

# Marc C. Shoquist Interview

## Prologue

In the early days of the Legacy Committee activities, John Westergren led the videotaping and recording of almost two dozen oral interviews. This interview was in 2007. Marc's family asked permission, then played the video at the funeral viewing for Marc in 2013 [see epilogue on page 7]. They also transcribed the interview and provided printed copies for funeral attendees. I, Lowell Benson, have re-typed that paper as this 'Article for the Month.' I have added a few comments as End Notes – referenced by superscript numbers.

## Introduction

I am Marc Shoquist. I was born and raised on a farm in Washington County, near Big Marine Lake. I went to high school in Forest Lake. It was during the depression and a good share of my youth was involved in 4-H. My mother was a 4-H leader and a former schoolteacher, and she organized the 4-H club in our area. My brother and I were very actively involved in it, and quite successful in winning awards. My brother at the age of 15 won a state championship demonstration and three years later, I won the same demonstration. One of the highlights of my youth was to go to the National 4-H Congress in Chicago. That was the award for giving the demonstration. I went on to do other things in 4-H, and it became a good part of my retirement years. I consider the 4-H excellent preparation in communication skills and writing skills. We were required to write reports on our projects, and then to give demonstrations so we developed the capability to get up before an audience and communicate.



## Responses to Questions from John Westergren:

### How did it get you from high school into college?

Well, at Forest Lake, I was salutatorian of my class. The speaker at our commencement was the president of Macalester College – as salutatorian I had to give a commencement speech. A few days later I got a note that Macalester offered me a scholarship for the first year at Macalester. This was in 1945. When I was in high school, I took all the mathematics and physics courses. I guess in today's terms I would be known as a nerd, doing a lot of studying. But, I had recreation. Being on the honor roll allowed us some privileges. During study hour a friend and I would go down to the local bar and play pool. So, I look back as that being sort of entertaining during my high school years.

I was in high school during WWII, and part of my courses led me to apply for the Captain Eddy navy program where they would allow people who signed up to enter the Navy at a higher level than if we just enlisted. My brother was in the Navy. He was somewhat my role model, so I tended to follow whatever he did – or in many cases, tried to exceed him. We were very competitive. So, I went to Macalester one semester, and then enlisted in the Navy and spent two-thirds of that time going to a technical school. I ultimately was stationed for the last 8 months at Moffett field, which was an NAS base. It was a Naval Air Station, but it also was an airport, as they handled all the flights transporting Naval personnel. I helped repair radio equipment during that time.

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[What College did you go to?](#)

I came back in 1948 and then went to the University of Minnesota in electrical engineering and signed up for the ROTC program with emphasis on the signal corp. When I graduated in 1951, I was called up for duty in the Signal Corp, during the Korean War. I was very fortunate: I was sent to school for another six months in radar training. As a commissioned officer, the last part of my assignment was at White Sands missile range, where I was in charge of a detachment that installed high frequency microwave systems over the range.

My service ended in 1953, I looked in the St. Paul area for employment, and I interviewed with several companies including Honeywell and General Mills with an electronic division. I was most impressed with ERA because when you started working with them you were immediately assigned to a project. At Honeywell, you went through a 6-month training program where you tested Honeywell products. So, I was enthusiastic about joining ERA, and I was assigned to the Antenna coupler project, which was just going into production. As a junior engineer, I worked on the qualification test program for the coupler, and then shortly after that the antenna coupler was part of the military HF communication system. ERA was successful replacing its antenna coupler with an RCA contract. Until 1959, I worked on the antenna coupler [sic. Projects], and we developed a major reputation as one of the best designers of this product.

What I consider very successful was that our major customer was Boeing. Boeing built a lot of military transport aircraft and our antennae coupler was on every one of them. When Boeing launched the 707 product (their entrance into the commercial jet business), even though our division was not involved in commercial products, Boeing came to our President, Bill Norris, and demanded that we supply the commercial coupler for them. This ultimately resulted in very successful business for this young ERA Company. Over a period of about 10 years, there were over 12,000 antennae couplers built. It was one of the first production programs for the division, and it was very profitable.

