Artifacts on Display

[1]Keith Myhre and Lowell Benson, Unisys Defense Systems retirees.

INTRODUCTION

In March 2021, the Dakota County Board of Commissioners approved a $1.2M project for 2022 ADA accessibility improvements to the Lawshe Memorial Museum in S. St. Paul, MN. Thus, it is now appropriate to summarize what visitors can see there and quite likely will visit again in future years. [See https://www.dakotahistory.org/lawshe-memorial-museum for visiting hours.]

The Lawshe Memorial Museum has an extensive collection of computer industry hardware artifacts that were developed (engineered and/or manufactured) in the Twin Cities. State of Minnesota Legacy grants and volunteers have generated 16 story boards that explain some high-lights of Minnesota's 75-year computer legacy that began in 1946 at Engineering Research Associates (ERA), continuing yet today at Unisys!

The museum is part of the Dakota County Historical Society (DCHS), that in 2012 agreed to establish a permanent display of the Information Technology artifacts that were temporarily stored at Lockheed Martin (LMCO) in Eagan. LMCO closed their Eagan facility in 2012, an Eagan Unisys 'branch office' of engineering and services is yet in operation at 3199 Pilot Knob Road.

Picture 1. The museum's Great Hall floor has a map of Dakota County, the hall periphery has display items.

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[1] Keith took the snapshots and reviewed text for accuracy; Lowell wrote and formatted text for the web.

BACKGROUND

The on-display artifacts were collected by volunteers from the local VIP Club; retirees of Unisys, Lockheed Martin (LMCO), and their heritage companies as illustrated by this corporate lineage icon. In 2005 retirees formed a legacy committee to begin collecting artifacts, documents, and photos. Since 2012, club volunteers have been cataloguing the artifacts and photographs at five museum workstations. LMCO donated the workstation computers while a legacy grant provided scanning equipment and database storage equipment. In addition to the artifact displays at the museum, the VIP Club has a legacy anthology - http://vipclubmn.org/Legacy.html. The anthology and this article are *Wikipedia* like in that they have a plethora of links to detail information and relevant web story chapters and articles.

STORYBOARDS ON DISPLAY

In 2020 the museum staff received a grant to put informational storyboards behind plexiglass.

Picture 2. Les Nelson and Bob Pagac are Tuesday morning volunteers, both Lockheed Martin retirees.

Picture 3. Eight of the 16 story boards are in two great room corners. Andrew Fox, then DCHS employee, was the principal creator.

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The bottom center of the right story board has four logos: 1) Clean Water Land & Legacy Amendment, 2) Minnesota Historical & Cultural Grants, 3) the VIP Club, and 4) Dakota County Historical Society – sponsors and creators of the ERA spawned history highlights.

Adjacent to the logos is the text: "The exhibit was produced by the Dakota County Historical Society and funded by the people of Minnesota through a grant funded by Minnesota Arts and Cultural Heritage Fund. Special thanks goes to the many company retirees in the VIP Club whose help with this project was essential to its success."

The Birth of Minnesota's Computer Industry

Minnesota's computer industry is not a story widely known, and until recently, not widely told. It had its humble beginnings in a company named Engineering Research Associates (ERA), founded in 1946 in St. Paul. Over the years, the company grew, changed names, was bought and sold, and eventually closed up shop.

In its time it was the source of great innovation, brilliant minds, and many dedicated hands. Through their labor they powered naval ships and submarines, sent rockets into space, landed countless commercial airplanes, and predicted the weather.

This exhibit tells the story of ERA and its many successor companies, their many products and systems, and the profound impact they have had on the economy of Minnesota, and the United States.

Above: An ERA representative at a trade show in the early 1950s. Many of the company's products were produced for the U.S. Military and were classified, completely unknown to the public until years later.

You can say quite confidently that the computer industry has its roots in two places in the world, Philadelphia and here (Twin Cities).

Dr. Thomas Misa
Director, Charles
Babbage Institute

From a St. Paul Pioneer Press article 1/3/10

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Land of 10,000 Engineers:
UNIVAC and the University of Minnesota

In the early days of ERA, most of the engineers the company hired were graduates of the University of Minnesota. Over the years, UNIVAC and other Minnesota tech companies continued to stay connected with the University in what remained a mutually beneficial relationship.

