

Realization of a Dream

From ERA to Lockheed Martin: Minnesota's Computer Industry

Introduction

On 13 August 2013, 50+ VIP Club members and Dakota County Historical Society (DCHS) board members previewed a new exhibit at the DCHS Lawshe Museum in South St. Paul, MN. The August 14th exhibit opening is a major milestone in the Information Technology (IT) Legacy initiative of the Club and our sponsor companies.

Harvey Taipale wrote¹: "In late 2005, Lockheed Martin Corporate, motivated by the realization that their current company was created from over 20 predecessors, asked the various operating units to "capture their legacy" without a real concept of what was to follow. In Eagan, Ole (Dick) Olson was tasked to respond; he formed an ad hoc group of volunteers and contacted the VIP Club Board. The group quickly realized that the history of Engineering Research Associates (ERA), continuing to the present, was a remarkable story of technological innovation and contribution to the computer industry in general and to Minnesota in particular. ***This story, particularly the early years, has never really been completely told; e.g. ATHENA missile launch computer.***" At that October 2005 Club board meeting, Lowell Benson volunteered to co-chair an IT Legacy Committee with Ole; Dick Lundgren said that he'd help. The IT Legacy Committee quickly defined three objectives:

1. **Capture** whatever remaining material and information we can,
2. **Catalog and archive** all the material collected, and
3. **Publish/publicize** our history and heritage in a way that interests others within our industry and our fellow Minnesotans.

Ole began soliciting career summaries and artifacts; Dick contacted the Charles Babbage Institute at the U of MN for 'catalogue & archive' advice; and Lowell began web site publicizing. During the ensuing eight years, over 300 volunteers have contributed their time, documents, articles, and artifacts. Ole retired in 2008 – John Westergren became the committee co-chair at LMCO.

When Lockheed Martin announced their Eagan facility closing in 2010 - Bernie Jansen², on behalf of the committee, asked the DCHS to become the permanent repository of our Legacy artifacts plus to do an exhibit of our IT Legacy. Chad Roberts, then the DCHS Executive Director, toured the Eagan plant with John; understood the significance of this part of Minnesota's history; then set up the DCHS exhibit vision as an educational, historical presentation. Thanks to him and to all of our volunteers who keep supporting our committee objectives and 'dream' of telling the story.



¹ <http://vipclubmn.org/Articles/LegacyArticleRev4.pdf>, published on the web November 2007.

² Bernard Jansen is a DCHS Board Trustee, VIP Club Member Emeritus, and an IT Legacy Committee member.

Established in 1980

Lawshe Museum Exhibit

The snapshot³ below shows the main Lawshe Museum display hall. The floor of this space is painted with a topographic layout of Dakota County, showing roads, lakes, and rivers. The exhibit preview was at a wine and cheese social hosted by the museum for the VIP Club. The exhibits themselves are distributed around the room's periphery – they consist of explanatory storyboards, various configurations of the AN/UYQ-70 workstations, and several smaller artifacts in display cases.



Our Club's October newsletter included people snapshots. A few people to note in this photo:

- In the bottom center is 2013 Club President, Bob 'RC' Hanson talking with Dick Lundgren.
- Standing at the left center looking right are Club Treasurer Harvey Taipale, Club Director John Westergren, and Ghis Devlaminck. Harvey has been leading the photo identification initiatives of the Legacy committee for 4 years. John coordinated the artifact and document shipments from LMCO to the museum before he retired from LMCO in December 2012.
- At the right bottom is Millie Gignac; the VIP Club founder, the first female director at Sperry, a DCHS Board Trustee, a VIP Club Member Emeritus, and a very active nonagenarian.

³ Bernie Jansen and Keith Myhre took most of the photos used in this paper.

The Museum exhibit hall entryway Poster introduces the exhibit topic.

**From ERA to Lockheed Martin:
Minnesota's Computer Industry**

Most of the history of computers is focused on the contributions from Silicon Valley in California, but Minnesota also played an integral role in the computer industry; so much so that it could be considered the "Silicon Valley" of the 1940s, 50s, and 60s.

Minnesota's legacy in the computer industry began with Engineering Research Associates Inc. (ERA) which was founded in 1946. The legacy continued with ERA's successor companies, which include: Remington Rand, Univac, Sperry, Unisys, and Lockheed Martin. Over the years, the corporate name of the company and the name of its Twin Cities branch changed many times, but its ingenuity endured. These companies had a vital presence in the computer and defense industries.