[You mentioned working with Boeing. They were providing the first Presidential Air Force Ones.](#)

Right! That was sort of a highlight. The communication system on Air Force One was very elaborate. They had at least three duplicate HF systems. A special team was assigned to support that aircraft, and I remember going out to help at Andrews Air Force base where they did an upgrade on it in 1965 or so. It was quite a thrill to go through that aircraft - - actually, it is more than an aircraft; it is a fleet of aircraft. The president has a fleet of aircraft of all different plane sizes. That was one of the highlights of our antennae coupler business.

This gets into my career at Lockheed and its predecessors. But, I should add that I left the company in 1959 for a period of years partly because I had an opportunity to form a company with other colleagues from the antennae coupler group. We started a communication company in Minneapolis. However, we were bought out by another company in 1963 that wanted to transfer the division to Dayton, Ohio. I elected not to leave and went back to what was then Remington Rand UNIVAC. Moreover, by that time, the antennae coupler business had declined because we had really stolen several of the members of the design team. A challenge to the company (Univac) and to me was that in the commercial coupler, we had one customer that was very unhappy – Qantas Airlines: every time they flew through a monsoon, the coupler would go out because they'd be struck by lightning and it would destroy some of the sensitive discriminator circuitry. And they were about to go with a competitor. We solved this technical challenge with a very simple fix. We lifted the main transmission line off the circuit board that it was on and this prevented lighting strike from arching over to the board and destroying the circuitry. One of my engineers who helped us solve that was

Ernie Griffith who was on my staff for most of my career, and was instrumental in other activities that I did for the company.

[Didn't this also give you the chance to be one of the first to work with Lockheed, also P-3s, right?](#)

Well, right! I can say prior to the time I came back, our major customer was the Air Force, and our equipment was on Boeing aircraft and their commercial equivalents. But, when I came back, and partly through my colleague salesman Fred Hargesheimer, who was a Lockheed P-38 pilot who had been a military pilot, when the upgrade to the P-3C was announced, they had elected to go to a different antenna system. Prior to that time, they had had a long-wire antenna, but cap antennas were becoming better antennae because they did not cause as much drag on the aircraft. So, this required a different type of antennae coupler, and Remington Rand decided to enter the competition. We beat out the incumbent, which was Collins Radio, one of the primary communications manufacturers in the world, I would say. So, that was very satisfying to me personally, because Collins used every technique. They tried to turn the contract around after Lockheed had awarded even to saying that well, the coupler is just sort of a secondary product of Remington Rand because they're in the computer business, so you're not getting a long-term supplier of your product. But, I think because Remington Rand had performed so well on the computer part of the program, Lockheed disregarded this and we went on to have a major business with the antennae coupler and the P-C3 program, which as far as I know is still going on.

Ultimately, the local division decided that the antennae coupler didn't belong in the computer division. Since the corporation had a lack of business down at the Sperry Marine division in Charlottesville, VA. In 1970, they transferred the antennae coupler down to that division. They went on to continue to supply the coupler to the P-3 and other programs. But, that left me with a career change -- What do I do now? I've been involved in communication projects. Where can I find a role?

Well, it didn't take me long to recognize that I should belong in the interface business, because at that time there were two new initiatives in computer interconnect. A major one was to replace the multi-wire twisted pair-cables with a serial interface. And, following that, to replace that interface with a fiber optic interface. Fiber optic communication was then just becoming a possibility, but our customer the Navy, and particularly two individuals had recognized it. One was Captain Eric Swenson, who wanted to sell Navy products to other countries -- particularly the NATO countries who were far behind the US in developing military computers. There were a lot of direct foreign military sales orders for the UNIVAC hardware to the major NATO countries. And, at that time, the technical side of NATO Navies had started a project to develop this high-speed serial I/O system<sup>i</sup>. Remington Rand received the contract to develop a new high-speed low-level serial I/O system. And, to that extent, members of the Naval side of NATO had a representative on the NATO committees at the time. Briefly, the background of NATO was that there was an industrial program where NATO would award contracts for about 10 or 12 study contracts. Low-level serial was one of those projects, and Harvey Kline served on the committee for about 4-5 years, as did Bill Geiger, and others. But anyway, I had shifted into interconnect system design and my group developed the low-level serial I/O and handed it off to Gary Hokenson's group<sup>ii</sup> for implementation and NTDS.

