000 computer - technically, commercially, a bunch were sold, it was a very rewarding experience. Then when everything went down the tubes it was a very discouraging experience. There were two groups of

people who decided to form their own company. The one group was centered around Ian Sharp, I.P. Sharp Associates, and the other was ESE, which was seven, odd, founding members who were fairly equal - Ritchie was the president but we were all in there figuring out how we were going to do this, figuring out a business plan etc.

[M]: Do you remember what ESE stood for?

[S]: It came from Electronic Systems Engineering.

[M]: But it was never called that?

[S]: No, just ESE. Some of us stayed working at Ferranti for quite a while after these companies were formed - not in secrecy - I for one, and others, were working at Ferranti and in our spare time were helping to organize ESE.

[M]: And Ferranti didn't object to this?

[S]: I am not sure how much they knew. There was never any ...I don't recall any problem or any objection, but some people left earlier than others. I stayed on at Ferranti and eventually resigned- the purpose of resigning was to go and work full time for ESE, to join that group.

[M]: So you had to wait until they had built up some contracts.

[S]: Actually ... I said earlier that there wasn't a long term relationship with the nuclear industry but there was a long term association. I know Fred Longstaff.. the main money maker for ESE when it started was Fred Longstaff working as a consultant for ESE at AECL out in Sherring (SP?) Park. I am sure that time was right back when he quit.

[M]: He didn't mention that when I was talking to him.

(End of Side 1 of the tape)

[There is obviously some small amount of material missing here which will be on the video tape]

[S]: The IP Sharp side I can't tell you as much. They eventually got into APL and the timesharing system. Although the concept of a large central computer with terminals on it quickly went down the tubes in general, they had built a communications network system world wide for their services and it was really the communications network (at least that is my understanding) that was the real plum that they had which ultimately resulted in them making a very valuable sale to Reuters.

[Ian Sharp has a different version of this - see the interview with him]

See Reuters bought out I.P. Sharp. There were a good number of multi-millionaires made out of that deal. They did very well. Of Course the strength of the Company was in their people, any company is. The central computer concept went down the tubes with the PC. But they had their own design of a world wide packet switched network that spanned the globe and that was one of their main achievements.

[M]: There was no more connection between I.P. Sharp Associates and ESE?

[S]: Not much. Socially there was, but there was not joint ... they went their separate ways. ESE was very much in the hardware area initially. Later on they did some high powered computers for the Canadian Government. They did some pretty sophisticated computer work which I can't tell you very much about - try Gord Lang.

  Before they moved to he Motorola plant they used to be out on Albian Road. ESE was quite successful, they expanded and so on but then they got into financial trouble. A lot of their early work was developing modems. They had 9600 Baud modems which are of course common in computers now, but that was thought to be almost totally impossible in those days when 300

Baud was tops. That was largely Gord Lang's work. He was also at U of T - both U of T and ESE. He was the mastermind behind a lot of the communications concepts going right back to the Janet meteor scatter system, through the modems at Ferranti which made use of multi-phase encoding which is still used to get the high data rates. I think it was that which made Motorola interested because Motorola had bought CODEC (spelling OK), an American company doing modems too. And that brought it all together. I am not the one to tell you about that - any of the ESE people could fill you in.

[M]: What was it you did in ESE?

[S]: I wasn't there all that long.

[M]: When were you there?

[S]: Just in 1966. I started 1 September 1966 and left to start at T-Scan 1 October 1967. One of the early things I worked on was a pacemaker for the Hospital for Sick Children. It used the concept of magnetic coupling - all external.

[M]: No external power supply?

[S]: That's right. There would be a coil that would be surgically implanted and lead to the heart. The part that we made would be external, the transmitting coil, in a plastic ... The concept there was to make a high power pacemaker, something that would put out watts of power. This thing was relatively high power, peak power I mean. I remember working on that. Then we got into an area that we tried to make logic cards. This was before LSI, when we just had gates. The concept of how you packaged this was important, everybody was wrestling with it. The logic design required interconnections and the problem of how to make them was very very difficult. You could go to a printed circuit board, but for something like a special purpose computer that was not very practical - printed circuit technology was not as advanced as it is now. The technique that was used in the FP6000 was that you would have a logic card that had a number of simple functions on it, and the logic wiring was in the back plane. They weren't busses, they were the actual logic of the machine.

[M]: So the actual card would have a few gates?

[S]: The integrated circuits had a couple of gates in a package, something like that, and we would put three packages on a card at ESE, so you would have about 10 gates per card. We just build the cards. That was my first and last taste of selling, I hated it. I remember going around Ottawa and places trying to sell these cards. My heart wasn't in it.

