

VIP CLUB



IT'S A WRAP

Minnesota's Sesquicentennial, Plus



A Legacy Project Report

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VIP CLUB Sponsors and Sesquicentennial Team Supporters:



PROLOGUE

This report captures small pieces of Minnesota’s Information Technology (IT) pioneering heritage for our VIP CLUB readers. The VIP CLUB is a retirees’ social and services organization founded in 1980 by Millie Gignac, the first female director at UNIVAC. A founding constitution requirement is: “The CLUB shall provide a forum for information on the heritage and ongoing action of the sponsoring business entities and their predecessors.” The CLUB has grown over 28 years to the now 1,000+ retiree members from the Twin Cities Divisions of UNISYS, Lockheed Martin (LMCO), and their corporate predecessors.

In 2005 Richard ‘Ole’ Olson, an LMCO systems engineer, asked the VIP Club Board of Directors to form a Legacy Committee to pursue documenting our history. Our legacy logo [right] lists our corporate lineage - the first is Engineering Research Associates (ERA) which began when State of Minnesota incorporation papers were filed on December 27th, 1945. ERA opened its doors in January 1946 at 1902 Minnehaha Avenue in St. Paul, MN with a classified contract to develop cryptography equipment for the U.S. intelligence service. The rest of the story is yet to be told – this report focuses on some of the Legacy Committee’s 2008 work.



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Report photos by Benson and Taipale.

IT'S A WRAP

Minnesota's Sesquicentennial, Plus

1. Introduction

Richard 'Dick' Lundgren, a VIP Club Board Associate, brought an idea to the September 2007 board meeting. He'd read an article about Minnesota's upcoming 2008 Sesquicentennial celebration. Since the Club's Legacy Committee had an objective of 'telling-the-story' about our Twin Cities history of computer innovations and pioneering, the Board and Legacy Committee quickly decided to form a team to pursue 'getting our story' in front of the public as part of those 150-year celebrations. The Legacy Committee's UNISYS representative, Ron Q. Smith, and Lockheed Martin (LMCO) representative, John Westergren, endorsed the Team – agreeing to provide some company support. The VIP Club Board passed a motion to provide support funds for incidentals as necessary. Mr. Lundgren agreed to be our point man in contacting and working with the Sesquicentennial Commission.

Dick arranged a Team meeting with the Sesquicentennial Commission's Director and her staff on Oct. 10th, 2007, to meet them and offer our participation to present our Twin Cities computer history. After the Commission's Director mentioned Control Data Corporation (CDC) twice, we adamantly pointed out that CDC was but one of hundreds of spin-offs from Engineering Research Associates and successors since 1946.

The Team put together a general plan to set up and staff a booth on May 17/18, 2008 at the Minnesota Capitol Mall during Centennial week. Because of the public interest in our booth, the Commission asked us to repeat the booth in their exhibition tent at the Minnesota State Fair in August. They also asked us to conduct a morning forum at the Fair about our 60+ years of Minnesota history. Then, in December, 2008 we responded to the Sesquicentennial Commission's request for items to be included in a bicentennial time capsule. The remainder of this report details these Sesquicentennial Team activities.