[Did you see any other technologies where the military was actually leading technologies as opposed to what's happened today?](#)

Well, in my area, they certainly were leaving it in the fiber optics area, and that was my third career actually. I sort of was a natural offshoot to serial I/O because the Naval electronics laboratory was a technology center for fiber-optics. NATO Navies were interested in it as well, so the navy sponsored development of some fiber-optics transmitter and receiver modules. Their initial plan was to have a little module that plugs into a co-axial connector that will do the conversion from

copper conductors to fiber optics and we actually developed a hybrid fiber-optic module that did just that. For a certain period, there were quite a few of these, I'll call them special installations, where we had a plug-in fiber optic module. The primary advantage of this was that you could go very long distances with it, and it was immune to interference and grounding problems. It was very expensive. Ultimately, it became a significant business space for the division and fiber optic interconnect. I was fortunate to have some of the smartest engineers on my staff who knew how to build a product. One was John Kolling who had this hybrid circuit lab, so he was ideally suited to do the circuit design for the fiber optic modules. We developed a reputation in the Navy as one of the best implementers and suppliers of fiber optic hardware.

### What years were these?

Our first fiber optic program was awarded in 1975, and it was a series of development contracts through Naval Electronics Lab, now Naval Ocean systems. Prior to that, the Salt Lake City division of Sperry was involved in covert data links on stealth aircraft. They had a major program in stealth aircraft and they had a requirement for 100 MB internal data bus, and John Kolling developed the fiber optic modules. This was around 1976, so we were one of the first military implementers of fiber optic systems. That program was followed by a major competition for the development of the interconnect system for the ground launch cruise missile. We won the program against two major competitors in the fiber optic business. One was ITT, who even had their own plant in it. Interestingly, a division of Lockheed was another one of the competitors. So, we won that contract and it ultimately resulted in about 100 million dollars of interconnect business. The fiber optics was just a small part of it. There were multiplexors, cables, and fiber optic modules. Anyway this was a unique win because it was the first radiation-resistant production implementation of a fiber optic interconnect system at that time. This program was won in 1979.

### With those technical challenges were you involved in any of the business challenges also in getting the corporation to sign up and support these kind of thoughts?

Absolutely, and on your questionnaire you mentioned disappointments. One of my major disappointments was in the mid-1960s when Boeing announced the development of the 747 aircraft. We were a favored developer of that system and we had the technology to do it. But I was unsuccessful in getting the company to sponsor it, because Boeing wanted the suppliers to pay the upfront costs. It must have been a down period in sponsoring such projects, and they had a controller's division that evaluated the potential return on investment. They should have considered the long-term business opportunity for this product, not just 1-2 years' profitability, but they did not approve of the antennae coupler.

### How about other obstacles, technical obstacles? I know that you had one or two of those, especially in the interface area.

Well, one of the technical problems (and it still exists) in serial transmission systems in using coaxial cable is the interface between the cable and the circuit board. For inexperienced designers, this would cause a lot of noise that would essentially not allow the interface to work. So, that was a technical problem. Not so much with us. As a matter of fact, on another area of the interconnect system is my group's contribution to local area networks, particularly the SHINPADS data bus system. There was a major technical discriminator in that project, which started out as a study contract from Canadian National Defense (CND). They gave an award to two companies. One to Lockheed Canada, which was an in-country company; and the other to us. The challenge was to develop a bus with which the network did not have a single point of failure. Our approach was to have the connection to the primary bus be passive. The alternative approach was a ring bus where

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every connection was an active tap and the signal would be regenerated. Of course, this represented since it was active. A single point of failure. But, I believe that our approach, the passive tap connection, helped us win the program. But it presented a major challenge. One of my engineers Bill Davis, modified the coaxial connector, the key connector to the line that minimized the reflections. He and Ernie Griffith have the basic patent on that connector. That allowed us to put up to 28 connections on the primary bus, meeting that technical challenge.

