

38th year of WWII Talks

The Dr. Harold C. Deutsch
**World War II
History Round Table**

2024-25 Program Schedule
7 PM • SELECT TUESDAYS, SEP-MAY • MINNESOTA HISTORY CENTER, ST. PAUL
Round Table admission is free • Parking \$6/\$4 MHS members

5:45 PM - STUDENT OUTREACH:
Participate in informal conversations with the authors and veterans on the program topic.

2024	2025
<p>SEP 10 OPERATION MARKET GARDEN John McPherson, author of <i>Operation Eagle</i>, will discuss Operation Market Garden and the attempt for an early end to the war in Europe by the end of 1944. This historic presentation will include firsthand veteran experiences!</p>	<p>JAN 14 IBM TECHNOLOGY IN WWII Marc Wortman, author of <i>The Greatest Capabilities: How Ever-Lord</i>, will discuss the evolution of IBM technology in WWII. And Lowell Benson will talk about how the WWII glider program helped create a computer industry in Minnesota that still exists to this day.</p>


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From Gliders to Computers

Northwestern Aeronautical Corporation (NAC)
became Engineering Research Associates (ERA)

Unpublished 2016: John M. Lindley - Grant Number 1510-07526 of the Minnesota Historical Society's Historical and Cultural Heritage Grants Program. **BORN OF A WARTIME NECESSITY.** He provides the history of Northwestern Aeronautical Corporation (NAC) and its post war transformation to Engineering Research Associates (ERA). Extensive data from Charles Babbage Institute archives, cites 250+ references including 'oral interview' of Mr. Parker. .



John E. Parker, Investment Banker

- John Parker graduated from the US Naval Academy in 1922.
- He worked then was a partner in investment firms 1925-42
- John E. Parker was NAC President, 1942-46
- Chapter 6 on page 161 is Gliders to Computers.
- Mr. Parker was ERA President, 1946-52

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Thanks for the Introduction. This evening's topic is From Gliders to Computers. **We weren't there** so must rely on what others have researched and written. John Lindley via a MHS grant researched then wrote BORN OF A WARTIME NECESSITY, gliders in MN - an unpublished manuscript. John accessed Mr. Parker's interview and numerous papers at the Charles Babbage Institute. The person in charge of NAC was John Parker, pictured here with a glider in the background. As the war was ending, the NAC president looked for work for 'his' factory and employees. Chapter 6 of the manuscript is about the transition to Engineering Research Associates. More from chapter 6 in a bit.

My talk this evening has four sections: Information about gliders, bits about cryptanalysis during the 2nd WW, a few bytes about early digital computers, and the ERA successors over the last 7 decades.


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NAC to ERA Topics

1. Gliders in Minnesota, 1942-46
2. US Cryptanalysis, 1932-196x
3. Computer History, 1940s-60s
4. The Outgrowth of ERA

- ✓ <https://vipclubmn.org/Articles/NACbecameERA.pdf>
- ✓ Kenneth W. Bush was the Industrial Relations manager for NAC
- ✓ Ken was the Human Resources manager for ERA
- ✓ Ken's son Tom and grandson both worked for ERA successors;
- ✓ Tom donated the badge to the Lawshe Memorial Museum in S. St. Paul, MN.



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Serendipitous? Last August we posted the ERA portions of Dr. Lindley's manuscript online as a monthly 'Our Stories'. Then Col. Patton invited me to talk after the IBM presentation in January.

Mr. Parker wasn't the only person that was part of both NAC and ERA.

Ken Bush was there and part of both – his son was a production engineer, part of ERA computer history and outgrowth. His grandson was an engineer as the company(s) evolved in the 90s.

Ghis Devlaminck, one of our VIP Club directors put together a few slides about gliders – Our Stories, March 2014.