In 2010, Lockheed Martin announced that it would cease almost all Minnesota operations by the end of 2012, including its facility in Eagan in Dakota County. This marked the end of an era for Minnesota's innovation in the computer industry.

With the closure of the Eagan facility, a large collection of artifacts – representing the company's legacy – was donated to the Dakota County Historical Society. The collection contains objects from the 1940s up to the present day covering all time periods in Lockheed Martin's history. There are archival records for once top-secret projects, naval computer workstations, pictures of early computer production, a Japanese airplane computer, and many other artifacts.

You can see some of these artifacts displayed in the great hall and learn about the history of these companies on the accompanying reading rails.

We are honored to be able to help preserve this legacy of innovation through the preservation of these artifacts and the presentation of this exhibit.

Established in 1980

Below, in this case on the left is a type 1824 computer model designed for missile applications. In the center is a desk set given to Don Weidenbach when he retired after 30 years in 1976. This desk set has a vacuum tube from the file computer and a transistor module from the Athena computer, Don had worked on both of these computers.



This photo at the left shows three variations of the AN/UYQ-70 workstation with embedded micro-processor units. The Q-70 is the 4th generation Naval Tactical Data Systems⁴ (NTDS) standard computer.

⁴"When Computers Went to Sea - The Digitization of the United States Navy", By Capt. David Boslaugh, USN Ret. relates the early story of NTDS.

Established in 1980

The Q-70 embedded computer units shown below began with a proposal in the fall of 1993. I, Lowell Benson, wrote the embedded processor section of that proposal before leaving UNISYS in February of 1994.



Before the Q-70, the first NTDS digital computer was the AN/USQ-17 delivered in 1958; six were built (three in a horizontal configuration and three in a vertical configuration.) In 1960 the first of the 17 'service test' AN/USQ-20/CP642 computers was delivered. In the fall of 1961, the first of 142 CP642A computers was delivered. In February 1963 the first of the 241 AN/USQ-20B/CP642B computers was delivered. On April 21, 1969 we delivered the first of over 3,000 AN/UYK-7 processor units. On May 27th, 1983 we were awarded the AN/UYK-43 production contract.



In March of 2011, the Navy and Lockheed Martin had publicized the delivery of the NTDS AN/UYQ-70 S/N 8000 to go aboard the submarine SSN783. (Two photos from an LMCO press release.)

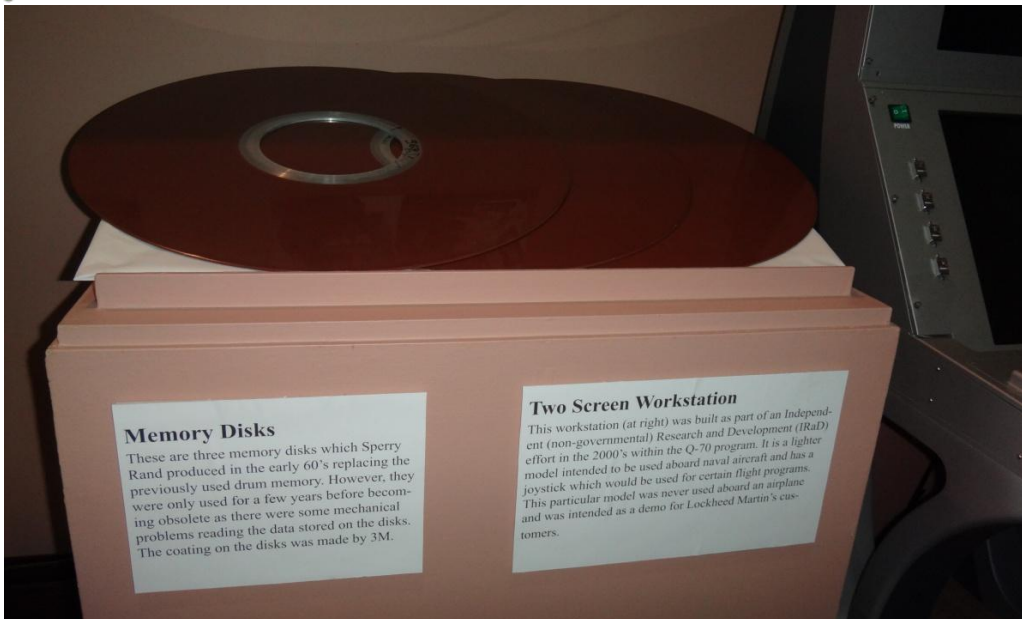


In September of 2013, 55 years after the first NTDS unit, the Navy announced the launch of the USS Minnesota, the 3rd ship to bear our state's name. [Trivia: For 25+ years the Eagan plant atrium displayed the ship's bell from the second USS Minnesota, now in the submarine. The local Navy League chapter had facilitated saving the bell!]