[Wasn't SHINPADS the first real local area network to be deployed on a Naval combat...?](#)

Yes, and there were complimentary data buses being developed by the US Navy at the time, but the Navy takes a long time to implement new systems. So, the Canadian Navy could do it in a matter of months, because they were very small and didn't have communication problems between all of the different divisions, plus there was a champion of the SHINPADS data bus – Commander Carruthers. At the time, he had a PhD in electrical engineering, and had enough clout with CNL that he was able to get the Ship board integrated display system where everything would be connected to a central bus. The study contract was awarded in 19077 or so, and I think by 1978-9 we had developed the bus. It became, you're right, the first data bus used in a combat data system. How about any other projects through your different companies?

[How about any other projects through you different companies?](#)

I was with the military, Sperry, then Lockheed for 34 years. When I retired from that division in 1991, but because of my NATO work, I continued to serve on the NATO committee, along with Steve Anderson. You were personally involved in this because you sponsored me to continue to serve on the NATO committee during the period, which I did. But then in 1993, that {personal} contract was terminated, but I sort of controlled the {NATO} contract. I went over and worked with Computing Devices for a period of 5 years, and got re-involved with their contribution to the Canadian Patrol Frigate, and the Canadian division built the display system for it. But, I would say as far as impact, that the technology that I worked on was for \$1 billion, and it was announced as not only the largest military program that Sperry had won, but the largest single contract they had ever had, including all of their commercial computers which is somewhat surprising. I would say that the participants in that program made a major contribution to a very successful initiative with a foreign county.

[How about as far as, I know that you became a mentor to, and you mentioned some of them, a great number of people. How about through your career, did you have any mentors?](#)

Absolutely, I sort of always wanted to have a mentor, and the one that I think was the most successful was Jim Herrmann. Jim Herrmann was involved in the initiation of the fiber optic part of the business. And, he developed an equivalent fiber optic passive tap to the electrical systems. Fiber optics have a major disadvantage: every time you want to connect to something, you split the light and quickly lose all the power you have. So, the development of an efficient fiber optic tap became a discriminator. There was a follow on jet aircraft that McDonald Douglas was building that required a fiber optic interconnect system. Jim was instrumental in developing that product. And when he left UNIVAC, he became an entrepreneur in his own right. He was the chief engineer of a company that is developing the last mile for implementing fiber optics in commercial telephone systems. But I've always wanted to nurture a junior engineer, I guess. When I left the company, Jim Herrmann took my place. But there's always been somebody.

Established in 1980 Any other programs or projects you worked on that you're especially proud of besides the SHINPAD system, the fiber optics, and the antennae couplers?

Well, the last part of my career was involved in pursuit of a major program – the F-22 system. We were partnered with McDonald Douglas<sup>iii</sup>, and Lockheed won it. This major initiative involved a fiber optic interconnect system. Some of my people were involved in the initial part of that, but by that time fiber optics had been transferred to a mature design group. Throughout my career, I was associated with advance development. We would go after new study contracts and cultivate the customer. And hopefully get company money to turn these development projects into major programs. I think I was very fortunate, because the three major programs I worked on were technology, but near-term technology, so they all resulted in very successful programs for the company.

Just so you know, your legacy is still going on, because we're providing the fiber optic data bus for the F-35 fighter?

Yes, I was pleasantly surprised about three or four years ago when at our Annual {UNIVAC} Old Timers' meetings they said we still have a major role in fiber optics. Nothing pleases me more to hear that.

Anything else, what have you been doing afterwards, after leaving?

