'Legacy' at the University of Minnesota

On January 19th, 2010, the VIP Club signed a one-year exhibit agreement to display legacy artifacts and information in the Walter Library at the University of Minnesota. The exhibit uses a two-sided University display board with dual display cases – located in the reference desk hall as shown in this first photo.
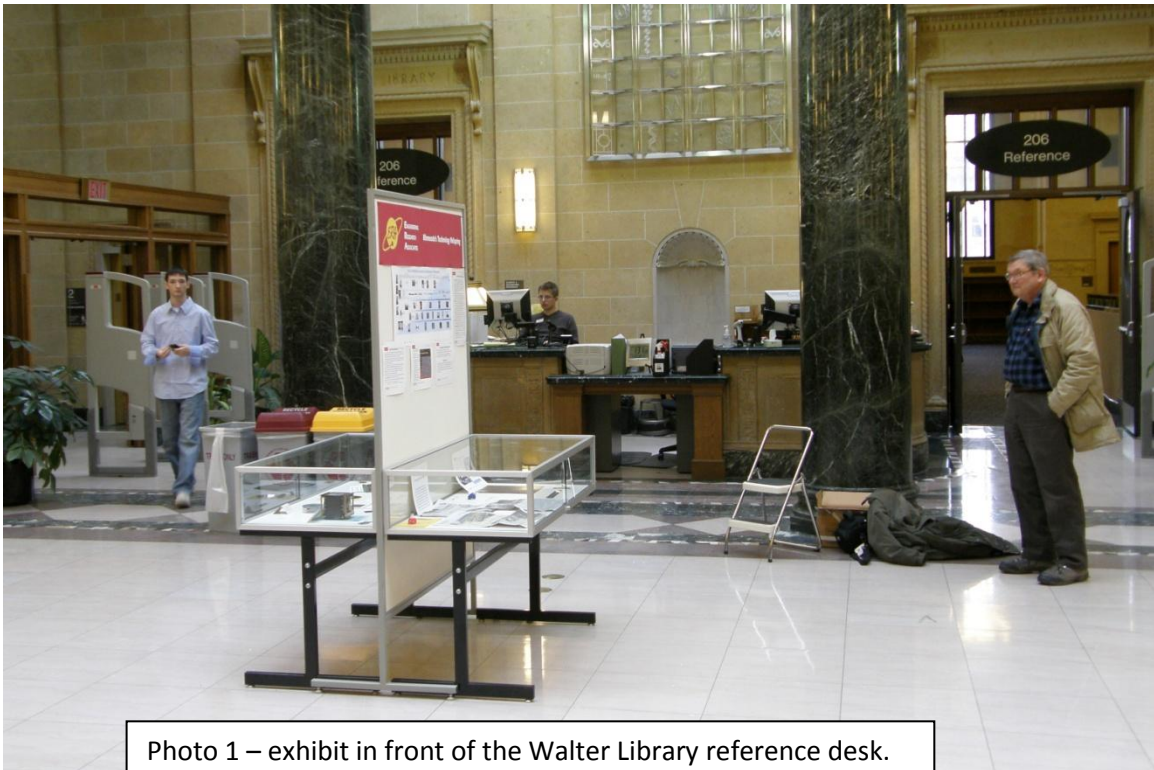

Photo 1 – exhibit in front of the Walter Library reference desk.

Club President, Tom Turba (right side of photo 1), and Vice President, Lowell Benson, set up the display on January 20th, 2010. The University's Walter library facility manager, Kristia Davern, facilitated the agreement and installation on behalf of the University. Thanks also to Paula Beck (ECE) and Janet Fransen (Walter Library) at the University who guided us into the Walter Library location.

Photo 2 – another view of the exhibit site.

We plan to update the posters and artifacts in May for the summer school session – again in September for the fall semester

The primary side of the display (photo 3) uses two large posters generated by a VIP Club sponsor, Lockheed Martin. The top 'ERA Minnesota's Technology Wellspring' poster and center time-line chart were originally created for the Club's 2008 sesquicentennial displays. We credit the design of these two charts to retired Unisys Fellow Quint Heckert, who is also a Club Director and our membership database manager.