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Photo and slide by Club Director Ghis Devlaminck

WW II Glider Manufacturers

1. Ford Motor Company's Kingsford (4,190)
2. **Northwestern Aeronautical Corporation of St. Paul (1,510)**
3. Commonwealth Aircraft of Kansas City (1,470)
4. General Aircraft Corporation of Astoria, L.I., NY (1,112)
5. Gibson Refrigerator of Greenville, Michigan (1,078)
6. Waco Aircraft Company of Troy (999)
7. Pratt-Read of Deep River, Connecticut (956)
8. Nine Other Manufactures (2,515)

Total Built 13,830

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This plaque snapshot and listing shows that NAC was the second largest Cargo Glider manufacturer during WWII.

Why Minnesota? In the late 30s John Parker worked at an investment firm that specialized in funding airline companies. Then he became a partner in a company that was financing Northwest Airlines in Minneapolis. That firm was also financing Porterfield Aircraft Co. in Kansas City MO. Mr. Parker was sent to assess the Porterfield company – when there, he recommended that they shut down, the owner and most of the employees left.

Porterfield had proposed building gliders to the Army Air Force – so Parker had the proposal and about \$9k of equipment. He arranged to create NAC, initially in a Northwest Airlines building. On March 1st, 1942, NAC received a contract for 30 gliders.

If you picked up the round Tablette, there are more details therein.

Although mostly for infantrymen transporting, they also be used for equipment.

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CG-4A (Cargo Glider 4A) aircraft was designed to carry a payload of 3,750 pounds. Payload consisted of a pilot, copilot, and thirteen glider infantrymen; or instead of the infantrymen, a 75 mm howitzer or a quarter-ton jeep.



- Expansion factory at 1902 Minnehaha Ave in St. Paul, MN.
- Buildings purchased by Government in 1942, then leased to NAC.
- Frames welded by De Ponti Aviation Company, woodwork by Villaume Lumber.

Glider frame snapshot from Club Member Dean Van De Walker

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The left phot shows two frames, sort of an assembly line – workers in the background.

The government acquired facility is at the right. It was located at 1902 Minnehaha Ave. in the Midway Area of St. Paul and leased to NAC.

Ghis had visited a French Glider Airborne Museum near Normandy.

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Photo and slide by VIP Club Director Ghis Devlaminck

CG-4A Glider Airborne Museum, Normandy France



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Many historians have written about D-Day on June 6th, 1944! I was just 6 years old at that time and oblivious to international events. (night blackouts in LA because of suspected Japanese sub spotting?)

Villaume was offered a relic frame from Missouri then set out to rebuild a glider with volunteers.

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From 2007 to 2012; a Villaume led team devoted countless hours to restoring a CG-4A, the beginnings of which were in a Missouri field.

VIP Members Saw the Villaume Inc. Restoration Work in Eagan



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The retirees club became aware of the restoration work, our board toured the Villaume warehouse then set up tours for Club members as part of a 2012 Last Bash at Lockheed Martin.

Look at the top left picture – standing next to the wing is Don Patton who was with us on February 3rd, 2012. Sadly, four retirees pictured here have passed away.

Gish also toured the Fagen WWII Museum in Granite Falls.

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The restored glider can be seen at the Fagen Museum in Granite Falls, MN. www.fagenfighterswwiimuseum.org

Photo and slide by
Ghis Devlaminc

CG-4A Inside Views



- Glider designs came from Waco in Troy OH.
- NAC had built a few other models
- CG-4A production ended abruptly in 1945

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Although the primary gliders built in Minnesota were the CG-4As, a few other models were also built according to the John Lindley manuscript.

Mr. Lindley's paper also identified a plethora of bankers, directors, etc. that were part of the NAC management team.

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Cryptography Equipment

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- ❖ Major WWII messages in need of code breaking were encoded by the German Enigma machine.
- ❖ In the late 30s and into the 40s, kids had a single 'wheel' encoder ring.
- ❖ The 3-wheel Enigma had ~625 code combinations – the 4-wheel about 15,000.
- ❖ The Brits and US Navy had captured a few Enigma machines BUT the settings for the day(s) were rarely found!
- ❖ Und Schreiben war auf Deutsch; das macht es ganz schwer zu lesen.