Well, I was fortunate enough to retire very gradually. There was none of this work today and then forget and become retired overnight. So, I officially didn't retire until two years ago after I was five-years with Computing Devices, which was a Control Data derivative. But, General Dynamics bought out Computing Devices, so I took my contract and went over to Lion-Tech Systems in 1997. I continued to work for them on NATO committees until two years ago when I officially decided to retire. So, what have I done since then? Well, I have spent a lot of time doing family history, and became a volunteer for 4-H, looking up distinguished 4-Hers. I have done this because I felt that if you're a distinguished 4-Her, the chances are you've been successful and others were successful. So I researched and found a lot of businessmen who were 4-Hers, and Glen Taylor was a very key example of that because his father was a farmer, and Glen was one of his 6 children. Glen was in 4-H, a 4-H leader. Not only was he an adult leader, but he was a distinguished 4-H adult leader, and so I contacted him and I visited him and he was now retired in Mesa, AZ. I went out to visit him, and of course he told me all about his son, and about 4-H, and I got his father selected as one of the distinguished adult leaders when we were doing the 4-H campaign, the 100-yr 4-H campaign. It was a three-year program. I was initially just a volunteer, but I was surprised when they asked me to be heir co-chairman of their campaign. So, I spent a lot of time on that, and that was fun. I still spend time on it, but the rest of my time is helping run our investment club. I spend a lot of time on investments. I'm the investment chairman and this can take, as you might well know, a lot of your time if you want to be successful.

Well, Marc, thank you very much. I appreciate the time. Thank you.

Good, thank you.

## Epilogue

Shoquist, Marc Chaney age 85, of Edina, was born Feb. 17, 1928 in Scandia and died suddenly but peacefully on Oct. 15, 2013. Marc served his country in the U.S. Navy near the end of during WWII, and was an officer in the U.S. Army Signal Corp during the Korean Conflict. He worked nearly 40 years as an Engineer at Sperry Univac, Alliant Tech, et al' and was a member of several standing NATO committees for 25 years. He was a participant at "the original Geek Squad" luncheons and an article contributor to the VIP Legacy Committee. Marc was a committed volunteer to 4-H, supporter of the DFL and lover of the arts. He was an active alumni of Macalester College and the University of MN. For 4 decades, he was the investment committee chair of a local Growth Stock Investment Club.

I enjoyed interfacing with Marc on a variety of projects during my own career at UNIVAC/Sperry/UNISYS. Also as a member of the Growth Stock Investment Club, at the Geek Squad luncheons, and lastly during the IT Legacy Committee initiatives including eight contributions to our web site anthology.

Bless you Marc, may you rest in peace knowing that your parts of our IT Legacy are well documented for future researchers and historians.

*Lowell A. Benson*

### Editor's end notes:

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<sup>i1</sup>.Now the MIL-STD-1397 Type D serial interface.

<sup>2</sup> Marc's memory had faded at the interview time. The Low-level serial technology, along with engineer Ken Graber, transferred to Lowell Benson's support engineering group. That group created the Low-level serial interface hardware for the AN/UYK-7 and AN/UYK-20 computers. These two projects created printed circuit cards with the aforementioned hybrid circuits and I/O chassis mechanical connectors. Also, they used the AN/UYK-7 printed circuit cards to effect Low-level I/O for the RD-358 magnetic tape units in cooperation with Salt Lake City engineering/manufacturing operations.

<sup>iii</sup> There was a fly-off competition for a stealth fighter plane; Northrup developing the F-23 and Lockheed developing the F-22. The Joint Integrated Avionics Working Group was trying to refine specifications and requirements to facilitate common electronics between these aircraft as well as two competitive helicopter projects. We were teamed with Northrup for the YF-23 electronics. At the same time, McDonnell Douglas was working on a classified aircraft program, not the YF-22 nor the F-23. During the JAIWG's three years; I, Lowell, represented our Northrup prime on 13 of the 20 technical area working groups. When Lockheed was awarded the F-22 - the F-23 participants were read out of the groups thus to this day, I don't know the results of the McDonnell Douglas 'Black' development.