Right: Erwin Tomash and Dr. Arnold Cohen (L to R) both joined ERA in 1946. Tomash was a 1943 graduate of the University of Minnesota and Cohen was and later served as the associate dean in the U of M school of engineering.

Keeping up with the times, the University purchased their first digital computer in 1957. Having first contemplated purchasing an IBM computer, they bought a UNIVAC 1103 for a bargain $250,000. This state-of-the-art machine helped spur on the field of computer science at the University which they later established as a formal department in 1970.

Right: A picture showing the construction of the Computer Science building at the University of Minnesota in the mid-1990s. Prior to the establishment of Computer Science as a field, many of UNIVAC's employees were graduates of the U's Electrical Engineering School.

Some of the company's early hires from the University went on to become leaders in Minnesota's computing industry, and for a few, industry giants. Seymour Cray, an alumnus, is widely regarded as a pioneer in the industry. Known for his genius in designing computers, he later founded Cray Research and built supercomputers. The U acquired a Cray-1 computer in 1981.

Today the legacy still remains. Several endowed chairs, one named for William Norris (who later founded Control Data), bear the names of important individuals and companies in Minnesota's tech industry. The University also houses the Charles Babbage Institute, dedicated to preserving the world-wide history of the IT field.

Below: A continuation of their 1100 computer series, UNIVAC rebranded an upgraded 1103 computer as the "UNIVAC Scientific." Its commercial successors, the 2200 series from Unisys, continued into the 1990s.

We took virtually the whole class of 1950 and '51 out of the electrical engineering school.

Erwin Tomash
ERA Employee

From a 5/11/1983 oral history interview from the Charles Babbage Institute.

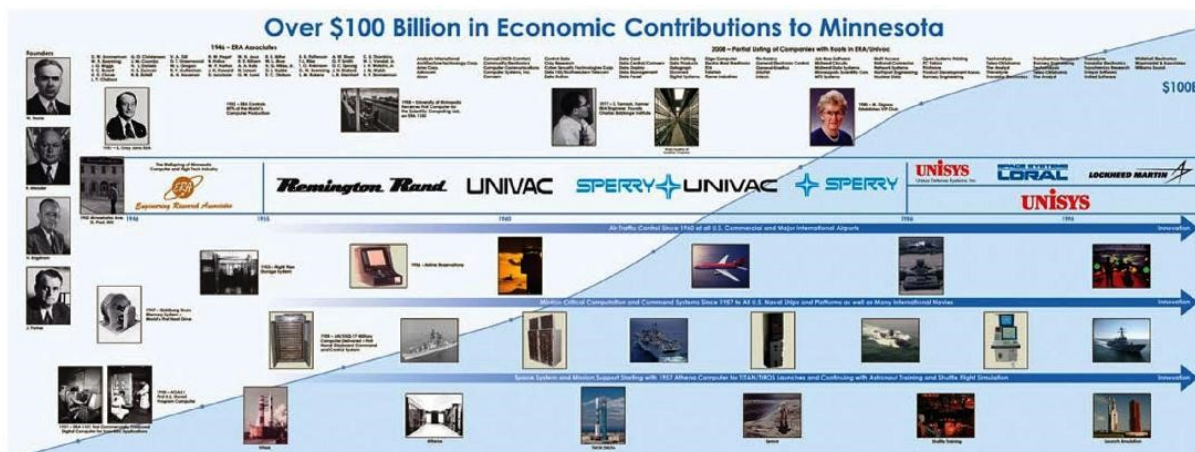*Picture 4. Each history storyboard is 4' high and 1.5' wide.*

Erwin Tomash, blue citation at the left, is the 'credited' founder of the Charles Babbage Institute (CBI) at the University of Minnesota. In the blue above, Dr. Thomas Misa was the Club's legacy advisor from 2007 to 2018. Appropriately, the CBI Director holds the **E**ngineering **R**esearch **A**ssociates Land Grant Chair for the History of Technology.