Decoder Ring and three-wheel Enigma from former ASA/NSA guy.



Four-wheel Enigma from Chicago Science & Industry Museum.

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Bullet 2. Even kids exchanged private messages between themselves using single letter substitution. Code 8 for example shifted the alphabet by 8 places so A would be H, B would be I, etc. Crypto-quizzes in newspapers use letter-by-letter substitutions, but not sequential as a single ring substitution.

What was the problem to solve? The initial settings of the three, then four code wheels of the Enigma. The message recipient had to have the same settings to de-code then read the intended message. Apparently different on a day-by-day basis or organizational day-by-day.

Capture of a few of these machines was highly classified thus ... not in the usual history books nor newspaper reports.

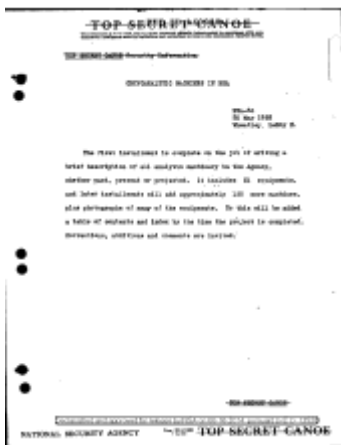
This is not the forum for those discussions!

One of the Club's Legacy Committee members, Keith Myhre, found some de-classified documents while searching the web. The last from a HS classmate who had worked for CDC and Cray at an NSA site.

De-Classified 'Equipment'

Most cryptanalyses is reduced to counting, comparing, rewriting, and referring!

A60928 – Cryptanalysis Machines in NSA,
30 May 1953: declassified June 16, 2014



A656071 – Machines in the service of Cryptanalysis, 28 Sept 1954:
declassified Nov. 13, 2013

A6586784 – History of NSA General Purpose electronic Digital
Computers, 1964; declassified Feb. 2004.

A6586785 – NSA's Key Role in Major Developments in Computer
Science; declassified July 2017.

<https://vipclubmn.org/OurStories.html#unpub>

- **Entries go back to 1932/5!**
- **Over 150 equipment type acquisitions by Navy and Army organizations.**
- **Companies mentioned are Eastman Kodak, ERA, IBM, NCR, RRU, Control Data, UNIVAC, ...**
- **There was interaction with England**
- **Some info blocked out during declassifications in the 2000s – although 40 to 50 years old.**
- **IBM equipment was, in general, rented**
- **ATLAS delivery from ERA, Engstrom who had worked on Bombe noted as ERA head.**

1/9/2025

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Crypt analysis

Very few people have been exposed to cryptanalyses methods; We have links to these papers on our website. Read one of the doc titles: [READ the Bullets.](#)

One entry says that about 1932 the Navy bought IBM card sorting equipment and the Army followed a few years later. So, equipment was either purchased or developed to facilitate decoding of intercepted messages. Even though these documents were declassified in the 2000s, some things were still blocked or cut out.

After WWII the Navy had asked NCR, Kodak, IBM if there was interest in continuing the classified work. There was not so a new company was a possible solution.

Many Minnesotans recognize the name William 'Bill' Norris as the founder of Control Data Corporation. We found his WWII story in an unpublished paper.

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Cryptanalysis, etc. during WWII

- 1932, Electrical engineering degree from U of Nebraska
- 1934, salesman for Westinghouse.
- 1940, hired by Navy Bureau of Ordinance.
- 1941, Navy reserve commission, assigned to Communications Intelligence (COM INT) – mission was to identify German U-Boats by unique characteristics of their radio transmissions.
- 1943, assigned to research under Capt. Howard Engstrom – Their most important contract was with NCR for the design and production of electromechanical and electronic equipment to speed up the decoding processor, i. e. Bombe. NCML was there.
- 1944, the trip to Germany included a stopover at Bletchley Park, England.
- 1945, US/Japan war ending; Engstrom and I started discussing our return to civilian life.