Lowell Benson authored the 'text' posters for this exhibit with editorial feedback from Bernie Jansen, Dick Lundgren, John Skonnord, and Tom Turba. Further credits are on page 8. Both exhibit sides have one poster in common (below), to recognize exhibit participation.

Information Technology Legacy
• Display courtesy of the VIP Club's Legacy Committee.
• Display coordinated with the University's Department of Electrical and Computer Engineering and the Engineering Librarian.
• Poster artwork courtesy of the Lockheed Martin Corporation.

Contact Us?
• Use the contact page on our website, http://vipclubmn.org. The VIP Club is a non-profit, social and services organization of retirees from UNISYS, Lockheed Martin, and their Twin Cities predecessors.
• Lockheed Martin MS2 located in Eagan, Minnesota can be called at 651-456-2810.

Photo 3 – primary side of the exhibit.

The other two other 8 ½" x 11" posters on this side of the exhibit are shown below.

CHART EXPLAINATIONS
• At the left are the 4 Engineering Research Associates founding officers – the 1946 early employees are listed across the top left. One of the officers, William 'Bill' Norris went on to form Control Data Corporation in 1957.
• Seymour Cray received a Master's Degree from the University in 1951; started work at ERA as a computer designer, moved to CDC in 1958, then formed his own 'CRAY' company in 1972.
• The time line across the chart's middle shows the corporate names beginning with ERA in 1946. Of note is 1986, when Burroughs bought Sperry to form UNISYS. UNISYS then sold their Eagan-based defense operations to Loral in 1995, who in turn sold to Lockheed Martin in 1996. UNISYS in Roseville continues to provide Commercial Industry Systems.
• Just above the time line of companies are some of the significant milestones, e.g. the 1958 delivery of the University's first computer.
• The chart's lower half illustrates a few of the computer systems developed in St. Paul: Space Age Missile Launching – over 300 successful launches!
Air Traffic Control   Air Line Reservation Systems   Navy defense systems

• Corporate histories pre-dating ERA's 1946 start.
• Burroughs had a Minneapolis office before 1986 Sperry acquisition.
• The Remington name was on typewriters, shavers, and other items independent of the computer industry.
• The 1947 Eckert-Mauchly Corp. held the initial 'Computer Invention' patent before a 7-year court battle by Honeywell negated the patent.

Very appropriate on this 'history' side of the display is the University's relationship to the ERA legacy. This is identified on an 8 ½ x 14" poster at the top right of the primary board, the text thereon is:

U of MN and the ERA IT Legacy

- **Since 1946**: Thousands of University graduates have worked for ERA, Remington Rand UNIVAC, Sperry UNIVAC, Sperry, Burroughs, **UNISYS**, Loral, and **Lockheed Martin**.
- **1958**: Remington Rand Univac donated an 1103 computer to the University of Minnesota, the beginning of the Computer Science department under Dr. Marvin Stein in the school of Electrical Engineering.
- **1977:** Former ERA engineer/manager Erwin Tomash and wife Adele founded the International Charles Babbage Society, renamed the Charles Babbage Institute (CBI) in 1979, and then moved to the University of Minnesota in 1980.
- **1989**: With support from industry and individuals, the University established the *'Engineering Research Associates Land-Grant Chair in the History of Technology'*, initially held by CBI Director Arthur Norberg. Under Dr. Norberg's leadership, CBI developed into the world's leading research center for the history of information technology.
- **~2005**: A University *'Wall of Discovery'* display item is the Remington-Rand UNIVAC Nike-Zeus missile launch computer block diagram credited to Mr. Rolland Arndt, a 1948 U of MN BEE graduate hired by ERA in 1952.
- **2006**: CBI Director Norberg retired, Dr. Tom Misa was hired as his replacement, now holds the ERA Land-Grant Chair. Dr. Misa is also an advisor to our VIP Club Legacy Committee.
- **September 2008** through **May 2009**: A lecture series *"Minnesota's Hidden History of Computing"* presented by Dr. Misa of the Charles Babbage Institute, started with ERA.
- **January 2009**: VIP Club representatives put documents reflecting the University relationship to the ERA Legacy into Minnesota's bicentennial time capsule.