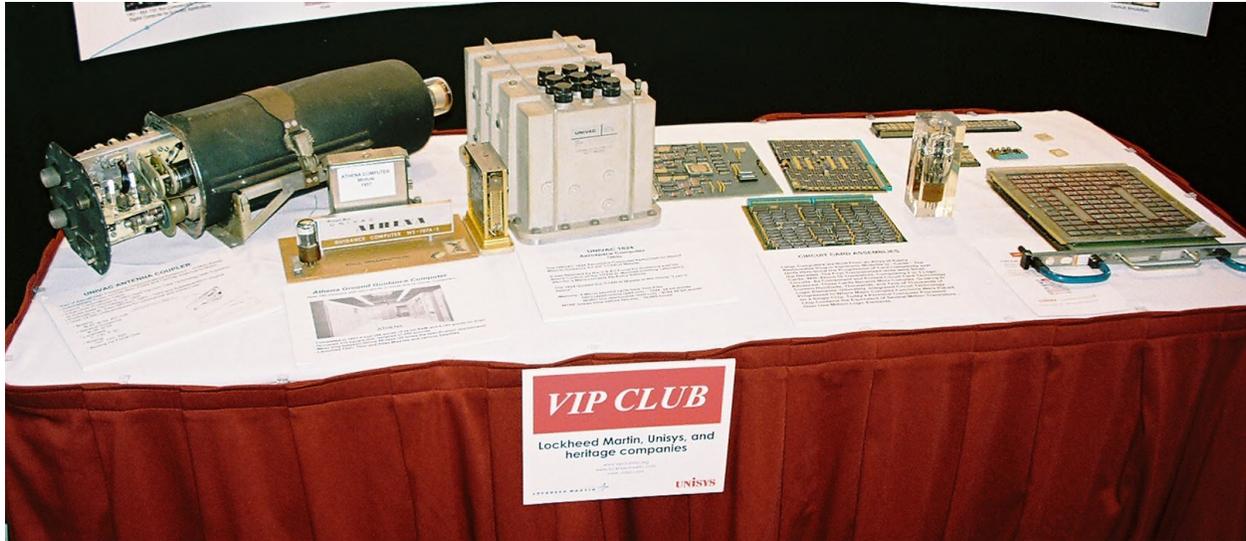
2. Capitol Mall

The Sesquicentennial Team quickly consisted of Dick Lundgren, Quint Heckert, Tom Turba, Ron Q. Smith, Lowell Benson, and Harvey Taipale - with behind the scenes support from many others. Ron Q. Smith, representing UNISYS, offered to bring in two 8' high by 10' wide display-booth structures. John Westergren offered the Lockheed Martin artwork department to make our display wallboards look professional. Quint Heckert offered the use of his truck to transport the display to/from the setup site(s).

LMCO provided the Sesquicentennial Commission with a donation to reserve display space within the Capitol Mall exhibition tent. During several meetings at UNISYS, Plant 4, the Team decided to create a history timeline on one wallboard and a services area wallboard for the other area. Quint drafted the artwork concepts for the wallboards. The Team also obtained a magnetic drum memory and an Automatic Antenna Coupler from Harry Wise's widow as centerpieces for artifact displays – both designed during the 1950s. Capitol Mall photos of the team efforts follow:



Picture 1 - Time line display of corporate names from 1946 to the present.



Picture 4 - UNISYS also provided a couple displays from their Roseville Plant 4 history wall – these show 1955 versus 1996 circuit and memory technologies.

After the Capitol Mall completion, the displays were setup in the LMCO plant atrium for a couple of weeks, then in the UNISYS MACS building atrium for two weeks, then in the Eagan Community Center during the Eagan Fun Days celebration in July. The wallboard drafts were also posted at the VIP Club's June summer picnic in St. Paul.

3. State Fair Grounds

The Sesquicentennial Commission invited us to set up our booth in their first tent, to be located near the West end of the grandstand. Our booth was to be ready on the day before the Fair started; then we had to staff the booth from 9 a.m. to 9 p.m. for the entire 12 days of the Minnesota State Fair. To recruit volunteers, we 'advertised' in the VIP Club newsletter, on the VIP Club web site, and on bulletin boards at the LMCO and UNISYS plants.



3.1 Display Booth

Lowell Benson, Quint Heckert, Dick Lundgren, and Tom Turba set up the booth on Wednesday afternoon before the fair opened on August 20th: Tom and Quint are shown in the booth as both wallboards were merged onto one display because of the floor space allocated to us.



The Sesquicentennial Commission provided free Fair access tickets to our booth volunteers. Tom Turba took care of scheduling volunteers into the time slots. The VIP Club Board thanks the many, many volunteers who made our display successful at the 2008 Minnesota State Fair; they were:

- Five Team members served several 6-hour shifts as the Sesquicentennial Team on-site leader, these yeoman workers were; Dick Lundgren, Quint Heckert, Ron Q. Smith, Harvey Taipale, and Tom Turba.
- The following volunteers served a single four-hour booth shift; Charlie Anderson, Steve Anderson, Warren Becker, Lowell Benson, Brian Berggren, Robin Bjorklund, Dave Boucher, Tom Burns, Barney and Ardella Buss, Marquita Clardy, Bruce Clark, Dan de Young, Bob Gambrel, Dr. Carl Glewwe, John Jensen, Steven Ross Johnson, George Kydd, Jason Larson, Andrew Lee, Don Lovely, Darrell Lynn, Tom Magill, Jim Melville, Jerry Nelson, Ole Olson, Bob Peterson, Dale Phelps, John Pollack, Mike Rieschl, Gene Rodi, Ron Schroeder, Max and Alice Tiede, Gene Topitzhofer, Don Weidenbach, and Dr. Steve Yahr.
- The following nine served multiple four-hour booth shifts on multiple days; Larry Bolton, Tom Burns, Les Flugum, Bernie Jansen, Barb Kachmarzinski, Hal Lebo, Lynn Farris Lindholm, Greg Metzger, and Marc Shoquist.

Team members Tom, Dick, and Quint along with Tom Burns, the final shift volunteer, dismantled the booth the last evening of the Fair; then sent the display booth structures back to Blue Bell and stored the artifacts back at LMCO, UNISYS, and Quint's home.

