FOREWORD

The Center for Cryptologic History (CCH) is remembering the people on the cryptologic front who contributed mightily to victory during World War II. After the discovery of photographs from Arlington Hall Station in northern Virginia and the U.S. Navy’s communications annex in the District of Columbia, CCH wishes to share some of these images with you. (The collection and this calendar also include a few photos from shortly after the war and from other locations.)
Glossary

ADFGVX: A cipher comprising the six letters identified, which Germany began using in 1918

AEF: American Expeditionary Forces, World War I

AFSA: Armed Forces Security Agency (predecessor to NSA)

ARPANET: Developed by the DoD, the Advanced Research Projects Agency Network was the first operational switching network and a precursor of the Internet

ASA: Army Security Agency

Bombe: Electromechanical device used by the Allies during World War II to decrypt messages generated by the German ENIGMA machine

BRUSA: British-U.S. agreement to partner on SIGINT matters

CAST: U.S. intercept site on Corregidor, World War II

CCR: Center for Communications Research

COLOSSUS: Machine developed at Bletchley Park to break high-level German cipher; the world’s first programmable, electronic, digital computer

COMINT: Communications Intelligence

COMSEC: Communication Security

DEFSMAC: Defense Special Missile and Aerospace Center

DIRNSA: Director, National Security Agency

DoD: Department of Defense

D/DIR: Deputy Director, National Security Agency

ECM: Electric Coding Machine

ENIGMA: German cryptographic device, World War II

FRUPAC: Fleet Radio Unit Pacific, World War II

G2A6: Organization that conducted battlefield communications intelligence support for AEF units in World War I

GC&CS: Government Code and Cypher School (predecessor to UK’s GCHQ)

INSCOM: U.S. Army Intelligence and Security Command

NARA: National Archives and Records Administration

NRO: National Reconnaissance Office

NSC: National Security Council

NSOC: National Security Operations Center (formerly National SIGINT Operations Center)

RSA: Public key cryptographic algorithm, named after Rivest, Shamir, and Adleman, its co-inventors

SECAF: Secretary of the Air Force

SecDef: Secretary of Defense

SIGABA: Highly secure U.S. cryptographic machine used to encipher communications from World War II to the 1950s

SIGINT: Signals Intelligence

SIGSALY: Secure Digital Voice Communications machine used in World War II

SIS: Signals Intelligence Service (forerunner of Army Security Agency)

USAFSS: U.S. Air Force Security Service

WAAC: Women’s Army Auxiliary Corps

WAVES: Women Accepted for Volunteer Emergency Service, U.S. Navy

VENONA: U.S. program from 1943 to 1980 that discovered Soviet diplomatic communications and dealt with espionage matters
Arlington Hall Station (AHS), a former girls' school, was headquarters for the U.S. Army's cryptologic organization during and after World War II. The post also served as one of the two main locations for the Armed Forces Security Agency from 1949 to 1952 and for the National Security Agency for several years afterward. During the war, most AHS employees were women, like the keypunch operators gathered here on the campus. *CCH Photo Collection*
In early 1944, the U.S. Army began hiring African Americans to do meaningful cryptologic work. Under the social mores of the time, their office was segregated. In this photo cryptanalysts are working to break nongovernmental codes from multiple countries. Supervisor William Coffee, standing, was inducted into the Cryptologic Hall of Honor in 2011. NSA Archives, HIST-026-013
Just before World War II, the U.S. Army and Navy developed a revolutionary cipher device. Called the “SIGABA” by the army and “ECM” by the navy, the device kept U.S. high-level communications secure from the country’s enemies. In this photograph, technicians are performing maintenance on a SIGABA and another communications security device. Note the basket of rotors the man is working on. Both the German ENIGMA machine and the SIGABA used rotors; the ENIGMA had three or four, while the SIGABA had 15, which allowed for more complex rotor movement. NSA Archives, HIST-010-009
### Naval Security Station