UNISYS   *LOCKHEED MARTIN*   ©2010, LABenson

In the display case on the primary side (photo 4) we laid out two pages of the January 3rd St. Paul Pioneer Press article "*The almost Silicon Valley*" written by Tom Webb. For the edification of those who have not seen the article, the Pioneer Press article's first page is copied on the last page of this report. A link to the full article is available on-line from our web site as the February 2010 'Article for the Month', section of 2 ofhttp://vipclubmn.org/documents.aspx.
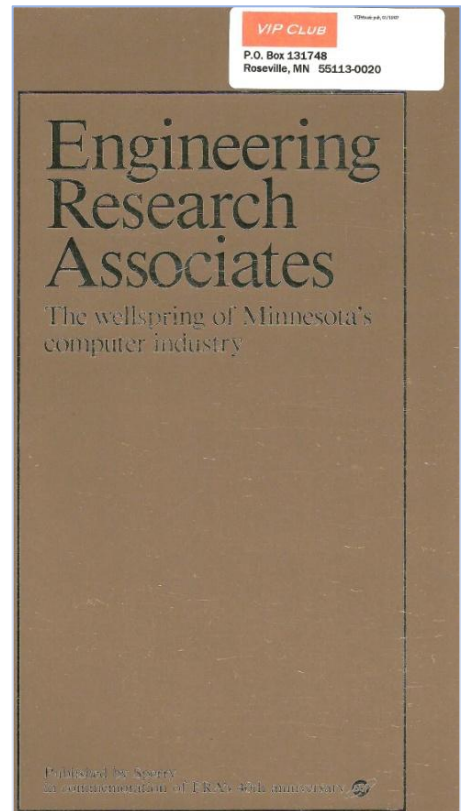

Photo 4 – primary side display case.

"The almost Silicon Valley"

VIP Club Legacy Committee co-chair, John Westergren, read an Armour Company 'history article' in the Pioneer Press the summer of 2009. Mr. Westergren called the author, Tom Webb, to suggest that Engineering Research Associates (ERA) could be a good topic for an article.

In December 2009, Mr. Webb researched the ERA topic at the Charles Babbage Institute then interviewed several VIP Club members to develop this January 3, 2010 article.

Just at the head of the Pioneer Press pages, we've placed a small poster (left) to show our involvement with the article.

In the right side of this primary display case, we've also put a 1986 Sperry booklet (right). This booklet's sub-title provided our sesquicentennial theme "*The wellspring of Minnesota's computer industry*." Unfortunately, the commemoration plaque (poster at left) was lost after the original plant was closed in the 90s.

40 Years of the Legacy

In 1986 Sperry employees and management erected a plaque commemorating the founding of ERA at 1902 Minnehaha Ave. in St. Paul.

Unveiling the plaque were Rollie Anderson, Bill Geiger, Jack Nichols, and Robert 'Bob' MacDonald.