3.2 Technology Forum during the Minnesota State Fair

In late May, Bernie Jansen and John Westergren had organized a technology brown bag session in the LMCO atrium while the Capitol Mall displays were set up there. Ole Olson emceed the brown bag 'history' presentations by retirees Bernie Jansen, Jack Sater, Phil Phipps, and Manny Block. This provided an initial set of technology slides for our use at the Minnesota State Fair - Sunday morning, August 24th from 10 a.m. to noon, in the Sesquicentennial Commission's show tent next to the display tent.



Seven volunteers presented parts of our legacy at the Computer Technology Forum as coordinated by Bernie Jansen. Dr. Peter Patton led off the session with a discussion about ERA. We'd invited Dr. Patton because of his career experiences at UNIVAC then at the U of MN as their second director of the Institute of Technology's Numerical Analysis Center.

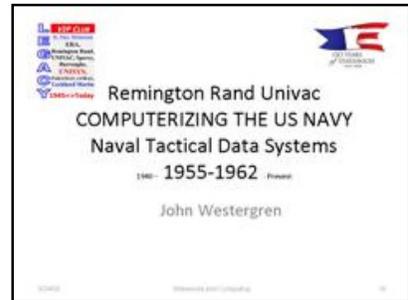


Marc Shoquist was second with the history of how the Antenna Coupler production lines provided the cash flow to keep the company in business in the 1950s and early 60s. Marc was one of the development engineers of the Antenna coupler product line.



Then Bernie Jansen discussed the company's flawless history of missile launching at Cape Kennedy, Van den Berg Air Force Base, and Johnston Island as we helped the U.S. catch up and pass the Soviets in the space race. Bernie was one of the system programmers and managers at the Cape!

Our fourth speaker was LMCO's John Westergren, who spoke about the early days of the Naval Tactical Data Systems (NTDS) development and how these systems allowed the Navy to efficiently track both friendly and aggressor aircraft and ships. As a Marine in the 60s, John had worked with computers interfaced to NTDS.



Jack Sater showed how NTDS was the base technology in the development of Air Traffic Control systems for the Federal Aviation Administration's 64 major and 135 minor airports through the United States. These systems used extensive networking to hand off departing aircraft control to the 23 regional en-route systems [made by IBM] then re-take control of landing aircraft. Jack was both an NTDS development engineer and an ATC systems engineer.

Ron Q. Smith presented the UNIVAC/UNISYS Commercial Systems operating today in government and business arenas. Brian Toren finished the session by



predicting 'The Future of Computing' applications.

Ron Q. Smith had put all seven slide sets into one big power point file which is on the Club's web site at <http://vipclubmn.org/archive.aspx>. The Minnesota Sesquicentennial Commission was favorably impressed with forum and thus, has asked us to do an encore - sometime in the spring of 2009 for the Minnesota State Historical Society.

4. Bicentennial Time Capsule

On 19 December 2008, Lowell Benson, acting for the Team, delivered a descriptive cover letter [Attachment A] and several items to the Sesquicentennial Commission's office at the James J. Hill House on Summit Avenue in St. Paul, MN. These items were placed into a box along with contributions from several other Minnesota organizations and citizens. Our delivered items are described in the following paragraphs.

4.1 ERA to UNISYS and Lockheed Martin Heritage Time Line

One of our booths' wall-boards illustrated "Over \$100 Billion in Economic Contributions to Minnesota." [See chart below] At the top left, W. 'Bill' Norris was one of four founders of our 1946 heritage company, Engineering Research Associates - a full decade before he founded Control Data Corporation as an eminent Minnesota 20th century computer corporation. Across the top, this chart lists 45 early ERA employees followed by 90 companies with 'roots' in ERA/UNIVAC. It also shows Seymour Cray whose career history includes the U of MN, ERA, UNIVAC, and CDC before forming Cray Research.



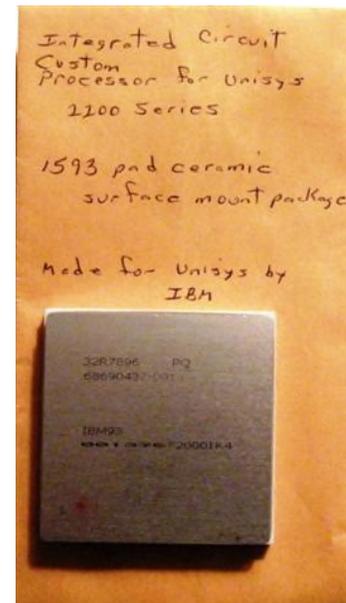
up the 1958 NTDS CP-642A unit computer. The 6"x 8.5" sheet of paper at the right of the snapshot shows the general schematic and logic diagram of the cards 1960's spare parts replacement design including four PNP transistors [gates].