The U.S. Navy's cryptologic organization, the Naval Security Station (known as OP-20-G during World War II), similarly acquired a former girls' school for its main site. Located in the District of Columbia, Mount Vernon Seminary for Girls, like Arlington Hall Station for the U.S. Army, hosted OP-20-G and NSA after the war. This photo shows the grounds and some of the buildings erected for wartime work. Nebraska Avenue is at the bottom of the frame. **CCH Photo Collection**

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Samuel Morse, developer of telegraph code, died, 1872</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Bell Labs completed the first cell phone call, 1973

Secretary of War transferred cryptologic functions from the Military Intelligence Division to the Signal Corps; created the Signal Intelligence Service with William Friedman as its head, 1929

Captain Georges Painvin of the French Cipher Bureau solved the first key for the ADFGVX cipher, 1918

The United States entered World War I, 1917

The Yamato, a 72,000-ton Japanese battleship, sunk off Okinawa in large part because of SIGINT tips, 1945

IBM introduces the System/360 mainframe computer, which developed from NSA's HARVEST computer, 1964

Navy PBY-2 shot down, Baltic Sea, 1950

Abraham Sinkov reported to SIS to work for William Friedman, 1930

FRUPAC intercepted encoded itinerary of Admiral Yamamoto Isoroku's upcoming tour of the Solomon Islands, enabling his shootdown five days later, 1943

Der Spiegel reported on what might have been the first case of computer espionage, an operation run against IBM's West German affiliate from East Germany, 1969

Central Bureau established in Australia to provide General Douglas MacArthur's Southwest Pacific Theater with COMINT, 1942

Navy EC-121 shot down by North Korean MiGs, Sea of Japan, 1969

COMINT intercepts revealed Japanese plans to attack Port Moresby, allowing Allied defense, 1942

NSA experts spoke in public for the first time on computer security at the Spring Joint Computer Conference in Atlantic City, 1967

Confederate Signal Corps established, 1862

Der Spiegel reported on what might have been the first case of computer espionage, an operation run against IBM's West German affiliate from East Germany, 1969

Clinton administration proposed "Clipper Chip" key escrow method for telephone security, 1993

Shootdown of Admiral Yamamoto by U.S. forces, 1943

Confederate Signal Corps established, 1862

Louis Tordella retired as D/DIR, 1974

Solomon Kullback reported to SIS to work for William Friedman, 1930

General Douglas MacArthur, USA, based on COMINT reports, attacked Hollandia, New Guinea, deep behind enemy lines, 1944

SecDef authorized the establishment of a National Cryptologic School at NSA, 1965

Bay of Pigs landing in Cuba, 1961

Confederate Signal Corps established, 1862

U.S. Senate issued the Church Committee report, 1976

Estonia suffered mass cyber attack, 2007

SECAF approved women for duty on EC-130 aircraft, 1985

SecDef authorized the establishment of a National Cryptologic School at NSA, 1965

Samuel Morse, developer of telegraph code, died, 1872

U.S. Senate issued the Church Committee report, 1976

Frank Rowlett reported to work for William Friedman, 1930

Lieutenant General Lincoln D. Faurer, USAF, became DIRNSA, 1981

Admiral Michael S. Rogers, USN, sworn in as Director, NSA and Commander, USCYBERCOM, 2014

President Franklin D. Roosevelt signed the Emergency War Powers Act, 1973

General Douglas MacArthur, USA, based on COMINT reports, attacked Hollandia, New Guinea, deep behind enemy lines, 1944

SecDef authorized the establishment of a National Cryptologic School at NSA, 1965

President Franklin D. Roosevelt signed the Emergency War Powers Act, 1973

U.S. Senate issued the Church Committee report, 1976

Frank Rowlett reported to work for William Friedman, 1930

Lieutenant General Lincoln D. Faurer, USAF, became DIRNSA, 1981

Admiral Michael S. Rogers, USN, sworn in as Director, NSA and Commander, USCYBERCOM, 2014