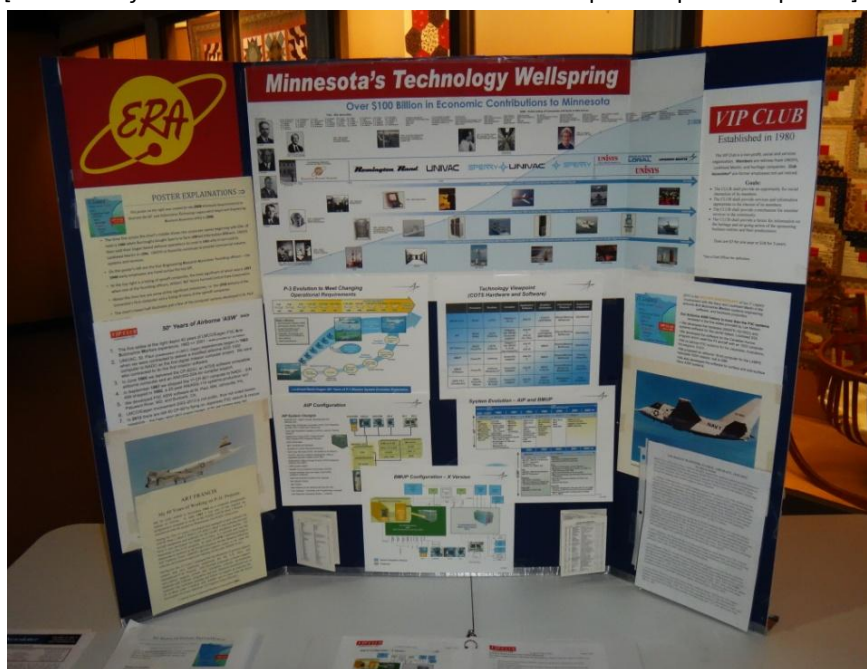
There have been thousands of MN engineers, programmers, assemblers, technicians, instructors, sailors, et al. who have been part of this NTDS history.

Established in 1980

This display stand (right) has Memory Disk artifacts from the early 60's. The display stand also has a storyboard describing the adjacent NTDS Q-70 two screen workstation.




At the left is the CP-2044 computer donated from the Clearwater, FL factory. This unit represents our extended history of airborne computer systems since 1963. This unit was designed in the early 90's with embedded microprocessors to replace the CP-901 computers aboard the Lockheed P-3C. The Club's portable display below provided details of that history⁵, shown previously at the Club's annual picnic. [The 'Hunt for Red October' movie made the P-3C plane's prowess public.]



⁵ <http://vipclubmn.org/Articles/OceanSurveillance.pdf> published on the web August 2013.

It is most appropriate to recognize the founders of ERA, including Bill Norris who also founded CDC.

ERA: The Genesis of Minnesota's Computer Industry



The computer industry in Minnesota has its roots in the Engineering Research Associates Inc. (ERA) which was founded in January of 1946 in St. Paul MN. ERA Inc. was the genesis for the Minnesota company which served as a subsidiary of Sperry Rand, Unisys, and Lockheed Martin among others.

Many of the company's founders and first employees had worked in naval intelligence in WWII and had been a part of the Communications Supplementary Activity - Washington (CSAW) in Washington D.C. This was a high security clearance group in charge of code breaking activities during the war. They all had backgrounds in engineering and mathematics.

Looking to keep this unique group of individuals together after the war - a number of people including William Norris and Howard Engstrom suggested that they form a private company which could serve as a government contractor.



With their specialized knowledge of engineering and naval intelligence, they were well equipped to provide for the security needs of the US Navy.

After receiving approval from top naval officials, they set out to find funding for the proposed company.

The man they turned to was John Parker (left), who was the president of the Northwest Aeronautical Corporation (NAC) in St. Paul. During the war, his company had manufactured wooden gliders for the military.

Parker, who served as ERA's first president, provided the necessary manufacturing facilities as well as business connections which furnished them with contracts in the aviation industry in addition to their military ones.

By February of 1946 ERA had already secured its first contract with the US Navy and was well on its way to making its mark on the computer industry.

William Norris (left) served as ERA's vice president of engineering and research. Later, he became the CEO of Control Data.

Howard Engstrom (right) served as ERA's executive vice president. He had a Ph.D. in mathematics from Yale.