70 Years Ago, January 2016!

Bill Norris was one of the founders of Engineering Research Associates. The VIP Club recognizes that event with Mr. Norris' experiences before that time.

William C. Norris



World
War II
Experiences

Advisory

This electronic file was created in August 2015 by scanning a paper document donated to the VIP Club's IT Legacy Committee in 2006. The committee was in its infancy at that time thus did not record the paper's donor. The paper is now archived at the Charles Babbage Institute at the University of Minnesota.

Other IT legacy information is available at <http://www.vipclub.org>. Scanning and formatting to the web was by Lowell A. Benson, webmaster and 2014/15 VIP Club President.

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1941 – listening stations set up along the East coast

1943 - NCML – Naval Computing Machine Laboratory at NCR.

1944 - If you get a chance to watch the movie Imitation Game, it is about Bletchley Park and Alan Turing – a WWII cryptologist and digital computer pioneer.

From Lindley's manuscript.

Col. Talbott of the Quartermaster Corps in Chicago invited Engstrom and Meader from NCML to meet with John Parker! Their boss, Capt. Wenger of OP-20, was on-board, and then Admiral Nimitz told Parker that there was a job for him to do! Thus, ERA was created with Parker as President and Norris, Engstrom, and Meader as VPs.

Since ERA had no gov't contracting record, their first contract was via NAC.

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ERA Products

- 1946, N6-0NR-240, Task 1, which called for "an investigation and report on the status of development of computing machine components – re-print in 1950, HIGH SPEED COMPUTING DEVICES, .."
- 1947, J. M. Coombs paper, STORAGE OF NUMBERS ON MAGNETIC TAPE, a reprint from Proceedings of the National Electronics Conference. It illustrated tape on a drum w/circuits!

The chart shows a timeline from 1946 to 1956. Key milestones include: 1946 (ERA founded), 1947 (Task 13 ATLAS I ERA 1101), 1948 (Various Classified Systems: Goldberg, Stinson, Hectate, Robin, O'Malley, etc.), 1950 (Task 29 ATLAS II ERA 1103), 1952 (ERA 1102), 1953 (SHA - Sandford Burger), 1954 (ERA analysis completed), and 1956 (Sperry - Sandford Burger). A box labeled 'ERA 1101 to ERA 1103A Development Timeline' spans from 1946 to 1956.

- ❑ The 1950 book has no mention of the ERA classified systems that had been delivered nor the ATLAS I in design – just circuits used in computer equipment.
- ❑ J. M. Coombs had been at NCML, worked at ERA, then transferred to IBM.
- ❑ In 1952 ERA built magnetic drum 1102 computers for online data reduction and open-loop control of experiments at USAF's huge Arnold Engineering Development Center in Tennessee.
- ❑ The 1104 was built for the AF BOMARC missile launch at Eglin, etc.

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As ERA started, their first product was from the Office of Navy Research, Task 1. This describes a plethora of ‘tube’ circuits used in equipment from many companies. After receiving the report in late ‘47, ONR decided to go public so authorized McGraw Hill to publish it for the public. Not surprising that none of the ‘classified’ systems being built for NSA crypt analysis in the late 40s are mentioned, Goldberg, Demon, Hectate, Robin, O’Malley, .

Here is another NCML engineer who went to IBM. Mr. Coombs was an MIT electrical engineering graduate student before going to NCR in Dayton in the early 40s.

Another article found by Keith Myhre – LCDR Snyder was there, i. e. part of the ATLAS computer delivery.

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Originally published in the Spring 2001 - Volume 4, No. 1 The Link, Bulletin of the National Cryptologic Museum Foundation, Inc. [ATLAS AND THE EARLY DAYS OF COMPUTERS](#) By Harlan C. Snyder, LCDR USNR, Ret.