The second hardware item at the top left of this picture is a blue 256 megabyte memory stick, labeled Lockheed Martin. The opposite side of this stick is labeled JQ-70, a government nomenclature of a 2008 NTDS display unit with embedded processors and software developed at the LMCO Eagan facility. This memory stick plugs into a USB port of most personal computers from mid 1980, continuing in 2008.

Hopefully, the folks in 2058 will have computers with the capability to read files stored on this device. If they can read it, they'll find the digital document files and the digital image files presently [December 2008] posted on our legacy web site. A disc copy of these same files and the cover letter were given to the Sesquicentennial Commission for their files and use in describing the 'time capsule.'

4.3 2008 Hardware Item

A third hardware item in another labeled brown envelope is an Application Specific Integrated Circuit (ASIC) manufactured by IBM for the UNISYS 2200 series processors. This device is a Memory and Cache Controller used in UNISYS 2008 Clear-Path and ES7000 systems. The 2200 series of computers are the 'great-grandchildren' of the 1103 computer originally donated to the University in 1958. The blue memory stick has a couple of files in the Legacy folder which show the computer genealogy of this 50 year old, computer series. Comparing the 1958 card with the 2008 ASIC, we have 15 pins versus 65 input/output contacts and four transistors [gates] versus ~14 million gates in about the same physical volume.



4.4 Futurist's Slides

Since the time capsule will be opened in 2058, Dick suggested that we should include a copy of Brian Toren's viewgraphs from his State Fair 'Futurist' presentation. These were printed for the time capsule inclusion [see

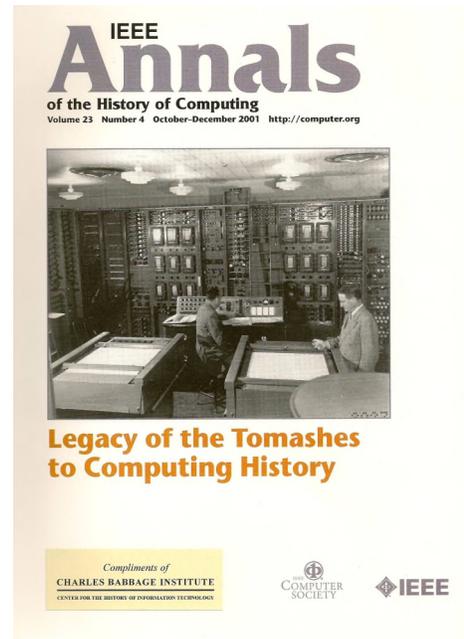


Attachment B of this report].

Referencing the two computer hardware items described above, if the 1958-to-2008 electronics density trend continues at the same rate from 2008-to-2058, Mr Toren's nanotechnology forecasts may be commonplace at the time capsule opening.

4.5 Charles Babbage Institute History Document

Another item we've included is the October-December 2001 issue of "IEEE Annals of the History of Computing – Volume 23, Number 4". This journal's theme is 'Legacy of the Tomashes to Computing History'. Mr. Erwin Tomash was born in St. Paul, Minnesota, in 1921. He was also a 1943 University of Minnesota engineering graduate who then served in Europe in the signal corp. He was an early ERA engineer who left UNIVAC in 1955, moving to California to start a couple of electronics firms. With his successes there, Erwin and his wife were the leading founders of the Charles Babbage Institute (CBI) – finding a home for CBI at the University of Minnesota.



The original director of the Institute, Dr. Arthur Norberg held the "ERA Land-Grant Chair in the History of Technology" until his retirement from the University of Minnesota in 2005. Dr. Tom Misa has held this chair since 2005 as the Director of CBI.

A key photo in this magazine is clipped at the right. It shows ERA engineers and managers; Bob Perkins, Arnie Hendrickson, Bill Keye, Frank Mullaney, Arnie Cohen, and Jack Hill. Jack and Frank were the team who installed the Atlas computer in the Washington DC CIA predecessor's facility. Fully operational there in December 1950, we believe that this was world's first stored program computer operating in a customer's facility. These drums were the world's first production 'hard-drives' for several classified applications as well as the ERA/UNIVAC 1103 commercial computers.



5. Sesquicentennial Team

These six volunteers have a combined 216 years of computer industry experiences.