40- year document copies available from the VIP Club – paper or electronic.
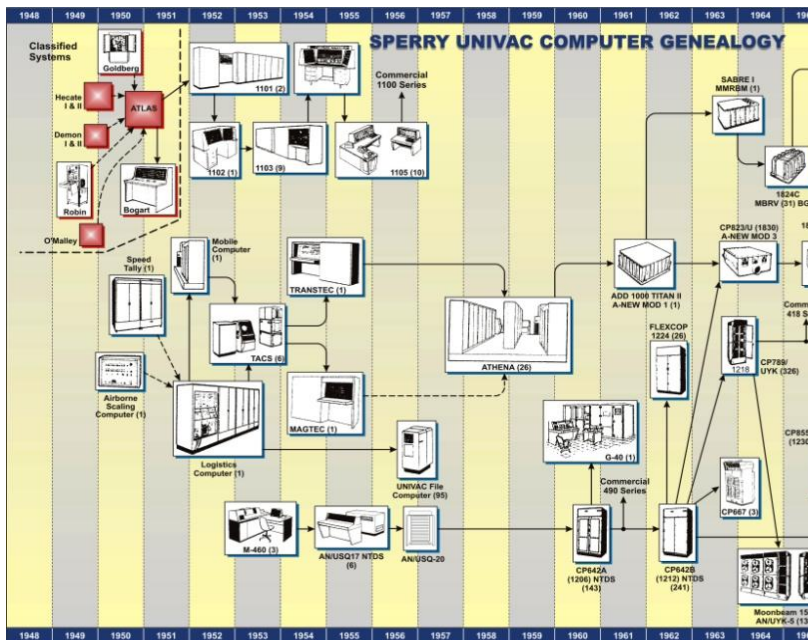
UNISYS   LOCKHEED MARTIN

In addition to the printed items, the display case has a couple of trinkets showing some former corporate names.

The obverse side of the exhibit (Photo 5) has the theme of memory evolution and the beginning or our product continuity. The top right of this side also displays the contact poster used on the primary side.

The centerpiece on this side of the display is the first half of the Sperry Univac Computer Genealogy chart, printed 22" wide by the LMCO artwork department.

Photo 5 – obverse side of the exhibit.

To provide information about this genealogy chart, we provided two explanatory posters.

VIP CLUB
COMPUTER GENEALOGY
Retirees of Unisys and Lockheed Martin
http://vipclubmn.org

- It all started with ERA classified hardware, top left hand corner
- Goldberg (**1947** delivery) and Demon (5 deliveries in '**48**) were 'Analytic Machines'.
  - Both designs used rotating drum memories.
  - Both were used for cryptographic work.
- ATLAS shipped via rail car 10/50 to Washington DC,
  - Used a drum memory for program and data storage.
  - The world's first stored-program computer operational in a customer's facility in **December 1950**.
  - Other 'first' claimants had machines operating in development laboratories.
  - ATLAS existence was classified until **1977**, thus excluded from early academic journals.
- The ERA 1101 computer was an unclassified version of ATLAS
- The UNIVAC 1103 (ATLAS II) was a technology upgrade:
  - Drum memory supplemented with core memory
  - Word size expanded from 24 to 36 bits.
- Evolved into the Commercial 1100 Computer series - 1107, 1108, 1110, … not shown on this 'defense computer' chart.

Other computers shown on the Sperry Univac Genealogy Charts will be discussed in future I T Legacy technology artifacts' displays.

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Retirees of UNISYS and Lockheed Martin
http://vipclubmn.org
CHART LEGEND

Location on chart is year of first unit delivery.

AN/USQ-xx AN/UYK-xx	Government Systems Nomenclature
CP-xxx	Government Processor Nomenclature
(11xx, 12xx, 15xx, 16xx, 18xx)	ERA, Sperry Univac, UNISYS Processor Unit Type Numbers
(1) or (130) or (xxx)	Quantity delivered to customers

At the left of the genealogy chart is an 8 ½ x 14" poster with a few points about memory evolution.

VIP CLUB

Retirees of Unisys and Lockheed Martin
http://vipclubmn.org

Computer Memory Technologies.

See display case and genealogy chart

- The ERA Drum prototype is in the *Minnesota's Greatest Generation* exhibit at the Minnesota History Center, St. Paul.
- ERA drum patents were licensed to IBM for some of their early computers.
- The **1946** ERA Magnetic Drum Technology can be tracked to today's PC hard drives produced by Seagate.
- Drum units similar to the one in the display case were used in the ATLAS, 1102, and other early computers.
- Core memory planes (similar to the display case artifact) were assembled into core stacks beginning with the 1103 (ATLAS II) computers in **1953**
- **1955** Computers, such as the AN/USQ-17 NTDS, used only core memory.
- **1961** Computers began the use of film memory;
  - ADD 1000 missile-borne guidance computer.
  - Early use of photolithography, deposition, and etching technologies.
  - Higher density and faster access than core memory.
- **1976** Computers began the use of 6"x9" semi-conductor memory boards.