        From that point ... Lyman Richardson go going again with his inventions. He got the idea of taking the original TCA Transactor concept, updating it, and building a company around it. It would still have a card that went into a slot, was mark-sense read, and the reply printed on the card. He formed a company called T-Scan Limited. (spelling OK). The initial development work he contracted to ESE. I was one of two or three engineers at ESE that were working for him on the design of various parts of this transactor. Two things happened at that time: there was a bit of financial dispute between the founders of ESE which resulted in two other founders and myself leaving - rather unfortunate actually as we were a close knit group. I don't suppose there is any point in going into details - it wasn't ugly but it was clear that the best thing for me, and the others, to do who wouldn't sign for operating capital on their personal signature, which is what it came down to, was to leave.

[M]: ESE was obviously in a cash crunch at this time?

[S]: Well, not really. Not as serious as later. They just wanted to get a low rate from the bank and the bank said they could have it if they would personally sign. Some of them who were married

put all their assets in their wives name and signed. ESE even paid legal fees for me and some of the others to go and get advise. The lawyers said "you would be crazy". At the same time T-Scan had offered me the opportunity to be their first employee, to go out and help them find their office space etc. Which I did. I left ESE and started as the one and only employee for T-Scan. We gradually build it up with extra staff, developed a design team developing the transactor and the associated stuff. That started out looking good, but it was doomed.

[M]: What were they going to use this transactor for?

[S]: All kinds of things. When I say it was doomed, it was because it was an electro-mechanical device in the electronic age. It is too bad. Various people saw that at various times, but several people hung on. The concept goes back to the original Air Canada machine.

[M]: The second time around it would actually print on the card would it not?

[S]: That is right, it would print a reply on the card. The first time it would simply cut notches - but that showed the advantage of having a two way transmission: input from the public and output back again. The concept was interesting. About this time the CRT terminals were just starting. I remember we had set one up with a TV set at Ferranti with the FP6000 a couple of years before the time I was talking about. Somebody was able to put a few letters up on the screen using the resources of the whole computer and everybody thought it was great. The first CRT starting becoming available at they were about $5,000 in the T-Scan time. I started there about October 67 and left to teach at Ryerson in 1970 and the concept of this terminal was that it could be shared among several people. You didn't want to give each person a terminal, you gave them a card (like the lottery today) and they could mark it and then submit it to the operator. This allowed the machine to be timeshared. You also didn't want everybody to be staring at a screen at once - at $5,000 per terminal it would be too expensive. The reply would be printed on the card. People would be off line and marking up their cards, thinking, then zip it into the machine, get their quick reply, and go away again. It also had the capability of reading what it had earlier printed on the bottom of the card. That particular line could be optically scanned and read when a card was dropped into the machine - there was a fibre optic and a little moving photocell. It would zip along a read simple thing like a bar code. The problem was that it was a mechanical nightmare - built from the ground up with every little piece designed by T-Scan. It was expensive. We sub-contracted to Ferranti - my heart was still with Ferranti - and they actually built the units.

[M]: The first one with TCA was also done by Ferranti?

[S]: Yes the first TCA machine was a total Ferranti project. The second time around Ferranti was the manufacturer and we did all the design work. But costs were high, reliability was not good, and the CRT terminal was plunging in price. We had no other products. We were agonizing and talking to people about what happens if this thing fails and what other products we could produce - there were none. They had one big job - the Sao Paulo stock exchange which was quite successful. Consumers Gas bought out T-Scan about the time I left.

[M]: I talked to Lyman Richardson, but it is often difficult to pin him down. He is a great talker. I also heard him described by somebody as having a TV evangelists zeal for his ideas.

[S]: That is a good analogy. I wouldn't say he was a technical person in the true sense of the word. He was a missionary type person. He had a lot of ideas. I am sure that a lot of them were harebrained, but some of them were good. He would get a hold of the technical persons to evaluate them. His ideas have always been intriguing, and still are. There is a question of commercial viability. That whole area was never all that well analyzed. In his opinion there were

always tremendous possibilities. I am not trying to put him down, but just to point out that he is a driven person, he has these cleaver ideas, but is an optimist when it comes to sales and marketing. He just assumed it will all sell. I remember many times at T-Scan when he would say "we have a contract" when we were close but didn't really have it.

[M]: I came across somebody else, Len Casciato. Did he ever have any connection with T-Scan?

[S]: Yes he did. I was involved with Len. As I recall he worked as a consultant for T-Scan in various roles.

[M]: So he was never connected with them directly?

[S]: I don't think he was ever an employee. I remember having marvellous lunches etc with him. I liked Len, but I can't actually remember exactly what he did for them. He is a good guy - very solid in his ideas.

[M]: After you left T-Scan in 1970 you went to Ryerson?