5.1 Lowell A. Benson

Lowell was an employee of UNIVAC/UNISYS from 1960 to 1994. During those 33.5 years he progressively was a file clerk, technician, technical writer, computer operator, design engineer, installation engineer, instructor, engineering supervisor, project engineer, marketing support engineer, engineering manager, program manager, technical director, and a senior staff engineer. He is presently the VIP Club Vice President and co-chair of the Legacy Committee.

5.2 Quint Heckert

Quint began his engineering career as a U.S. Navy Officer. He joined UNIVAC in 1967, retiring in 1999 after 32 years as an employee of UNIVAC, Sperry, UNISYS, PARAMAX, Loral, and Lockheed Martin retired. His career began as a system engineer in the Navy Systems Group; he then had assignments as Supervisor, Project Engineer, Manager, and Technology Director, and he retired as a System Engineering Fellow. He is presently a VIP Club Director and chair of the Membership Committee.

5.3 Richard F. Lundgren

Dick was an employee of UNIVAC/UNISYS/LMCO from 1967 to 2004. He was a computer and peripheral hardware maintenance instructor for most of his career. Dick was also in the Field Service Organization for a few years and then was a technical writer for a pentad. He has been active with the VIP Club Legacy Committee for three years, serving as liaison with the Charles Babbage Institute, as the principal Legacy reporter for the VIP Club newsletters and leader of our Sesquicentennial Team.

5.4 Ron Q. Smith

Ron is a current employee of UNISYS. He joined UNIVAC in 1969 in Roseville and has worked primarily on Exec 8 for the 1108, later called the 1100 Series, then the 2200 Series, and now the Dorado Series of mainframe systems. Ron has held positions in software, system design, and system development. He is currently a Distinguished Engineer with responsibility for architecture and system design for the Dorado Series and other products.

5.5 Harvey Taipale

Harvey retired in 2007 after 41 years as an employee of UNIVAC, Sperry, UNISYS, Paramax, and Lockheed Martin. His engineering career assignments included hardware and system engineering, project and program management, and business development. He is presently the VIP Club Treasurer.

5.6 Tom Turba

Tom worked for UNIVAC/UNISYS from 1972 to 2006. His primary areas of work were in programming languages, parsing, databases, artificial intelligence, advanced research, and the development of point-and-click programming tools. He is presently the VIP Club President.

6. Wrap Up

Closing out our 2008 Legacy Committee's Sesquicentennial Team activities, we've taken four actions:

1. On January 6th, 2009 in the Minnesota State Capitol Rotunda; Dick, Lowell, and Tom along with Dick's oldest grandson and Lowell's two grandsons witnessed the sealing of the Time Capsule for the 2058 bicentennial – perhaps our grandsons will be at the bicentennial capsule opening on May 11, 2057?
2. Dick wrote a bicentennial time capsule article for the Jan/Feb 2009 VIP Club Newsletter.
3. Lowell provided the Charles Babbage Institute with an archival disc copy of our time capsule contributions [minus the hardware items.]
4. Lowell, with inputs from the Team, generated this report for our Club and Legacy web site readers.



Speaking for the VIP Club Board, we are quite appreciative of the extraordinary support from LMCO and UNISYS during this 2008 endeavor to tell our story. Again, we'd like to thank Bernie, Dick, Harvey, Quint, Ron, and Tom for the hundreds of hours of volunteer time that they put in during 2008 to make our Sesquicentennial participation a great success - and a special thanks to Larry Bolton, Quint Heckert, Dick Lundgren, Ron Smith, Brian Toren, and John Westergren who helped me prepare the Club's time capsule content items.

Lowell A. Benson BEE, U of MN – 1966

APPENDIX A – Letter to the 2058 Bicentennial CommissionMN Bicentennial Commission
St. Paul, MinnesotaFriday, December 19th, 2008

Dear Sirs:

Our **VIP CLUB**¹ was an active participant in the Minnesota 2008 Sesquicentennial activities with a booth on the Capitol Mall, a booth in the Sesquicentennial Commission's State Fair tent, and an August 24th, 2008 forum about Minnesota's Computer History. That forum ended with a series of slides by futurist, Brian Toren, projecting future Information Technology devices and capabilities. We've included a print-out of those slides and a memory stick of associated documents.

Our booths' wall-board illustrated "Over \$100 Billion in Economic Contributions to Minnesota" [refer to the attached laminated 11"x17" chart.] At the top left, W. 'Bill' Norris was one of four founders of our 1946 heritage company, Engineering Research Associates (ERA) - a full decade before he founded Control Data Corporation as an eminent 20th century computer corporation. Other corporation spinoffs are listed across the top while ERA's 2008 grandchildren, the Minnesota Divisions of Lockheed Martin and UNISYS, are listed in the 1946-to-2008 time line.