President Franklin D. Roosevelt signed the Emergency War Powers Act, 1973

Samuel Morse, developer of telegraph code, died, 1872

The Yamato, a 72,000-ton Japanese battleship, sunk off Okinawa in large part because of SIGINT tips, 1945

IBM introduces the System/360 mainframe computer, which developed from NSA's HARVEST computer, 1964

Navy PBY-2 shot down, Baltic Sea, 1950

Abraham Sinkov reported to SIS to work for William Friedman, 1930

FRUPAC intercepted encoded itinerary of Admiral Yamamoto Isoroku's upcoming tour of the Solomon Islands, enabling his shootdown five days later, 1943

Der Spiegel reported on what might have been the first case of computer espionage, an operation run against IBM's West German affiliate from East Germany, 1969

Central Bureau established in Australia to provide General Douglas MacArthur's Southwest Pacific Theater with COMINT, 1942

Navy EC-121 shot down by North Korean MiGs, Sea of Japan, 1969

COMINT intercepts revealed Japanese plans to attack Port Moresby, allowing Allied defense, 1942

NSA experts spoke in public for the first time on computer security at the Spring Joint Computer Conference in Atlantic City, 1967

Confederate Signal Corps established, 1862

Louis Tordella retired as D/DIR, 1974

Solomon Kullback reported to SIS to work for William Friedman, 1930

General Douglas MacArthur, USA, based on COMINT reports, attacked Hollandia, New Guinea, deep behind enemy lines, 1944

SecDef authorized the establishment of a National Cryptologic School at NSA, 1965

President Franklin D. Roosevelt signed the Emergency War Powers Act, 1973

U.S. Senate issued the Church Committee report, 1976

Frank Rowlett reported to work for William Friedman, 1930

Lieutenant General Lincoln D. Faurer, USAF, became DIRNSA, 1981

Admiral Michael S. Rogers, USN, sworn in as Director, NSA and Commander, USCYBERCOM, 2014

President Franklin D. Roosevelt signed the Emergency War Powers Act, 1973

Samuel Morse, developer of telegraph code, died, 1872

The Yamato, a 72,000-ton Japanese battleship, sunk off Okinawa in large part because of SIGINT tips, 1945

IBM introduces the System/360 mainframe computer, which developed from NSA's HARVEST computer, 1964

Navy PBY-2 shot down, Baltic Sea, 1950

Abraham Sinkov reported to SIS to work for William Friedman, 1930

FRUPAC intercepted encoded itinerary of Admiral Yamamoto Isoroku's upcoming tour of the Solomon Islands, enabling his shootdown five days later, 1943

Der Spiegel reported on what might have been the first case of computer espionage, an operation run against IBM's West German affiliate from East Germany, 1969

Central Bureau established in Australia to provide General Douglas MacArthur's Southwest Pacific Theater with COMINT, 1942

Navy EC-121 shot down by North Korean MiGs, Sea of Japan, 1969

COMINT intercepts revealed Japanese plans to attack Port Moresby, allowing Allied defense, 1942

NSA experts spoke in public for the first time on computer security at the Spring Joint Computer Conference in Atlantic City, 1967

Confederate Signal Corps established, 1862

Louis Tordella retired as D/DIR, 1974

Solomon Kullback reported to SIS to work for William Friedman, 1930

General Douglas MacArthur, USA, based on COMINT reports, attacked Hollandia, New Guinea, deep behind enemy lines, 1944

SecDef authorized the establishment of a National Cryptologic School at NSA, 1965

President Franklin D. Roosevelt signed the Emergency War Powers Act, 1973

U.S. Senate issued the Church Committee report, 1976

Frank Rowlett reported to work for William Friedman, 1930

Lieutenant General Lincoln D. Faurer, USAF, became DIRNSA, 1981

Admiral Michael S. Rogers, USN, sworn in as Director, NSA and Commander, USCYBERCOM, 2014

Days of Remembrance (Holocaust)
Arlington Hall provided training in many cryptologic disciplines for personnel destined for deployment. This included, as shown here, intercept operators who would staff the many signals collection units near combat zones around the world. There were no tape recorders then; thus, operators had to be proficient in typing at high speeds exactly what they heard.