Pictures from Computers and Commerce by Arthur L. Norberg

ERA held the patents on Magnetic Drum memory, the grandfather of today's PC hard drives.

Magnetic Memory and the First Computers: ERA 1948 - 1955

One of ERA's first initiatives was to develop better methods of storing data. After conducting a survey of the different technologies available, the company developed a new method of storage using a magnetic drum. It allowed them to record, read, search, and alter data. The project was classified and codenamed Goldberg. This machine, although completed in 1948, was not delivered until 1951 because of the success of another ERA project codenamed Demon which used the same technology.

Remington Rand


In 1950 ERA developed a general purpose machine called Atlas; this was one of the first universal computers. Earlier machines had vast calculating powers but were not capable of completing other tasks. This machine could be programmed to complete more than one kind of task. After receiving permission from the US Navy, the company made a commercial version of Atlas named the ERA 1101 (left).

Computers use the binary system in which all things are expressed in 1s and 0s. Although most people are more familiar with the decimal system (which uses 10 as a base), the binary system has significant engineering advantages.

Because the Atlas was the 13th item on ERA's Navy contract, the commercial version was named the 1101 which is binary for 13.

In 1952 Remington Rand - a typewriter and calculator company based out of Connecticut - purchased ERA. Remington Rand also owned the Eckert Mauchly Computer Company, the developers of the ENIAC (Electronic Numerical Integrator and Calculator) which today is recognized as the world's first general purpose computer.

In 1953 ERA announced the 1103. This computer, a commercial version of the Atlas II, was an immediate success and the company ended up selling roughly 20 units in the following years.



Remington Rand also had great commercial success with an airplane antenna coupler (left). The coupler accounted for over 25% of their sales in the mid-1950s.

Later, ERA's name was changed to UNIVAC which stands for Universal Automatic Computer. Then in 1955 Remington Rand merged with Sperry Corporation (a gyroscope company founded by inventor and scientist Elmer Sperry) and became Sperry Rand.

Established in 1980

This display podium shows the AN/UYK-44 Navy computer along with some identifying text. It describes this 16-bit computer as a replacement for the earlier AN/UYK-20 computer. As we continue to develop the museum exhibit, we do need volunteers to develop story boards for the other equipments yet in the museum basement storage area.

Just below is a 'lab coat' donated by one of the UNIVAC quality control inspectors! Over the decades we had thousands of assembly line workers in St. Paul before transitioning most manufacturing operations out of state.



One of the fun parts of the IT Legacy committee has been the reminiscing about various projects as retirees have donated their project souvenirs, note in the display case at the left is an 'Iranian Operations' ash tray. Before the downfall of the Shah, we were working on a Navy System for four new Iranian destroyers. That was just one of dozens of projects we did internationally via the Navy's Foreign Military Sales authorizations.

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The Airborne Battlefield Command and Control Center (ABCCC) display is a donated model and associated photos. This C-130E model is a nice representation of an airborne system, initially deployed during the Desert Storm battles in the 90's. There is more about ABCCC at <http://vipclubmn.org/sysairborne.html#ABCCC>.



Epilogue

The Lawshe Museum isn't the only site of our IT Legacy information. Several palettes of document boxes were shipped to the Charles Babbage Institute at the University of Minnesota. Detailed cataloguing of those is underway. In St. Paul, the original ERA prototype drum is currently on display in the Greatest Generation Exhibit at the Minnesota History Center. We also put some Legacy documents into the MN sesquicentennial time-capsule to be opened for the 2058 MN bicentennial.



The exhibit at Lawshe Museum focuses on the defense industry aspects of our IT Legacy. There are many commercial computer aspects of the ERA to UNIVAC to Sperry to **Unisys** history in Minnesota which are only partially covered within our web site anthologies, <http://vipclubmn.org>. Over a dozen shadow boxes⁶ showing the 1100 computer series technologies from the 1950s to the 90s are in a hallway in the **Unisys**, Roseville plant.

We still have quite a bit of work to do - thousands of photos yet to be identified and catalogued; equipment stories to written; project relationships to write; and programs to be written for some of the Q-70 workstations to provide dynamic educational scenarios and interaction with visitors at the Lawshe Museum.

Personally, I'm looking forward to getting the Desert Hawk artifact displayed. Yes, the rugged design of the electronics and operational software for that drone was done in the Eagan plant.

Author: LABenson; UNIVAC 1960 => UNISYS 1994, U of MN BEE '66 with editing help by Bernie, Dick, and John.

⁶ <http://vipclubmn.org/Articles/ATLASevolution.pdf> published on the web August 2012.