There are two chart items that are of special historical significance for the year 2058:

- 1) In 1958 [Minnesota's Centennial Year] Remington Rand UNIVAC (RRU) donated an ERA 1103 Scientific Computer to the University of Minnesota, which marked the beginning of the University's Computer Science Department under Dr. Stein.
- 2) In 1958 RRU delivered the first Naval Tactical Data Systems' (NTDS) computer to the U.S. Navy. This computer and its successors are memorialized in the 1987 book, *When Computers Went to Sea, the Digitization of the United States Navy*, by Capt. David Boslaugh. The NTDS technologies became the digital foundations of the FAA's Air Traffic Control systems and NATO's defense systems continuing into the 21st century.

UNIVAC-developed computer systems were also used for missile launch control to begin the U.S. space age in the late 1950s! These missile systems technologies were developed and produced in the Twin Cities at the genesis of the information technology age. Pages 2 and 3 describe additional time capsule items.

The **VIP CLUB**, our Legacy Committee, our Sesquicentennial team, and our corporate sponsors [UNISYS and Lockheed Martin-MS2] appreciate the opportunity to illustrate this part of Minnesota's history during the evolution of the world's digital computer industry.

Sincerely,

L. Benson, BEE – U of MN, 1966Vice President of the 2009 **VIP CLUB** Board

¹The **VIP CLUB** is a group of retirees of the Minnesota divisions of UNISYS, Lockheed Martin, and their Twin Cities' predecessor companies. Many of our historical documents are archived the U of MN's Charles Babbage Institute.

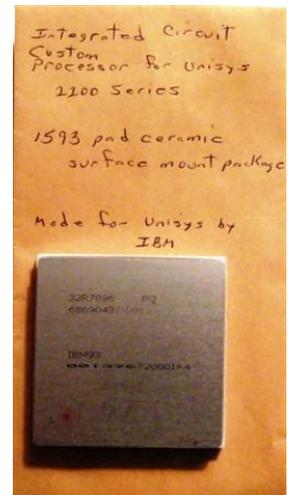
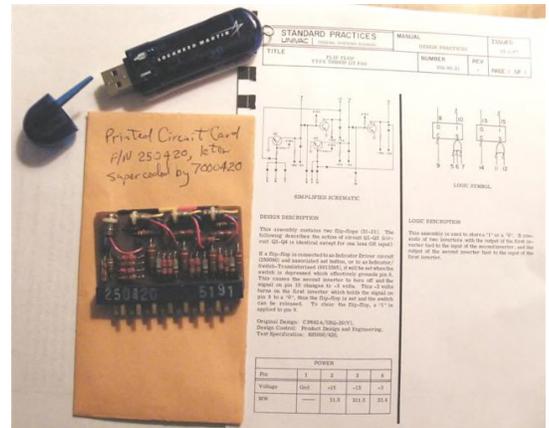
December 19th, 2008

At the right is a composite photo showing three items included in the 2058 time capsule. The printed circuit (PC) card is enclosed in the labeled brown envelope. This card is one of the card types delivered in 1958 in the first Naval Tactical Data Systems unit computer. About 1,600 cards of this size made up the 1958 NTDS unit computer. The 6"x8.5" sheet of paper at the right of the snapshot shows the general schematic and logic diagram of the 1960's spare parts replacement card.

At the top left of this picture is a 256 megabyte memory stick, labeled Lockheed Martin - a co-sponsor of our retirees' club along with UNISYS. The opposite side of this stick is labeled JQ-70, the government nomenclature of a 2008 NTDS display with embedded processors and software developed in the LMC0 Eagan facility. This memory stick plugs into a USB port of most personal computers from mid 1980, continuing in 2008. Hopefully, you folks in 2058 will have computers with the capability to read files stored on this device. If you can read it, you'll find the digital files listed on page three of this letter.

A third hardware item in another labeled brown envelope is an Application Specific Integrated Circuit manufactured by IBM for the 2008 UNISYS 2200 series processors. This device is a Memory and Cache Controller used in UNISYS 2008 Clear-Path and ES7000 systems. The 2200 series of computers are the 'great-grandchildren' of the 1103 computer originally donated to the University in 1958. The blue memory stick has a couple of files in the Legacy folder which show the computer genealogy of this, almost 60 years old, computer series. Comparing the 1958 card with the 2008 ASIC, we have 15 pins versus 65 input/output signals and four transistors [gates] versus ~10 million gates in about the same physical volume. If similar electronics shrinkage from 2008 to 2058 occurs, Mr. Toren's nanotechnology forecasts may be common place!