_May 2022_

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>GC&amp;CS activated Heath Robinson Machine (predecessor to Colossus), 1943</td>
<td>U-2 recon plane shot down over Soviet Union, 1960</td>
<td>Colonel Ralph H. Van Deman became Chief, Military Intelligence Branch, 1917</td>
<td>The first 29 Navajos of roughly 400 to be trained as codetakers reported to Fort Defiance, AZ, 1942</td>
<td>GEN Paul M. Nakasone, USA, sworn in as Commander, USCYBERCOM, and Director, NSA/Chief, CS, 2018</td>
<td>Battle of the Coral Sea, set up by COMINT, began, 1942</td>
<td>The 837th Signal Security Detachment, the first U.S. SIGINTers sent to Australia, arrived, 1942</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>National Bureau of Standards (in cooperation with NSA) began solicitation for a government-wide data encryption standard, which was adopted 3½ years later, 1973</td>
<td>WAAC (Women's Army Auxiliary Corps) established, 1942</td>
<td>System Development Corp. in Santa Monica, CA, convened private, academic, and DoD experts to discuss problems in computer security, 1965</td>
<td>The term “Signals Intelligence” (SIGINT) is formally defined by the National Signals Intelligence Committee (SIGCOM) as a combination of COMINT and ELINT, 1962</td>
<td>U.S. State Department approved creation of Cipher Bureau (“Black Chamber”), 1919</td>
<td>Armed Forces Security Agency (AFSA) created, 1949</td>
<td>William Friedman and Elizabeth Smith married, 1917</td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Death of Friedrich W. Kasiski; developed solution for polyalphabetic ciphers, 1881</td>
<td>The NSC requested implementation plan for Washington Protected Communications Zone and Executive Secure Voice Network in response to the Soviet intercept threat, 1975</td>
<td>“What hath God wrought,” first telegraph message, sent from Baltimore to Washington, 1844</td>
<td>Prime Minister Baldwin revealed in Parliament that the British government had intercepted and decrypted Soviet telegrams proving Soviet espionage conducted by the All-Russian Co-operative Society (ARCOS), 1927</td>
<td>Memorial Day</td>
<td>Asian American/Pacific Islander Heritage Month</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Memorial Day</td>
<td>SecDef delegated authority to the DIRNSA to accept gifts of documents, records, and equipment for research, display, or museum purposes, 1980</td>
<td>Rum-running trial against Consolidated Exporters Corp. began with Elizebeth Friedman’s cryptanalysis of company’s encoded messages, 1933</td>
<td>“What hath God wrought,” first telegraph message, sent from Baltimore to Washington, 1844</td>
<td>Asian American/Pacific Islander Heritage Month</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

_Aisan American/Pacific Islander Heritage Month_

_Arlington Hall provided training in many cryptologic disciplines for personnel destined for deployment. This included, as shown here, intercept operators who would staff the many signals collection units near combat zones around the world. There were no tape recorders then; thus, operators had to be proficient in typing at high speeds exactly what they heard._

_NSIA Archives, HIST-011-002_
Most army and navy personnel enjoyed sports. For individuals, golf, tennis, and bowling were quite popular. The posts also vigorously fielded teams in baseball, softball, and basketball, often playing other military teams from their district. NSA Archives, HIST-210-001 and HIST-017-001
### Cryptographic Security Board established, 1945