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Sixteen story boards at the museum are linked hereunder:

1. The Birth of Minnesota's Computer Industry, http://vipclubmn.org/EngDocImg/1.%20Exhibit%20Intro.pdf.
2. An Unlikely Birthplace: The Founding of Engineering Research Associates, http://vipclubmn.org/EngDocImg/2.%20An%20Unlikely%20Birthplace.pdf.
3. "Silicon Prairie" and the World's First Computers, http://vipclubmn.org/EngDocImg/3.%20Silicon%20Prairie.pdf.
4. Land of 10,000 Engineers: UNIVAC and the University of Minnesota, http://vipclubmn.org/EngDocImg/4.%20U%20of%20M.pdf .
5. Intercontinental Ballistic Missiles, Satellites & UNIVAC's Athena Computer, http://vipclubmn.org/EngDocImg/5.%20Athena%20Computer.pdf .
6. Across the Pacific and Back: UNIVAC Commercial Products, http://vipclubmn.org/EngDocImg/6.%20Univac%20Commercial%20Products.pdf.
7. ERA, UNIVAC & Beyond: An Expanding Minnesota Presence, http://vipclubmn.org/EngDocImg/7.%20ERA,%20UNIVAC%20&%20Beyond.pdf .
8. Punch Cards and MAPPER: The Evolution of Software, http://vipclubmn.org/EngDocImg/8.%20Software.pdf .
9. Computers at Sea: The Naval Tactical Data System, http://vipclubmn.org/EngDocImg/9.%20Computers%20At%20Sea.pdf.
10. Landing Planes for 40 Years: Air Traffic Control (ATC), http://vipclubmn.org/EngDocImg/10.%20ATC.pdf.
11. From Sea to Sky: Anti-Submarine Warfare and Ocean Surveillance, http://vipclubmn.org/EngDocImg/11.%20From%20Sea%20to%20Sky.pdf.
12. Nuclear Secrets, The B-2 bomber & The End of The Cold War, http://vipclubmn.org/EngDocImg/12.%20Nuclear%20Secrets,%20B-2.pdf.
13. Silicon and high Standards: Sperry's foray into Semiconductors, http://vipclubmn.org/EngDocImg/13.%20Semiconductors.pdf.
14. Radar, Hurricanes & Unisys on the Evening Weather Report, http://vipclubmn.org/EngDocImg/14.%20NEXRAD.pdf.
15. The Enduring Legacy of the Naval Tactical Data System, http://vipclubmn.org/EngDocImg/15.%20Q-70.pdf.
16. The End of an Era: Lockheed Martin Closes its Eagan Plant, http://vipclubmn.org/EngDocImg/16.%20Exhibit%20Conclusion.pdf.

Since 1946, ERA and 60+ 'spin-offs' http://vipclubmn.org/Spinoffs.html have benefitted the state.

Picture 5. An 8' wide poster shows corporate name chronology from 1946 to 2008. Poster was created by the VIP Club Sesquicentennial Team and produced by LMCO as MN celebrated 150 years of statehood.

HARDWARE ARTIFACT EXHIBIT STOPS
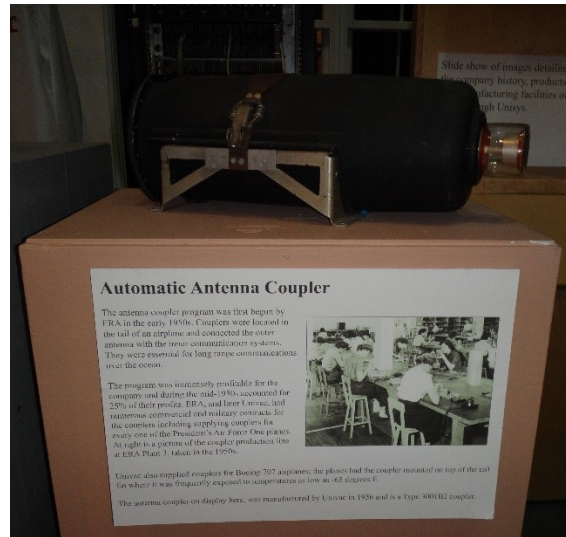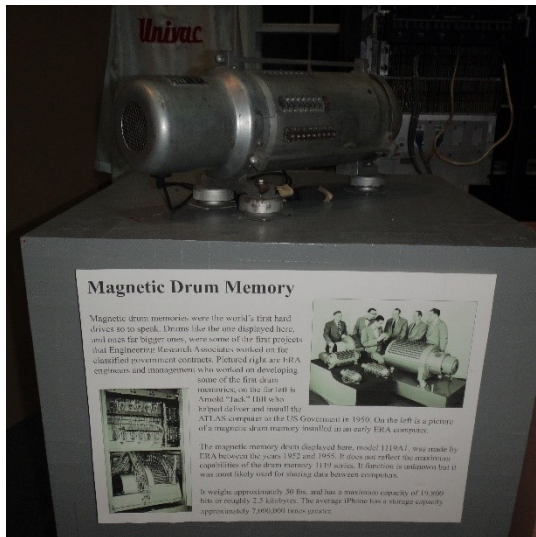
Picture 6. Drum memories were the world's first computer hard drive, invented and patented by ERA circa 1947.
Picture 7. Antenna couplers provided jet aircraft with radio signal technology for long range communications.