Another item we've included is a booklet, "IEEE Annals of the History of Computing – Volume 23, Number 4 October-December 2001". This journal's theme is 'Legacy of the Tomashes to Computing History'. Mr. Erwin Tomash was an early ERA engineer, born in St. Paul Minnesota in 1921. He is a University of Minnesota 1943 engineering graduate who then served in Europe in the signal corp. Mr. Tomash left UNIVAC in 1955, moving to California to start a couple of electronics firms. With his successes there, Erwin and his wife were the leading founders of the Charles Babbage Institute – finding a home for CBI at the University of Minnesota. The original director of the Institute, Dr. Arthur Norberg held the "ERA Land-Grant Chair in the History of Technology." Dr. Tom Misa has held this chair as the Director of CBI, replacing Dr. Norberg, who retired in 2005. A key photo in this magazine is clipped at the right. It shows ERA engineers; Jack Hill, Arnie Cohen, Frank Mullaney, Bob Perkins, Arnie Hendrickson, and Bill Key. Jack Hill and Frank Mullaney led the team which installed the Atlas computer in the Washington DC CIA predecessor's facility in December 1950 – the world's first stored program computer installed into a customer's facility. The drums shown were the world's first production 'hard-drives.'



Contents of the blue memory stick, plug into a computer's USB port.

<u>File Name</u>	<u>Type</u>	<u>Description</u>
Bicentennial_3	Document	Letter to the Bicentennial commission
Bicentennial 2058 Folder		
ASIC_2200,	Photo & message	An Application Specific Integrated Circuit used in the UNISYS 2200 series of computers in 2008 – this part is included in the time capsule
Ckt Board, NTDS	Photo	A printed circuit board vintage 1958 from an early Naval Tactical Data System computer, i.e. CP-642A
Future of Computers	*.pdf, *.pps and *.ppt	Three formats of the printed 'futurist' viewgraphs presented at the 2008 Minnesota State Fair.
CapitolMall2008 Folder		
Capitol Mall 00	*.pdf	Slides shown in the VIP Club booth on the Capitol Mall during the May Sesquicentennial celebration.
Capitol Building	Photo	View of the Minnesota State Capitol Bldg, May 2008.
Capitol Mall 01	Photo	Half of booth showing backdrop and artifact display table.
Capitol Mall 02	Photo	Other half of booth and artifact display table.
Capitol Mall 03	Photo	Unisys technology displays from 1955 and 1996
Capitol Mall 04	Photo	Artifact table showing Antenna Coupler, 1824 missile borne Computer, and several vintages of printed circuit cards.
Capitol Mall 05	Photo	VIP Club's booth staff, Harvey Taipale and Dick Lundgren with two visitors.
Contact Info	Photo	Contact us flyer handed out at Capitol Mall and State Fair booths
State Fair 2008 Folder		
State Fair Forum	Slides	The Power Point slides used by the August 24 th , 2008 presenters
VIP Booth	Video	Set up of the VIP Booth at the fair.
Original Geek Squad Folder		
A Gaggle of Geeks	Document	A July 2005 Minnesota Monthly article used with the author's permission, it discusses a group of computer pioneers who meet the first Friday of every month.
Dr. Tom Misa	Photo	Dr. Misa at a 'Geek Squad' meeting. He is the current CBI Director.
IMG_0303	Photo	Gerry Williams, Jim Wright, and Don Weidenbach: octogenarians, WWII vets, and former ERA engineers at a 2008 Geek Squad lunch.
IMG_0306	Photo	Dr. Manny Block: an ERA, a UNIVAC, then a CDC engineer. Dr. Peter Patton, the second U of MN computer center director. Bill Roos, a UNIVAC programmer, taken at a 2008 Geek Squad luncheon.
IMG_0308	Photo	Alden Allen, an ERA to UNIVAC engineer at a Geek Squad luncheon with Dick Lundgren, a UNIVAC to Lockheed Martin employee and the VIP Club's Sesquicentennial coordinator.
Legacy Items Folder		
Various	various	Several documents and photos from the 2008 VIP CLUB web site: Canadian Patrol Frigate, Eagan (LMCO) ATC history, Fred Hargesheimer, ERA to LMCO logos, 1 st 'Apollo computer delivery, European Defense business, NTDS computer models photo, ERA main plant photo, Sperry Military Computers, The Invention of Voice Mail, Unisys History 1, Unisys History 2, EMCC/UNIVAC plaque, etc.

APPENDIX B – Futurist’s Viewgraphs

Computer Futures – Outline

- ★ Near Future
- ★ Technology
- ★ Nanotechnology
- ★ Quantum Computers
- ★ Applications

Computer Futures – Mass Memory

- ★ Disc memory replaced by solid state memory.
- ★ Trillions of bytes will cost pennies.
- ★ Will be embedded on devices like Internet Appliances (IAs)

Computer Futures – Near Term, Processors

- ★ Near Future
 - 100s of computers printed on a chip
 - Trillions of operations per second
 - Flexible
 - Low power consumption
 - CPU, memory and I/O devices all printed on a flexible plastic sheet.