- Snyder graduated from Iowa State in 1948, was commissioned: then assigned to the ATLAS project which was underway at NCML. The Naval Computing Machine Laboratory at 1902 W. Minnehaha Avenue in St. Paul. NCML had been moved from NCR in Dayton, OH.
- “ERA personnel included Project Engineers Frank Mullaney and Jack Hill. Frank had been a television engineer at KSTP, St. Paul; Jack was from 3M. Other engineers and technical staff were Warren Burrell ..., Arnold Cohen from the University of Minnesota and RCA, Arnie Hendrickson, Sid Rubens (magnetic drums), **Dave Noble (who had been at the original NCML in Dayton, Ohio in WWII and later was a key inventor of the floppy disk at IBM)**, Joe Keller (who had been at RCA and was experimenting with CRT "high speed" digital storage), George Hardenbergh, and Bill Keye {sic. Keye and Mullaney went to CDC.}
- ATLAS was shipped from St. Paul in Pullman and Railway Express cars, with armed Naval personnel escort, to the Bureau of Ships/NSS (Nebraska Avenue) in November 1950. The individual ATLAS cabinets were loaded on a spur track which came into the ERA premises. In Washington it was transferred by truck to Nebraska Avenue, installed, and brought up and running by ERA personnel in less than two weeks. I returned to Washington at this time and remained with ATLAS doing training and maintenance until transferring to destroyers at the end of 1951.

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A couple of clips from his article – note an NCML engineer who was at ERA then at IBM.

A firsthand story of the ATLAS shipment.

Here are a few books that talk about the ERA beginnings and about Bill Norris.

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Perspectives of ERAs Beginning and Evolution.



- Colin Burke presented the *Secret in Building-26* at a 2012 WWII symposium at Ft. Snelling. Includes NCR and the Navy Computing Machine Laboratory (NCML).
- Dave Lundstrom was a UNIVAC engineer who went to work for Control Data Corporation, thus *A Few Good Men From UNIVAC*. Dave had been a VIP Club member.
- Capt. David Boslaugh, USN ret. wrote about the evolution of rugged computers and their peripherals.
- Dr. Thomas Misa was an advisor to the committee for a decade during which time he wrote about computer developments of several Minnesota companies.
- Don Hall was a CDC employee then a stockbroker which led to his history book. I think that he has a few copies here this evening if anyone is interested.

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READ THE BULLETS

The Secret in Building 26 is about the WWII crypt-analysis equipment, i. e. bombe and how they worked with the British Bletchley Park efforts to break the German enigma enciphering.

Good men from UNIVAC by Lundstrom tells of the CDC beginning.

When Computers went to Sea – During the Korean conflict, the Navy realized that their methods and radio systems could not keep up with jet aircraft nor missiles so specified the Naval Tactical Data System. UNIVAC and successors have produced four generations of Navy computer equipment since the late 50s – Navy ships have been using GPS since 1964, programmed by Arlyn Solberg. And when the USS Minnesota submarine was launched in 2013 it had S/N 8,000 AN/UYQ-70 on board.

Tom Misa’s book became the basis for TPT’s documentary. 2nd Director of CBI and 2nd holder of the ERA Land Grant Chair for the History of Technology.

Don Hall wrote about Control Data’s impact on the financial world. Don, stand up and wave.

Warren Burrell wrote his micro-bio for our Legacy Anthology. He had been in the AF toward the end of WWII, with a cryptographic clearance.

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Legacy micro-bio: Warren Burrell, 1948 to 1973; at ERA and ...

- My first job was on Demon I under project engineer, Jack Hill.
- IBM, I understood, was very favorably impressed with the ERA Drum Storage Technology and therefore entered into a no revenue overall patent exchange. Our effort to design the IBM 604 with an ERA Drum was not satisfactory. We three (George Hardenberg, Arnold Cohen, and Warren Burrell) were to prepare a paper design employing punched cards and drum. I had fun learning 'excess three binary arithmetic' from George. **John Coombs was persuaded to join IBM.** His early ERA patents included selective alteration on drum memory. Our paper designs were circulated among the six or seven IBM laboratories. Some questions came back but no details as to application until IBM announced the 650 {sic 1953} and it became the first large scale production computer.
- I was midway through the design of the Task 29 (1103) arithmetic section when I was told to be project engineer for three computers for data reduction at Arnold Engineering Development Center (AEDC). More than 40 years later at the 40th reunion of the AEDC facility it was made very clear to me that it was the impact of the 1101 that really sold the development that became the 1102s.
- Gordon Welshman was a man of many words, consulted with us on many subjects. He had been in charge of Hut 6 at Bletchley Park in England where his efforts, and more particularly Alan Turing cracked the German Enigma code during WW II.