Corporations often recognize employee anniversaries with a token of appreciation. VIP Club founder, Millie Gignac donated her 25-year clock and 30-year onyx/diamond ring to the Legacy committee. Then the committee donated these 'human resources' history items to the museum. In retirement, Millie had served on the Dakota County Historical Society Board of Directors.
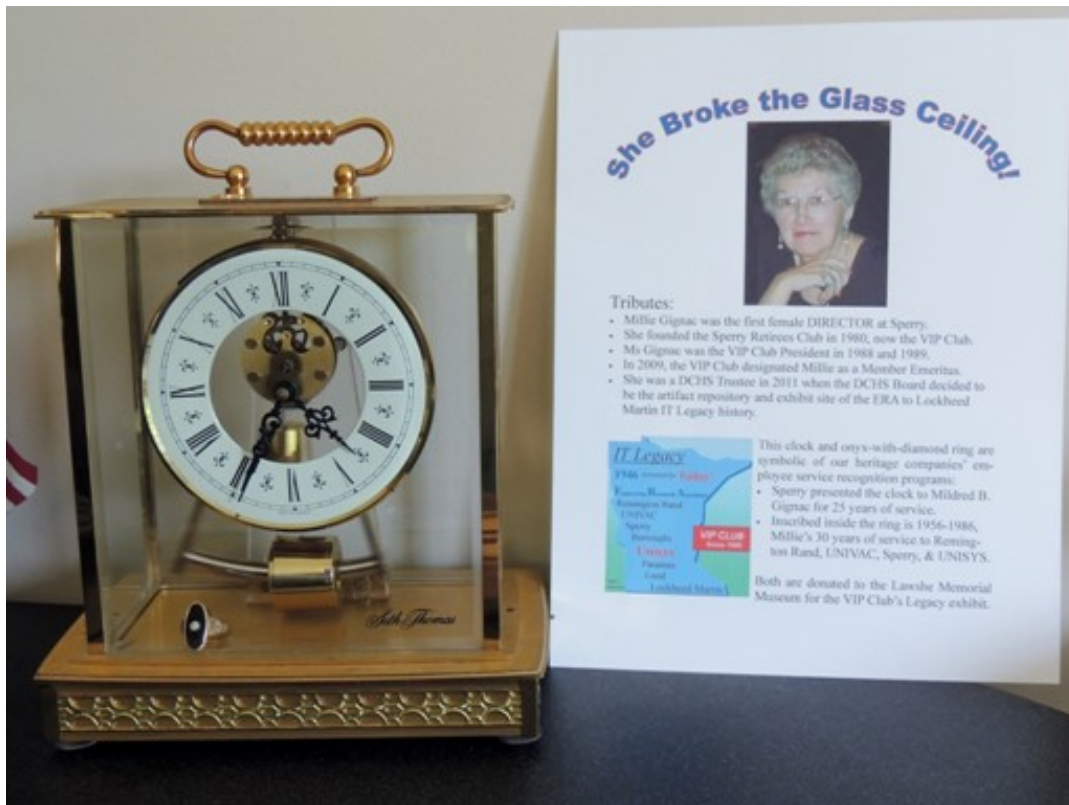
Picture 8. Millie celebrated her 99th birthday on October 22nd, 2020.

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In the 80's Sperry engineers developed the (silicon) Micro-1100 computer chip set. Carl Johnson, the development project engineer, donated this poster board and wafer set to the museum for exhibition. The chip sets were manufactured in Eagan, MN until Burroughs bought Sperry in '86 to form Unisys then closed that facility in 1988.

