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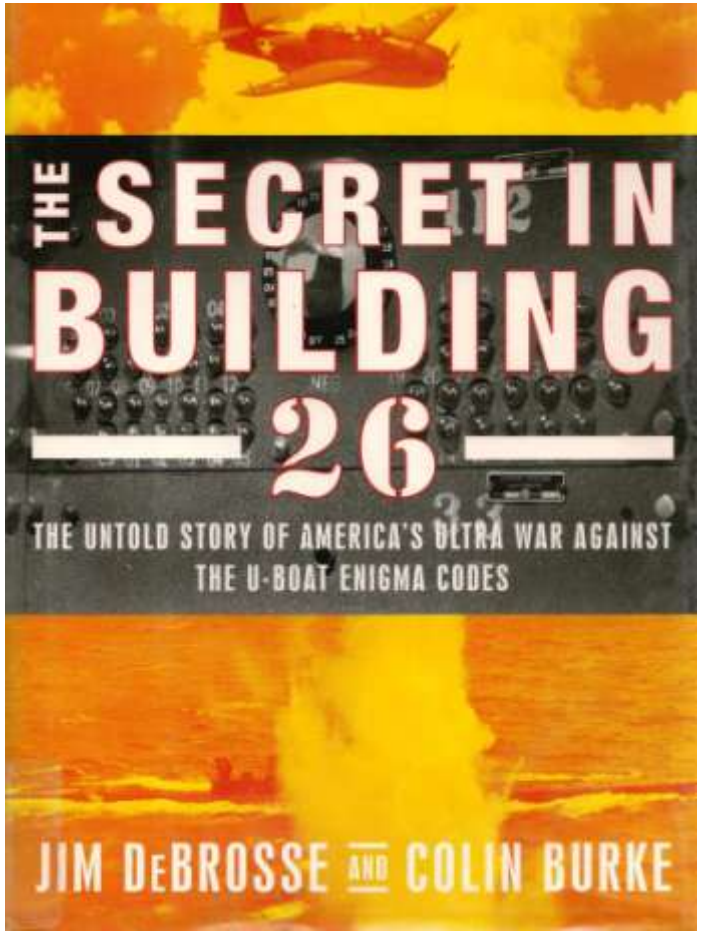
WW II History Round Table

February 9, 2012 at the Ft. Snelling History Center

"Code-Breaking and the Beginning of Computers"



'Bldg-26 Sequel'

OR

'Another Untold Story'

by

Lowell A. Benson

UNIVAC 1960 => UNISYS 1994

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Sequel?

- As WW II ended, the Navy, concerned that the makeup of the CSAW* team be preserved in peacetime, offered civil service appointments to several members including Engstrom and Norris – Engstrom suggested that they form a private company.
- They were joined by a new partner, Capt. Ralph I. Meader, who had headed the **N**aval **C**omputing **M**achine **L**aboratory (NCML) which manufactured devices for CSAW at NCR in Dayton, Ohio.
- The result was Engineering Research Associates (ERA) located in an old glider factory in St. Paul, MN

*Communications Supplementary Activities, Washington

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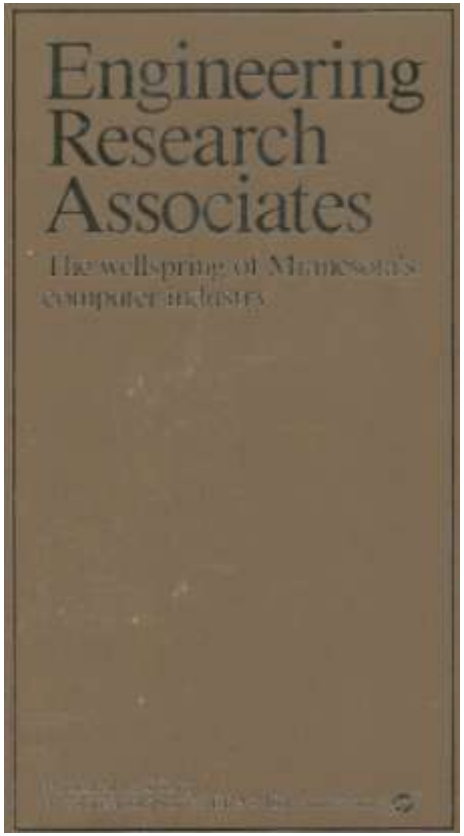
Sequel?