Memory storage outside of computers evolved through several technologies: Paper tape, punch cards, magnetic tape, magnetic disks, chips, USB sticks, etc.
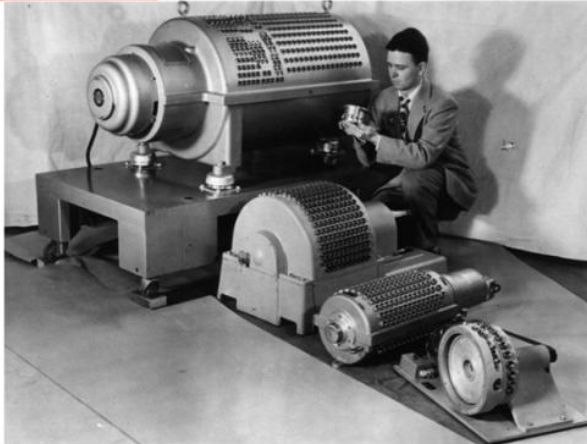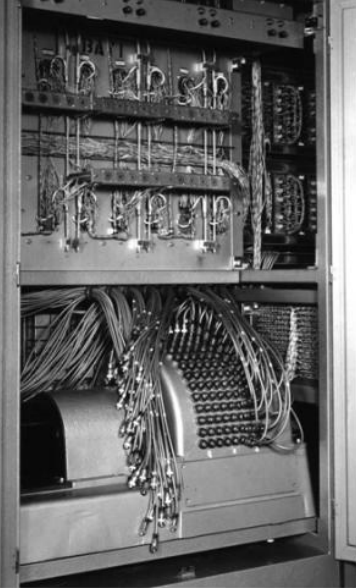
UNISYS   *LOCKHEED MARTIN*   ©2010, LABenson

The drum theme is continued with two topical posters.
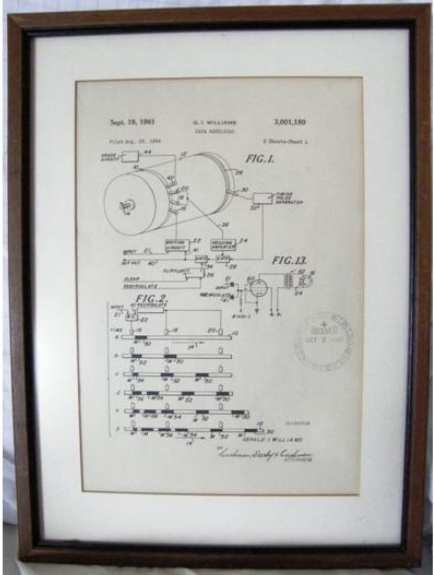
VIP CLUB   Multiple Drum Sizes   Retirees of Unisys and Lockheed Martin — http://vipclubmn.org

Above - Don Weidenbach, engineer from **1946** to **1976** at ERA, UNIVAC, & Sperry.

Right - Drum in 1103A Computer

UNISYS   LOCKHEED MARTIN

VIP CLUB   A Drum Patent   Retirees of Unisys and Lockheed Martin — http://vipclubmn.org

Octogenarians and former ERA employees: Gerry Williams, Jim Wright, & Don Weidenbach

Gerry Williams is patent holder of the drum circuitry shown at right.

Gerry Williams and Don Weidenbach were both cited in Tom Webb's January 3rd, 2010 Pioneer Press Article!

UNISYS   LOCKHEED MARTIN

The initial exhibit intent was to focus on the drum artifact to be placed in the display case. Because of the weight limit of 30# per display case, we just put a photo of one of our drums. Larry Bolton made the descriptive tags for the artifacts.