Picture 9. Each silicon wafer had 63 die, 1.25-micron lithography.

[The almost Silicon Valley](#)" by Tom Webb (St. Paul Pioneer Press, Sunday 1-2-2010), related 60 years of ERA's Minnesota history in St. Paul!
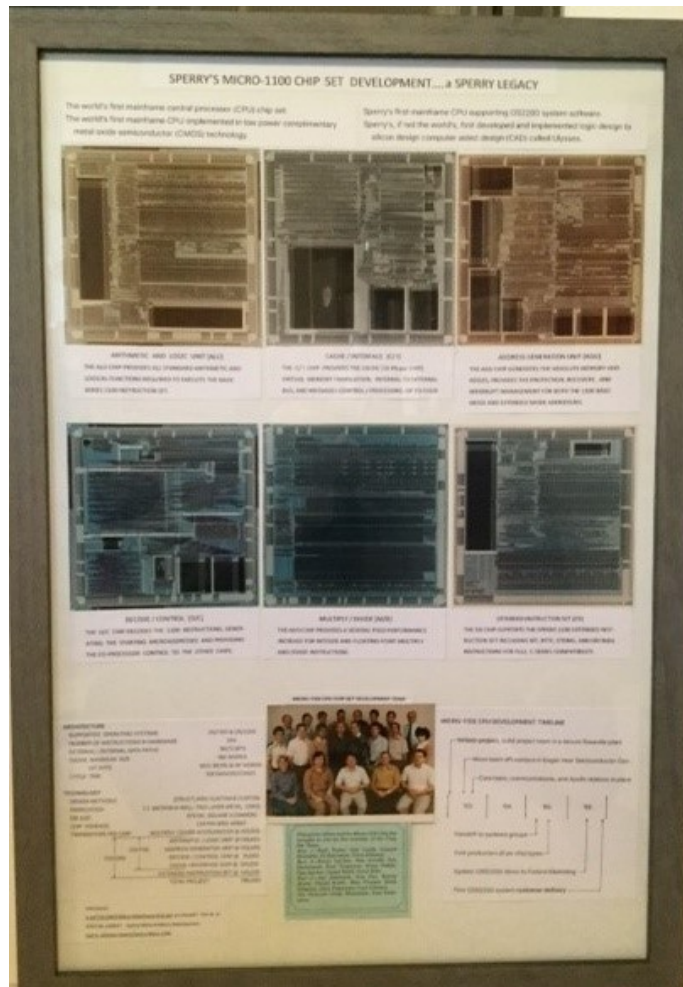
Picture 10. Designed in Eagan in the mid-90's, the AN/UYQ-70 is the Navy's 5th generation computer system. These multi-screen demonstration units were donated by LMCO. Thanks to Legacy Committee Co-chair John Westergren.

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Computer Circuit Generations: Vacuum Tubes - 1st, Transistors - 2nd, Integrated circuits - 3rd, Gate Arrays and custom silicon 'chips' - 4th, and Embedded Micro-processors - 5th.

Picture 11. Single screen AN/UYQ-70 configuration.