- Sperry published a 1986 booklet in commemoration of ERA's 40th anniversary – **E**ngineering **R**esearch **A**ssociates - The wellspring of Minnesota's computer industry
- Several people mentioned in Colin Burke's book are part of the ERA story. [Engstrom, Norris, Meader, Welchman, Eachus, …
- "The company hired nearly 40 more CSAW staffers as well as several veterans of the Naval Ordnance Laboratory and the Office of Naval Research and moved them to the NAC plant in St. Paul."



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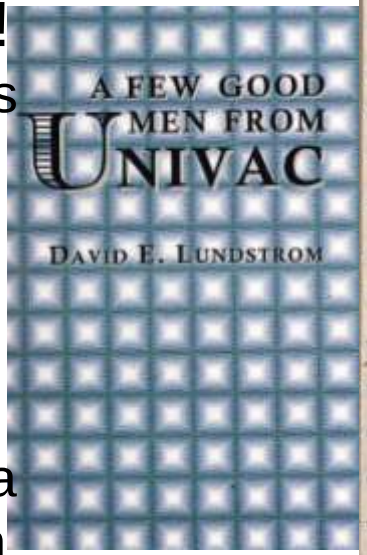
Sequel Sequels

ERA is more than a history footnote!

1. David Lundstrom's 1987 book chronicles the Control Data Corporation (CDC) beginning as part of his career history.
2. The CDC founder, 'Bill' Norris, was one of the ERA founders and a Bldg 26 projects veteran.
3. Illustrated in this time-line chart are but a third of Minnesota companies which can trace their lineage back to ERA.
4. CDC became the best known Minnesota computer company, Cray Research is also a spinoff.
5. The **impact** of all of these companies to **Minnesota's economy** is into the **billions of $s** since the late '40s.



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Code-Breaking and the Beginning of Computers

Reference: Department of Defense history: History of NSA [**N**ational **S**ecurity **A**gency] General-Purpose Electronic Digital Computers, Samuel S. Snyder, 1964 - Originally released under NSA FOIA 41023, **2/9/2004** - Requested and re-released under Mandatory Declassification Review in June 2009

"For the 15 years beginning about 1935, NSA's predecessors used punched-card equipment to attack wider and wider ranges of problems. During this time many special-purpose machines were also built, including some designed as attachments to punched-card equipment. The use of punched card equipments as general-purpose tools continued to grow until, by the end of World War II, 750 machines had been installed."

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More NSA Quotes

- Punched-card equipment -- keypunch, reproducer, sorter, collator, and tabulator -- were the forerunners of the electronic computer in every respect excepting speed and automatic operation. This is true because of the use of the punched-card as a unit record, flexibility of plug board together with switching capabilities in each machine, and versatility inherent in successive card passes through different equipments. The following types of data analyses could be done using punched-card equipments: expanding, reproducing (Reproducer) - distributing, sorting (Sorter) - merging, selecting (Collator) - counting, printing (Tabulator)
- In addition to operating an extensive computer installation, NSA has been a prime sponsor of computer developments. Of the nine electronic computer projects discussed in the following sections, two, ABNER and CUB, were designed and built by NSA (or predecessor) personnel. The rest were built under contract, following logical designs conceived or inspired by NSA personnel. ***ATLAS I****, ABNER, BAKER, NOMAD,* ***BOGART****,* SOLO, CUB, **ATLAS II**, and ***UNIVAC 1224A*** *(CRISPI).*