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Jack Hill had been one of the ATLAS installation engineers.

Warren also had had some interactions with IBM in the early days of ERA.

We have another unpublished paper on our Legacy Anthology – Dr. Champine perspective of the IBM work mentioned by Mr. Burrell.

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Unpublished 1979: By George Champine, PhD, chapter 3 from the Hagley Museum archives,
<https://vipclubmn.org/Articles/TheFirstComputerCompany.pdf>

➤ Well before the 1101 announcement, ERA was becoming known in the infant computer industry. In 1949, ERA contracted to do a paper design for IBM on a punched card, magnetic drum computer system intended for business use. ERAs design was to be judged competitively with those of two internal IBM groups. Few if any of ERA's technical contributions seem to have found their way into what eventually became the IBM 650. However, two extensive patents came out of the effort, and these were assigned to IBM as sponsor of the project. In addition, a cross-licensing agreement between ERA and IBM gave IBM access to ERA's then pending patents in magnetic drum storage.

At this point, a short review of some of the important milestones should clarify the overall course of events. These are:

- ✓ Idea of ERA Conceived Summer 1945
- ✓ Incorporation of ERA January 8, 1946
- ✓ First Navy Contract June 1946
- ✓ Delivery of 1101 (ATLAS) December 1950
- ✓ Remington Rand purchase of ERA December 6, 1951
- ✓ Delivery of 1103 (Atlas II) October 1953.



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This corroborates Warren Becker's bio story!

BTW, if you look over the IBM history web site for the 650, you'll find a snapshot of a drum memory that looks a lot like the ones that we have at the Lawshe Memorial Museum.

Dr. Champine's photo and bio was given to the Legacy Committee by his brother John whom I had met during a U of MN CSE alumni meeting.

Slide 16

I found an article that compared the performance of computers, I have extracted some early machines:


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In 1966 Dr. Kenneth Knight analyzed the performance of 225 computers. (Knight in ***Datamation***, Changes, pp. 40–54, and *Evolving Computer Performance*, pp. 31–35). He used two formulae to ascertain scientific and commercial operations per second.

Year	Computer	Scientific Ops	Commercial Ops	Memory
1944	Harvard Mark I	0.0379	0.0406	Paper Tape
1946	ENIAC	7.448	44.65	Delay Line
1949	BINAC	21.75	11.7	2 Delay Lines
1950	ERA 1101 (ATLAS)	682.5	301.8	Magnetic Drum
1950	SEAC	102.8	253.8	Delay Line
1950	Whirlwind I	110.7	45-57	Delay Line
1951	UNIVAC I	140.1	271.4	Delay Lines
1952	EDVAC	31.56	14.86	64 Delay Lines
1953	IBM 650	110.8	291.1	Magnetic Drum

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Note that the ERA 1101 and IBM 650 with Magnetic Drums had better performance than those with delay line memories.

We've had communications with the CHAP director Mark Greenia.

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ERA OUTGROWTH
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The Computer History Archives Project (CHAP) in CA has 32 ERA/
UNIVAC/ Sperry videos among its collections, linked from our website.