[S]: Yea. I was getting fed up with the whole industrial world. I was getting tired of being promoted through the management side of a firm - basically what drove me from a child was the technical side - I was always intrigued with things. It was a technical curiosity drive that gave me my rewards, but all my later work was interrupted when I became promoted to management.

(this discussion goes on for a while - nothing much about the main topic)

(This mentions Tony Lash and Draper Dobie, a stock broking firm, that used the T-Scan transactor. Tony Lash later went on to found T.I.L Systems, a firm which did computer work for the stock brokering industry.)

Peter Stevens later worked at T.I.L. until they, too, got into financial trouble.

He mentions the Toronto Stock Exchange and a system called CANDAT which was later replaced by CATS (Computer Assisted Trading System).

Mat Ardron is also mentioned as a key player at the Toronto Stock Exchange-Peter Stevens knows him well and has his telephone number if I want to get into the Stock Exchange (416-637-9373 in Burlington. The CANDAT system would take all the stock prices as they came in from the floor (on CRTs and keyboards) and provide them to the brokers on demand.

Stevens claims that brokers didn't like the qwerty keyboards and wanted abc keyboards in the early years, until they realized the error of their ways. They also wanted a lot of special keys - such as two different numeric key pads, one on the left and one on the right, presumably one for buy and one for sell or something like that. These people built special keyboards for the stock exchange, which is why they got the job to produce that system (IBM etc was reluctant to provide such special equipment). This was a firm called T.I. L. that built the CANDAT system. Stevens went on to work for T.I.L and eventually became a V.P of the firm. Then he retired.

  George Collins is also mentioned as being active in the Air Canada (TCA) project. He was an engineer. He is in southern ontario.. He was a key person at Ferranti in the early days. He was the man who coined the name TELEDON. He has his own company called RDP associates 519-856-9040 near Guelph.

  He evidently knows a lot about the problem with the reading system on the transactors that could read. To get neons to work required the presence of stray radiation. If you put them into a dark box they change their ignition point after a period of time.

  George eventually ended up at Revenue Canada as a Science Advisor.

Peter Stevens says that the common thread of Canadian computing is communications, and that

is because of our geography.

[M]: You mentioned Gordon Lang. What was he like?
[S]: Gord Lang is a very cleaver person and was behind a lot of the real technically advanced things that Ferranti, ESE, and Motorola did. He had a basic theoretical approach, not one of hands on. A pleasant nice guy. He had a neat way of taking something that was really relatively simple and making it extremely obscure and complicated - this got him in trouble with his teaching and in other things. That is a characteristic of many academic people. A certain amount of that was very common in Ferranti in the early days.
[M]: Were there a lot of English academic types in Ferranti in the early days?
[S]: Yes. I think a lot of that comes from an English attitude. I remember even Fred Longstaff, he is a legendary genius - he could reduce logic to the absolute minimum, of course it doesn't matter nowadays, you just throw in a dozen ICs - he could come up with the most cleaver ways of creating a counter that didn't count in the ordinary sequence, but saved one gate. It was brilliant, but nobody could understand it, particularly the technician who had to fix it.

(here follows a discussion of Fred Longstaff's health, or lack of it at the moment)

(here follows a short discussion on FORTRAN Traffic Systems Ltd.)

(This led into a discussion of the Toronto Traffic Control System)
[S]: It is true that KCS did the original experiments on the traffic system, but Ferranti was heavily involved in the system. They produced the loops in the road used for detecting cars. That was Kenyon Taylor's work. Kenyon Taylor experimented with the hardware in the parking lot at Ferranti. (This is probably the second stage of the system, after the radar pots were retired.)
  After that time, Canadian General Electric got very involved in the Toronto system (second stage). The computers went into a building just a few blocks from here at the corner of Charles and Jarvis, then the whole system was later moved up to Shepherd and Younge. The original system that was experimented on by Casciato and Kates had some concepts that are only now just beginning to come back. They went over to England and are now being reintroduced into Canada under licence to FORTRAN Traffic Systems. They are going to put it into Toronto under the SCOOT system. The system operating now in Toronto, and many cities, is not a true closed loop system. They use the counters to determine traffic patterns and they then develop a schedule for rush hour, another for off peak times etc., but it is not a closed loop system. Casciato used to bend my ear about this - he wanted to have a true closed loop system that could monitor the demand and change the system on the fly. Toronto has just now placed an order for the SCOOT software developed by Plessey and Siemans in the UK.

[M]: Joe Kates, the big push in KCS, is still doing work in that traffic control area.
[S]: I don't think he is associated with FORTRAN, they are not a computer company like Ferranti, they are more associated with highway and crosswalk signs etc. G. E. had a division in Toronto doing Traffic work and FORTRAN bought them out.

(Stevens does not know how they got the name FORTRAN Traffic Systems. But the man to talk

to there is Sandy Zeller 416-288-1320).

(end of the interview)