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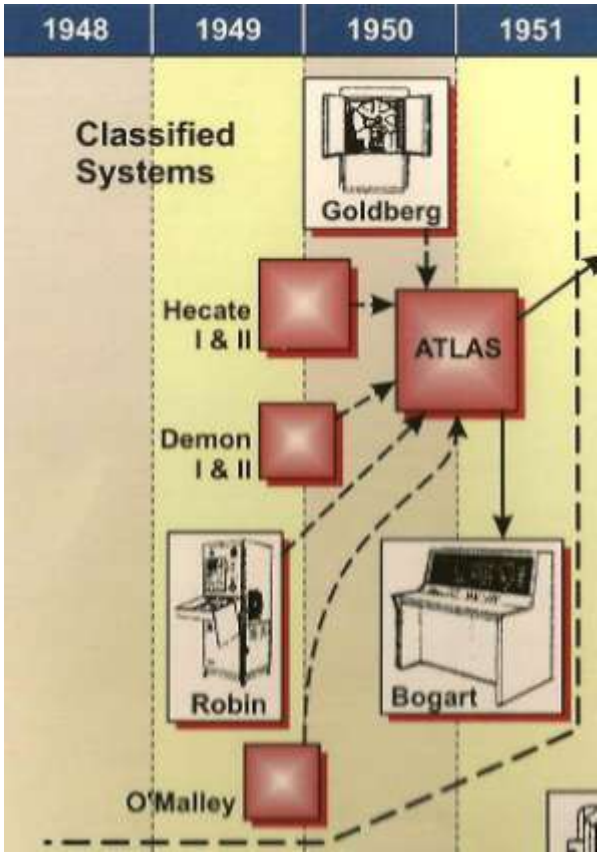
Will We Ever Know?

A Sperry Computer Genealogy Chart shows some ERA Classified Systems:



- The 2009 declassified NSA 1964 report identifies the ERA Goldberg, Bogart, and Atlas machines as NSA sponsored.
- A 1959 Remington Rand UNIVAC products book lists the Demon, Hecate, and O'Malley computers as "special purpose computing system that was designed and built for the U.S. Navy. Its specifications are classified."
- That 1959 book lists: "Robin I and II are special-purpose, analytical computers designed for military purposes. All information is classified."
- The 1959 book lists Atlas, Goldberg, NTDS*, and Warlock as having classified applications.
- Also, a dozen 'classified' peripheral and sensor devices are listed for Navy, Air Force, and Army applications.

*Naval Tactical Data Systems

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More Sperry Booklet Quotes

- At a 1947 symposium, Dr. Arnold Cohen introduced two terms that would become commonplace in the computer industry: volatility and non-volatility.
- ERA began development of non-volatile magnetic drum memories – information remained intact whether power source is on or off.
- ERA magnetic drums were utilized in two special purpose calculating machines, code named Goldberg and Demon, delivered to CSAW in 1948.
- The Navy's confidence was rewarded. The Atlas I computer … was delivered to Washington, D.C. in October 1950. "It's my belief that Atlas I was the first American stored-program electronic computer to be delivered – delivered in finished, working condition," observes Cohen.

The 'Goldberg' Drum prototype is in the Minnesota Historical Society Museum

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Telling the Other Story

In 2005 the VIP Club & LMCO began a Legacy Committee – collecting artifacts and documenting the ERA IT Legacy as a web site anthology; over 250 ex-employees have contributed their career summaries and/or project/product stories.

- A 66-year LEGACY of Defense Industry **I**nformation **T**echnology (IT) developments and applications started in 1946 with **E**ngineering **R**esearch **A**ssociates (ERA) at 1902 Minnehaha Avenue in St. Paul, Minnesota. This Information Age Legacy merged and diverged through the corporate ownerships of Remington Rand, UNIVAC, Sperry, UNISYS, PARAMAX, Loral, and Lockheed Martin.
- Lockheed Martin MS2 in Eagan, Minnesota triggered the end of this defense industry IT Legacy with their November 2010 announcement of an Eagan facility closure in 2013.
- CBI Director Dr. Tom Misa is a Legacy Committee advisor.