- NSA Civilian Welfare Fund established at NSA Fort Meade, 1956
- Mary, Queen of Scots, sent treasonous enciphered response to the Babington letter, 1586
- American cryptologic pioneers Parker Hitt and Genevieve Young married, 1911
- First current TUNNY traffic read at Bletchley Park, 1942
- Meeting at Pyry, outside Warsaw, where Poland shared its successes against the ENIGMA with Britain and France, 1939
- National Security Act passed, 1947
- U.S. Congress opens hearings on computer threats to privacy and the need for data encryption, 1966
- First use of transatlantic telegraph cable, generating upsurge in commercial cryptography, 1866
- U.S. Navy Code & Signal Section established, 1916
- First WAAC personnel arrived at Arlington Hall Station, 1943
- First WAAC personnel arrived at Arlington Hall Station, 1943
- The “Wabash” field code issued, 1918
- Agnes Meyer Driscoll discharged from U.S. Navy, 1919; retired from NSA, 1959

### Independence Day

- Cryptographic Security Board established, 1945
- First U.S. patent granted for a cipher device to Edward Hawley, for multiple alphabetic device, 1865
- Signal Corps began first communications security monitoring in France, 1918
- Lieutenant William Friedman reported to AEF G2A6, Chaumont, France, 1918
- Army Signal Corps conference about establishing the Signal Intelligence Service, 1929
- Captain Joseph Rochefort, USN, a major figure in Navy cryptology in World War II, died, 1976
- William Friedman received a patent for a device to transmit telegraphic messages quickly, the first of his eventual 30 patents, 1924
- The Soviets shot down an RB-50G-2 near Vladivostok, Russia, 1953
- WAVES (Women Accepted for Voluntary Emergency Service) established, 1942

**The AFSAs, NSA’s predecessor, was the original centralized cryptologic organization in the United States; it was based at Arlington Hall Station and the Naval Security Station. The central figure is Rear Admiral Earl Stone, AFSAs’s first director. Also shown, starting from the left, are an unidentified woman; Rear Admiral Joseph Wenger, AFSAs vice director; Brigadier John Tiltman, the British liaison officer; Stone; an unidentified man; Captain John Harper, director of Production; an unidentified man; and Paul Neff, a senior civilian in communications security (far right). NSA Archives, HIST-139-007**
Both the U.S. Navy and Army did vital communications security and cryptanalysis functions at their main cryptologic posts. Just prior to American participation in World War II, the two services developed what turned out to be the most secure cipher machine of its time, called the “SIGABA” by the army and “ECM” by the navy. Here, personnel are learning about the device. NSA Archives, INST-007-010
Cryptologic successes could not happen or be sustained without a large workforce of skilled tradespeople and first responders supporting critical functions, such as the post engineer (the above building), food service, garbage removal, construction, plumbing, and firefighting. NSA Archives, SC-017-001
Before World War II, the army and navy cryptologic services had been quite small. When war came, they rapidly expanded, reaching about 10,000 people each by the end of the war. Women comprised a clear majority of both workforces, some in uniform and some in civilian status. With this rapid expansion, offices at Arlington Hall and Nebraska Avenue were crowded. *NSA Archives, HIST-012-001*
The AFSA, as America’s first centralized cryptologic organization, helped the Service Cryptologic Components work together. Each component previously had operated in near isolation, and each had developed different procedures and vocabulary for many of the same functions. Symbolic of the new joint operations were joint sports teams. Here, Rear Admiral Joseph Wenger, AFSA vice director, is hosting a football team on which the U.S. Army, Navy, and Air Force are represented. NSA Archives, A-118-01
During World War II and after, the military services engaged in volunteer work and charitable giving to benefit the communities around them. A Christmastime gift collection for the less fortunate, organized at Arlington Hall in 1950, is shown here. \textit{NSA Archives, HIST-142-01}
ABOVE: One shift of the officers and enlisted personnel who worked at the U.S. Navy station on Nebraska Avenue. In the center is Captain Joseph Rochefort, who had led the team in Hawaii that succeeded in solving a mainline Japanese Navy code prior to the Battle of Midway. CCH Photo Collection