Computer History: UNIVAC, ERA, ...
by Computer History Archives Project (CHAP)
Playlist • 32 Videos • 4,087 views
A fascinating early history of UNIVAC / ERA family of computers from the beginnings of the top...
[Play all](#)

- 1 **Computer History "Engineering Research Associates" ERA 1101 UNIVAC Cryptology 1946 Sperry Rand NSA**
Computer History Archives Project (CHAP) • 14K views • 5 years ago
- 2 **Computer History 1949 -1960 Early Vacuum Tube Computers Overview, History Project Educational**
Computer History Archives Project (CHAP) • 111K views • 6 years ago
- 3 **1951 UNIVAC 1 Computer Basic System Components First Mass Produced Computer in U.S.**
Computer History Archives Project (CHAP) • 71K views • 6 years ago
- 4 **1979 - Introducing Sperry Univac System 80 Computer History, Educational, Vintage Unisys,**
Computer History Archives Project (CHAP) • 29K views • 7 years ago
- 5 **NASA Computers 1957-1959 IBM 704 - VANGUARD SATELLITE Launch "Science in Space" (Burroughs...**
Computer History Archives Project (CHAP) • 41K views • 3 years ago

The west coast followed the Silicon Prairie. Of CHAP's hundred-some YouTube videos, his first **group catalogue** was of our history equipment and systems. One of the videos talks about both IBM and UNIVAC computers.

Almost Silicon Valley, Pioneer Press January 3, 2010, by Tom Webb – maybe we were the Silicon Prairie.

A bit more from Mr. Champine' s paper:

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ERA OUTGROWTH

Unpublished 1979: By George Champine, PhD, chapter 3 from the Hagley Museum archives,
<https://vipclubmn.org/Articles/TheFirstComputerCompany.pdf>

- By 1954, despite its head start, Remington Rand had started to lose ground against IBM. IBM announced its 702 and 705 against the Univac I and its 704 against the 1103. Remington Rand countered belatedly with Univac II and the 1103A. But by 1955, it was clear that Remington Rand had neither the management nor the fiscal resources to maintain a position of market leadership. James Rand recognized the implications of Remington Rand's position and as had John Parker before him, sought a stronger partner. On June 30, 1955, Sperry Gyroscope Co., and Remington Rand, Inc. merged to form the Sperry Rand Corporation
- The fall of 1955 the Eckert Mauchly, the Norwalk Laboratories, **Engineering Research Associates**, the Remington Rand tabulating machine business, and the Electronic Computer Sales Department, were unified into a single electronic computer division. October 1, 1955, William C. Norris, head of ERA in St. Paul, was appointed as the first general manager of a newly consolidated Univac Division.

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ERA's 1st parent company, Remington Rand was in competition with IBM.

Sperry headquarters were in NY, their management demeanor contributed to Mr. Norris being part of the spin-off to Control Data Corporation.

Since 2005 the retirees club Legacy Committee has been on a quest to *tell the story* of ERA – thus this corporate name icon.

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ERA OUTGROWTH

- Even though the corporate name kept changing, many engineers had multi-decade careers.
- Like the energizer bunny, MN engineers & companies supported FAA and US Navy systems for decades!
- We have a 60-chapter Legacy Anthology, items from over 600 people – Pick your topic, search for friends, make editorial comments, or add your story:

1946 TO TODAY

LEGACY COMPANIES:

ENGINEERING RESEARCH ASSOCIATES

Remington Rand (1952)
Sperry Rand **UNIVAC** (1955)
Sperry **UNIVAC** (1973)
Sperry (1979)
Burroughs merger (1986)
U **U**nisys Defense Systems (1986)
N **N** Paramax (1991)
I **I**nisys, GSG Electronic Sys. (1994)
S **S** Loral (1995)
Y **Y** Lockheed Martin (1996-2012)
S **S** Leidos, PDA

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<https://vipclubmn.org/Legacy.html> Thank you, Questions?