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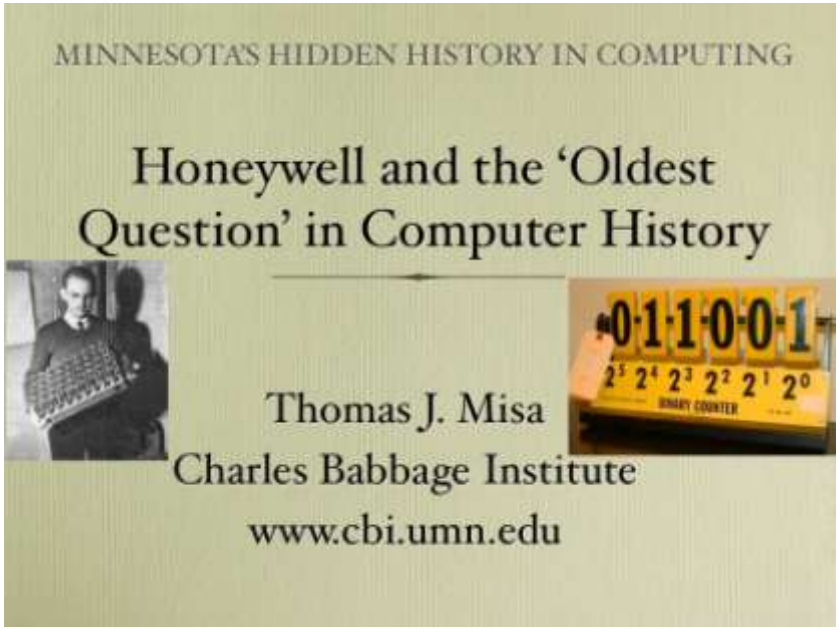
Telling the Other Story

Dr. Tom Misa began his 2009/10 “Minnesota’s Hidden History In Computing” lecture series with the history of ERA.



	Year	01?	compute	program
Zuse Z3	1941	B	mechanical	film stock
ABC	1942	B	electronic	(no)
Colossus	1944	B	electronic	patch cables + switch
Harvard Mk1	1944	D	mechanical	paper tape
ENIAC	1945	D	electronic	patch cables + switch
Manchester	6/48	B	electronic	stored: Williams tube
EDSAC	5/49	B	electronic	stored: 32 delay lines
BINAC	9/49	B	electronic	stored: 2 delay lines
NBS SEAC	5/50	B	electronic	stored: delay line
ERA Atlas	10/50	B	electronic	stored: magnet drum
EDVAC	49-51	B	electronic	stored: 64 delay lines

The Question? “Who invented the computer?” An enigma or who did what first; i.e. 1st commercial computer, 1st stored-program computer, 1st delivered computer, 1st transistorized computer, 1st integrated circuit computer, …, etc. Wikipedia and the web have many ‘opinions’, some without citing a confirmed source of the stated ‘fact.’