Picture 12. AN/UYK-43, US Navy's fourth generation standard computer for combat information centers, floor space is the same as the predecessor AN/UYK-7. On indefinite loan from U.S. Navy.
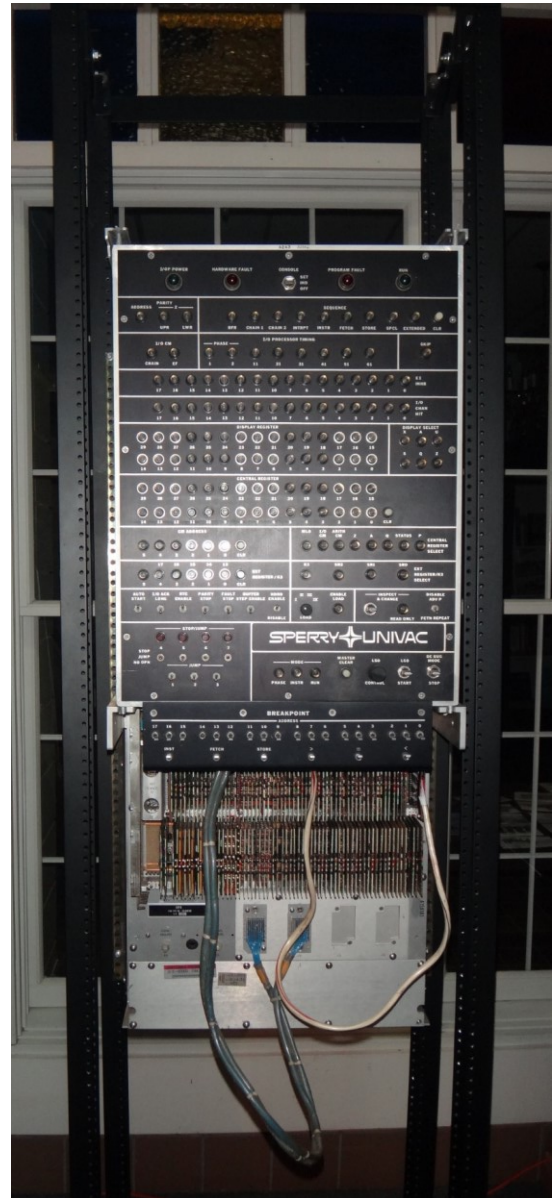
Picture 13. FAA's tower control computer: IOPs in service from 9/29/1971 'til 6/4/2011, see 40-year history at http://vipclubmn.org/aircontrol.html.

The FAA had two air traffic control system test sites, Atlantic City, NJ and Minneapolis, MN. UNIVAC/Sperry/Unisys/LMCO engineers and programmers spent many hours at both sites.

Picture 15. AN/USQ-69, the Navy's shipboard 'Personal Computer' developed by Sperry for NAVELEX in the 70's, also on indefinite loan from the U.S. Navy.

Picture 14. The CP-2044 is the P-3C's central computer, used for Japanese search and rescue missions after Navy ASW, see http://vipclubmn.org/sysairborne.html. Donated from the LMCO Clearwater, FL facility.
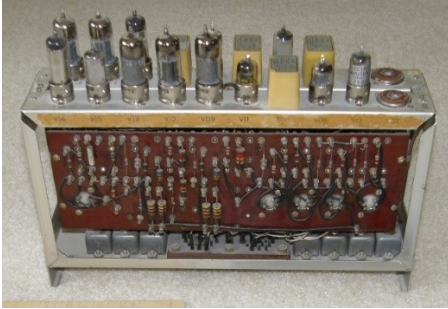
Picture 16. AN/UYK-44, the Navy's 4th generation small scale shipboard digital computer, designed in Minnesota then manufactured at the Clearwater, FL facility.

FUTURE DISPLAYS

Larry Bolton, LMCO retiree, catalogued over 200 printed circuit cards from three generations of digital computers; definitions are listed at http://vipclubmn.org/Artifacts.html#PCcards.   At the right is an example of one that used integrated circuits.

<u>Yet to be exhibited, six items below need display posters</u>.

Printed circuit card, 56-pin of the type used in the CP-901, AN/UYK-7, and AN/UYK-8. Manufactured by UNIVAC the 46th week of 196_ This card type holds twenty 14-pin Small Scale Integration (SSI) flat-pac circuits. Donated by Mike Bukovich.
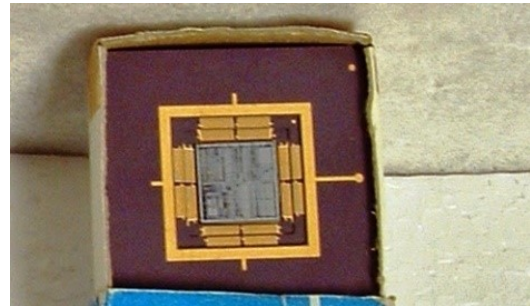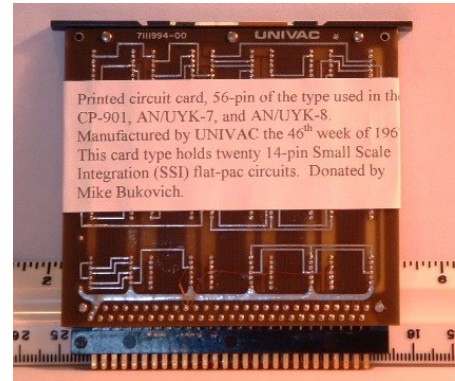

Picture 17. An ERA 1102 Arithmetic logic module circa 1952, donated by ERA engineer, designer James Wright.