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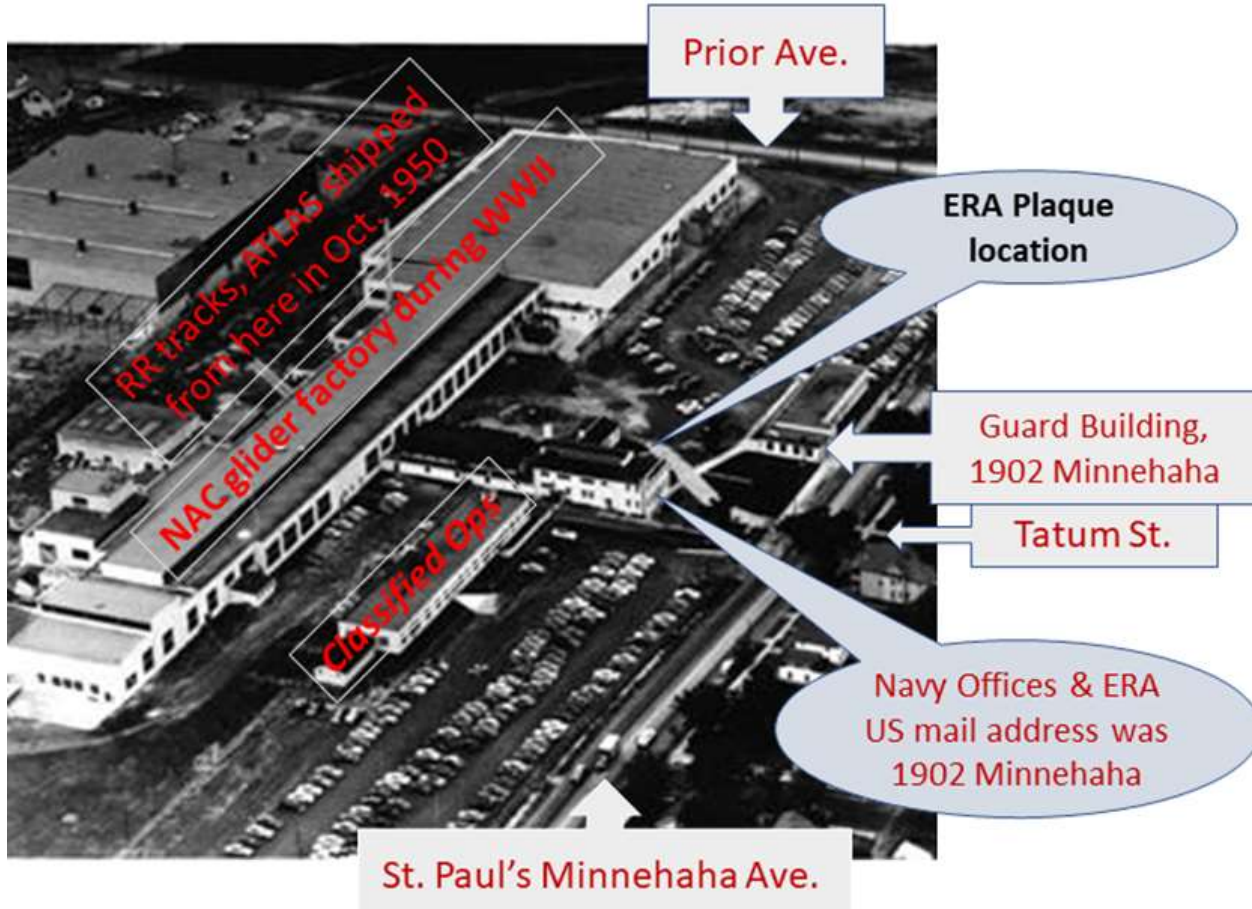
I had 33 ½ years with the companies from 1960 to 1994.

FAA systems are at Leidos and Navy systems at Product Development Associates. UNISYS has commercial operations in Eagan, moving to Woodbury later this year – provide CLOUD services.

We proclaim that ERA was the World’s First Computer Company: IBM, Remington, and Sperry bought their way into the industry. Although the name UNIVAC came from Eckert-Mauchley Computer Corporation, EMCC was incorporated 7 months after ERA.

Let me wrap up so that you can get home to your families.

There is an ERA commemoration plaque at the ERA St. Paul site, thanks to the Ramsey Co. Historical Society, Mr. Don Hall, et al'. June 13, 2023 details are our July 2023 Our Stories, https://vipclubmn.org/Articles/ERA-History_Talk.pdf.



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