Computer Futures – Power Supplies

- Quick charge Batteries (1 min recharge)
- Solar Recharge
- Flexible Material Charge (piezoelectric)
- Fuel Cell Batteries
- Printed Batteries

Computer Futures – Near Term Computer Futures

- ★ Supercomputer – more powerful simulations: better more accurate weather forecasts
- ★ Internet Appliances (IA) – cheap, wireless internet access. No more S/W purchases
- ★ Mainframe – database host, internet servers, IA accessed applications processor
- ★ Desktop/Laptop – soon gone, replaced by IAs

Computer Futures – Input/Output

- ★ Wireless
- ★ Voice
- ★ Touch Screens – control, writing & artist pads
- ★ Projection – Keyboard & Display (2D & 3D)
- ★ Position and Movement Sensitive
- ★ Three dimensional printers to buy & download products from the Internet

Computer Futures – Packaging

- Mainframes and supercomputers will be housed in familiar, but smaller cabinets, probably liquid cooled
- Desktops will be desk ornaments
- PCs embedded anywhere and everywhere until replaced by embedded IAs.
- PC then IA functions will be incorporated into glasses, cell phones, PDAs etc

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Computer Futures – Nanotech Computers

- A supercomputer can be printed on an 8.5 X 11 Sheet of plastic
- Computers and sensors can be integrated into clothing, paint, shingles, muscles, etc
- Nano-wires will assemble themselves into simple circuits
- Nano-wires are small enough to have quantum properties, opening more possibilities for new applications

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Computer Futures – Nanotechnology

- ★ Nanometer means 1 billionth of a meter
- ★ Nanotechnology means the creation of computer circuitry that is only a few atoms in width and depth
- ★ Nanotechnology means computers the size of molecules

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Computer Futures – Nanotech Applications

- Real (natural) control of prosthetics
- Artificial eyes near human resolution
- Computer robots will fly through your body scraping cholesterol off of artery walls
- Computer robots will monitor and repair cells
- Computer robots will hunt down and kill cancer cells & tumors
- Computer robots will build diamonds out of the carbon atoms in a sheet of paper
- Self assembling robots

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Computer Futures – Nanotechnology

- ★ Internet connection for the following:
 - computers in personal information cards with retina scan identification
 - Computers in electronic paper for books and newspapers
 - Computers in eyeglasses for heads up TV (3D) and ear-buds for music
- ★ Fuel cell power source will be embedded with the computer
- ★ Computer embedded in the brain and powered by proteins in the body

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Computer Futures – Quantum Computers

- ★ What - Computers the size of molecules
- ★ How - Quantum Weirdness
- ★ Where - Laboratories
- ★ Why - Superduper Computers with instantaneous results
- ★ When - 2050?
- ★ What For - Simulations, Cryptology & Research Analysis

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Computer Futures – Commercial

- Retail – Radio Frequency Identification (RFID)
- Manufacturing – closed/sealed/lights out factories
- Services – Internet enables work from home
- Internet – all application programs on line & accessed via Internet Appliances
- Internet Backbone – all satellite w/gigabyte speeds
- Advertising – more personal based on choices with suggestions provided on request.

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Computer Futures – Military

- ★ Planning – living plans influenced from battlefield
- ★ Logistics – RFI controlled
- ★ Robotic Weapons – remotely controlled
- ★ Robotic Soldiers integrated electronically
- ★ Robotic Ships, Airplanes, Vehicles & Drones Self navigating integrated with each other.
- ★ Communications – ultra-encrypted

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Computer Futures – Financial

- Banking – cashless society
- Stock Market – more computer control with automated buy/sell
- Personal Finances – more control over personal finances
- Total Surveillance
- Unbreakable Cryptography (until the advent of the quantum computer)

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Computer Futures – Conclusion

Computers will be more ubiquitous than ever, all aspects of life will be affected by computers.

The changes in technology, life and lifestyle in the next 25 years will dwarf all changes that have occurred in the past 75 years and the 25 years after that dwarf the previous 100 years.

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Computer Futures – Consumer

- In the Home – Central Command
- On the Road – automatic cars via GPS and on board lasers/radars
- Electronic Paper – Renewable every AM
- Electronic Books – foldable, look and feel real
- Sports – sports' wear and gear enhancements
- Games & Entertainment – do it yourself programming

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Computer Futures

Bon Voyage 2008

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Greetings 2058

End of report.