Picture 20. Radiation hardened 32-bit microprocessor chip - developed in 1987, an SDI project sponsored by the CIA. Donated by program manager Lowell A. Benson.

Picture 18. A missile 'onboard' guidance computer, UNIVAC type 1824 designed and built for the AF in the late 60s.

Picture 21. Two suitcase portable computers, circa 1975. These booted and operated from floppy discs.

Picture 19. NTDS 2nd & 3rd generation scale models, 1" = 1', refurbished by LMCO retiree John Westergren.

Picture 22. Electronics for the Desert Hawk *surveillance drone were developed at the LMCO Eagan plant. We have a 'spare parts unit' in storage, donated by LMCO.*

And several more not photographed yet.

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EARLIER MUSEUM ASSOCIATED PUBLICATIONS:

1. **2012 #175**, December: **Legacy - Preservation Sites** as presented by Bernie Jansen at the Nov. 16th Unihogs luncheon.

2. **2013 #185**, October: **Realization of a Dream** - The 1st report about our Legacy exhibit at the DCHS Lawshe Museum by Lowell Benson with editing by Bernie Jansen, John Westergren, and Dick Lundgren plus photos by Keith Myhre.

3. **2014 #200**, November: Two articles for this month from Lawshe Memorial Museum employees. First, a report on '**Accessioning in View**' by Andrew Fox and then #199, **LMCO volunteerism** by Sally Anderson. These were extracted from a recent publication by Club Member Emeritus, Bernie Jansen. Posted "Courtesy of Dakota County Historical Society".

4. **2015 #208**, May: **Legacy Preservation Partnerships**. Lowell Benson's paper describes Club partnerships with our hosts, the Charles Babbage Institute (CBI) and the Dakota County Historical Society.

5. **2016 #220**, April: This web site article is a paper listing the artifacts transferred from Lowell's temporary basement repository to the **Lawshe Museum** in July 2015. Each item illustrates or describes bits and pieces of our extensive Information Technology history.

6. **2017 #230**, May: Listing of **documents and pictures** now archived at the Charles Babbage Institute and the Lawshe Memorial Museum. This paper includes a summary of the Sperry-UNISYS Photo Club history, available at the museum for researchers.

7. **2017 #233**, August: **Through the Ages** - A handout developed for visitors at the 13 Sept. Open House and Legacy Exhibit at Unisys in Eagan, the 16 storyboards were. borrowed for this event.

8. **2019 #261**, November: **Micro-1100**, Carl Johnson donated two displays to the Lawshe Memorial Museum, the 1980's development of this VLSI chip set that became the UNISYS 2200 product line core.

9. **2020 #272**, October: Volunteers' **Initiative status** update; cataloging Legacy Artifacts at the Lawshe Memorial Museum, by Keith Myhre.

- https://www.youtube.com/watch?v=WbfCJZXxvw4 used some museum archived photos (18 m.)
- Minnesota's computing history web site is http://mncomputinghistory.com. Many of the photos therein were curated from the Lawshe Memorial Museum by Keith Myhre.
- View a TPT documentary produced in partnership with the Minnesota High Tech Association (MHTA). Several of the scenes were filmed at the museum.   Live stream from (58 min.): https://www.tpt.org/solid-state/video/solid-state-minnesotas-high-tech-history-35848/.

EPILOGUE

The Club has hosted two private *Wine and Cheese* open houses for Club members and museum staff in the great hall. Our club newsletter social activity reports of those events are http://vipclubmn.org/Newsletters/Enews1510.pdf and http://vipclubmn.org/Newsletters/Enews1811.pdf.

When handicapped accessibility improvement features are completed – we will celebrate again! Watch the Club's website and newsletters for a fall 2022 open house 'gala'.

The VIP Club thanks the Dakota County Commissioners, the DCHS Board of Trustees, the museum staff, and our volunteers for continuing support of ERA's Information Technology Legacy.

For the VIP Club Board, *LABenson* - BEE 1966, U of MN