Artifact items in the obverse display case are (top to bottom, left to right):

Photo 6 – obverse side exhibit case.

- A souvenir mug labeled with Sperry Bubble Memory airborne and shipboard unit photos.
- A semiconductor memory board from the AN/UYK-43 with label.
- The drum memory unit photo on poster paper (right).
- Two core memory planes, from the CP-890 computer with label.
- A hard drive disc and a 'Lockheed Martin' USB port memory stick. An identical memory stick is in the Minnesota bicentennial time capsule.
- A 1024-bit mated-film memory plane with label.
- A roll of paper tape containing a test program.
- An AN/UYK-7 computer core memory stack with label.
- A few trinkets showing some legacy corporate names.

At 50#, our drum 'artifact' is too heavy for the display case.

Credits: Many credits are listed within this report's text. Lowell Benson took photos 1 through 6, the drum picture above, the Minnesota Historical Society drum picture (page 6), and the Gerry Williams patent picture (page 7). The 'Formation of Unisys' slide (page 2) came from Ron Q. Smith. The three octogenarians' photo (page 7) came from Bernie Jansen. All other photos came from the Club's Legacy Committee files or CBI.

REMEMBERING: HOW THE NEXT BIG THING TOOK SHAPE IN ST. PAUL

COURTESY: LOCKHEED MARTIN TACTICAL SYSTEMS
The original site of Engineering Research Associates was at 1902 Minnehaha Ave. in St. Paul. The ERA name was quickly absorbed by other companies.

Engineering Research Associates

After World War II, St. Paul was one of two incubator sites for the computer industry — but missed out on later explosive growth.

COURTESY: LOCKHEED MARTIN TACTICAL SYSTEMS
This 1985 aerial photograph shows what had become the sprawling UNIVAC plant in St. Paul. At one point, UNIVAC had 13,000 employees in the Twin Cities.

The almost Silicon Valley

By Tom Webb
twebb@pioneerpress.com

At the end of World War II, an elite group of Navy code breakers created a company whose top-secret work helped to launch the world's computer industry.

It wasn't based in Silicon Valley. It was based in St. Paul.

The company was called Engineering Research Associates, and few people knew its secrets. Most still don't. Yet in the 1940s and early 1950s, its group of brainy engineers was quietly making history — and forging a path that turned the Twin Cities into a high-tech power for decades.

"You can say quite confidently that the computer industry has its roots in two places in the world, Philadelphia and here," said Thomas Misa, director of the Charles Babbage Institute, dedicated to the history of computing and housed at the University of Minnesota.

The ERA name lasted only a decade before it was absorbed by other companies. But its pioneering work would put Minnesota at the lead of the postwar era's most far-reaching technology. Most of Minnesota's famed computer names — UNIVAC, Control Data, Cray Research and scores more — can trace their roots to that original ERA site at the corner of Prior and Min-

COURTESY: LOCKHEED MARTIN TACTICAL SYSTEMS
The early computers contained thousands of vacuum tubes, precursors to the transistor. Keeping the machines cool proved a challenge for ERA engineers.

nehaha avenues.

"It's the seed from which an industry grows," Misa said. "It's not only the ERA company but spinoffs of the ERA company that were founded by ERA veterans, including Control Data. And Control Data led to 45 more spinoffs, the most famous of which was Cray Research."

The fruits of that revolution amaze the ERA pioneers.

"None of us had any idea

that computers would eventually evolve into an everyday item," said Don Weidenbach, who joined ERA in 1946. "To us, a computer was a huge machine that cost a million dollars or more, and the only people who could afford them were universities or the government."

There's a secondary story, as well, in what did not hap-

PIONEER PRESS FILE PHOTO
In 1955, ERA founder and eventual Control Data CEO Bill Norris broke ground for the Remington Rand UNIVAC plant on Shepard Road in St. Paul.

End of exhibit description.