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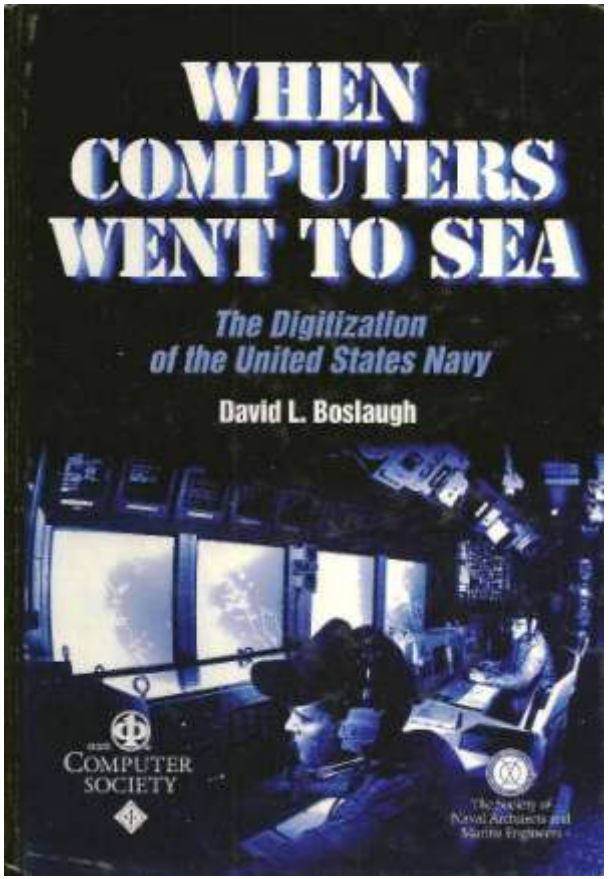
Telling the Other Story

Capt. David Boslaugh - US Navy, ret., told parts of the ERA story in 1999.

Chapter 3 is “The Codebreaking Computers – A Digital Solution”

> The reason for heightened Navy interest in radio message cryptanalysis, compared to the Army program, could be explained by greater reliance of land armies on telegraph and telephone wire communications whereas if forces afloat wanted to communicate ‘instantaneously’ over long distances, radio was their only option. Accordingly, during the 20 years between 1921 and 1941 the navy spent three to five times as much on radio intercept and codebreaking activities as did the Army, ….



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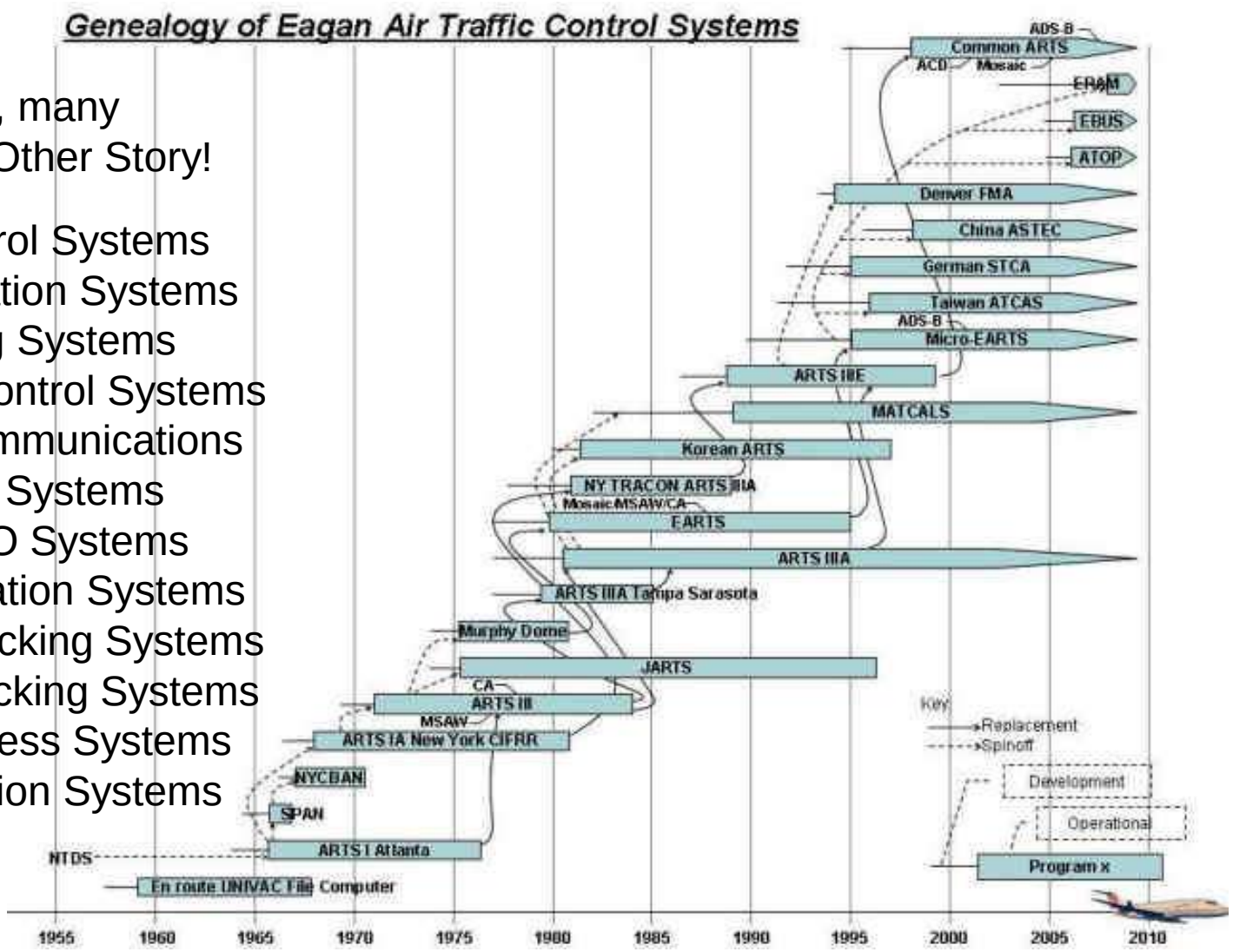
Telling the Other Story

There are many, many chapters in the Other Story!

- Air Traffic Control Systems
- Airline Reservation Systems
- Carrier Landing Systems
- Command & Control Systems
- Fiber Optic Communications
- Missile Launch Systems
- NATO & SEATO Systems
- Satellite Navigation Systems
- Space junk Tracking Systems
- Submarine Tracking Systems
- Telemetry Process Systems
- Voice Recognition Systems



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Reference Sources

- NSA document re-print available on our web site, http://vipclubmn.org/Documents/NSA-HGPEDC_1964.pdf
- A Few Good Men from UNIVAC – public library
- When Computer's Went to Sea - IEEE or public library
- Sperry's 40th ERA anniversary booklet – reprint copies here
- Univac Products Book, 1947 to 1959 – will be at the Charles Babbage Institute
- Minnesota's Hidden History in Computing, http://www.cbi.umn.edu/resources/MHHC/index.html - Dr. Tom Misa holds the ERA Land Grant Chair in the History of Technology
- Our Club and *IT Legacy* web site – http://vipclubmn.org

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Thanks for Inviting Our Participation

The VIP CLUB was created in 1980 as the Sperry Retirees Club - a non-profit, social and service organization. Today, we are over 1,000 retirees and former employees from UNISYS, Lockheed Martin MS2 and the Twin Cities 'heritage' companies as illustrated in this *IT Legacy* icon.

Lowell A. Benson – BEE, U of MN, 1966

- *VIP Club* President 2011, VP 10/09, Treasurer 08/07, Director '06, Associate '05
- IT Legacy Committee co-chair since October 2005
- U of MN Center for Transportation Studies, 1994-2001 (Engineering Manager)
- UNIVAC 1960 (file clerk) => UNISYS 1994 (Senior Staff Systems Engineer)
- Engineering Consultant 'Gigs', 1985 => 2009
- Selective Service Board (standby), St. Paul, 1981 – 2001
- 328th MI detachment (reserves) at Ft. Snelling, 9/60 – 3/63
- US Army Security Agency at Monterrey, CA & Germany, 7/57 – 6/60
- MN National Guard at Minneapolis Armory, 9/56 – 6/57