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From the Ground Up: American Cryptology during World War I

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Betsy Rohaly Smoot came to the National Security Agency in 1983 as a traffic analyst. She has worked in analytic, staff, and managerial positions at Fort Meade, Maryland, and overseas. She joined the Center for Cryptologic History as a historian in 2007. She received a BA from Mary Washington College with a double major in geography and economics and an MS in strategic intelligence from the Defense Intelligence College. She retired in 2017 but worked as a re-employed annuitant in 2018 in order to complete this book. She is the author of *Parker Hitt: The Father of American Military Cryptology*, published in 2022 by the University Press of Kentucky.

Front cover: Photograph described as "What remains of the original unit (Radio Section) that arrived in France Nov. 1917." Taken at Dieulouard, France, on December 2, 1918. These are some of the officers and men that formed the AEF Signal Corps Radio Section. Front row, left to right: Lieutenant Richard M. Richbourg, Colonel Robert Loghry, and Lieutenant Frank B. Fairbanks. The names of the enlisted men in the back row are not known. National Archives and Records Administration, College Park, Record Group 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-40372.

Back cover: US Army Signal Corps recruiting poster by H. Devitt Welsh. Library of Congress, Prints & Photographs Division, WWI Posters, LC-USZC4-7553. Brooklyn, NY: Latham Litho & Printing Co., 1917-1920, https://www.loc.gov/item/00651805/.

From the Ground Up: American Cryptology during World War I

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Betsy Rohaly Smoot

National Security Agency
Center for Cryptologic History
2023

This work is dedicated to:

The American cryptologists who served during the First World War.
"Time will not dim the glory of their deeds."—General John J. Pershing

Hank Schorreck, NSA Historian from 1974 to 1993, for his extensive research on the subject.

David Kahn, for paving the way.

Contents

Foreword

The First World War ranks among the most significant events in history, with effects that we continue to feel more than a century later. It shattered several empires, caused the decline of others, and provided the necessary chaos in which two of the most bloodthirsty regimes, Nazi Germany and the Soviet Union, could arise and grow. It set in motion the events leading to another world war that would be an even greater disaster. All of these effects, moreover, either were caused or exacerbated by improvements in firepower, transportation, production, and, most of all, communication. It is true that World War I saw the industrialization of war on a global scale, but that development could only come about because combatants and their leaders could now communicate in real time and at virtually any distance. Such increased capacity for command and control became a defining feature of all warring states and their contending forces, meaning that the methods for securing, and penetrating, national and military communications took on strategic significance.

The United States watched this spectacle with growing unease for nearly three years before events thrust it into the fray in early 1917. American leaders, diplomats, commanders, and forces were not ready for what awaited them "Over There." Once engaged alongside our French and British allies, the US Army and US Navy had to learn fast—and indeed had much to learn. Both communications security and the art of exploiting it had progressed dramatically since the war began in 1914, making it imperative that the Yanks learn new methods (and develop new mindsets) as fast as possible if they were to contribute to an Allied victory. To their lasting credit, they by and large did exactly that, ending the war in 1918 as junior partners but nonetheless valued members of the coalition team that defeated Germany.

In comparison to other American scholars to date, Betsy Rohaly Smoot has discovered more about this maturation process and what it ultimately yielded. *From the Ground Up* fully captures her years-long efforts to share this undeservedly neglected story. What it features first and foremost is her passion for the all-but-forgotten men and women who served in France, Britain, and America in far-flung efforts to make sense of what was happening in a sprawling theater of war. In her hands, the beginnings of America's modern signals intelligence capabilities have come to light and (figuratively) to life. The story is illuminating in its own right and represents an invaluable guide to new research in World War I and in American military history. I recommend it to all who serve in cryptologic enterprises today and to those who wish to learn how such capabilities emerged and served a grateful nation.

Michael Warner
USCYBERCOM Command Historian
Fort Meade, 2022

Author's Note

When I came to work in the Center for Cryptologic History in 2007, I was surprised to find that there was no complete written account of American cryptology in World War I. I was disappointed with the few books available on the subject, and I vowed to produce a book that would better explain the subject for both practitioners of SIGINT and the public—that is, the book I had hoped to read. This book, however, is not exhaustive; there are still more details available in the records of these organizations, and I encourage others to explore the source material to add to the story.

Introduction

Foundations of Modern Signals Intelligence

Purpose

The seeds of the modern American cryptologic system were planted in the months after the United States entered the First World War in April 1917. Small bits of existing cryptologic knowledge were nurtured and encouraged by skilled managers and foreign friends keen to see American efforts flourish in the demanding field of military cryptology. Advances in radio technology and radio's use as a tool of war fed the growth of radio intelligence (which would later be called communications intelligence and, still later, signals intelligence). Code and cipher breaking had to be rapid and responsive to support decision making and troop movement, and to thwart enemy propaganda and foreign agents. The vulnerability of radio transmissions to interception meant code and cipher making had to adapt to protect the nation's communications. New techniques were developed to extract and synthesize information from the ether—traffic analysis and direction finding—and methodologies and coping mechanisms were developed to forward, process, and store the huge volume of data that was collected and produced.[1]

Soon after the end of the war, the growing American cryptologic system was neglected, starved of information, ignored by its foreign friends, and severely reduced in size. But the memories of the early years lived on and were preserved, and some lessons from 1917–1918 helped cryptology blossom again just before World War II.

For many Americans, World War I itself is a bit of a mysterious subject, with or without the cryptologic angle. While the centennial of the end of the war in 2018 resulted in a plethora of scholarly works and public commemorations, many of the remembrance activities were overshadowed by the 50th anniversary of significant events of the Vietnam War, as well as the 75th anniversary of key World War II engagements. It has always been so for a war whose veterans, 25 years on, fought, or had sons who fought, in World War II. Fifty years later, in 1968, their ranks were thinning, and world events were moving so quickly that many forgot the war to end all wars. In 1993, there were few remaining who had fought in 1918, and American participation "Over There" was the merest wisp of a memory for most—the refrain of a song, the influenza pandemic—or maybe granddad's old helmet. Even those conversant in cryptologic history, who know the importance of cryptology in the Allied victory in World War II—breaking the German Enigma machine, cracking the Japanese code to ensure success at Midway—are hard-pressed to name a single World War I cryptologic success story.

Therefore, slightly more than 100 years after the

end of the Great War, I have attempted to gather in one place what is known about the structure and practice of American cryptology during World War I. The First World War marks a revolution in cryptology, establishing techniques and practices that were the foundation for cryptologic success in the twentieth century and beyond.[2] Radio intelligence was considered one of the most important services of intelligence by the American Expeditionary Forces (AEF), but its story is little told, particularly compared to the stories of British work in the field during the same war.

Just as the United States began to build its cryptologic effort, the global signal environment was changing. High-power, long-distance radio transmission made it possible for Germany to gain a communications toehold in the Western hemisphere, and this made the United States uneasy. On the Western Front, the use of ground telegraphy for frontline communications created the need for new and dangerous collection tactics. An increase in radio communications in 1916 and 1917 led to development of the disciplines of traffic analysis and direction finding. For the first time "intelligence gathered by line of sight could be transmitted to infinite distances at speed of light,"[3] and this advance made it possible for cryptologists, working a considerable distance from frontline units, to access raw frontline communications, conduct analysis, and provide information and warning to the commanders in the field.

Though the stories of World War I cryptologic success are not as dramatic as those of World War II, they exist and these efforts laid the groundwork for what was to follow. World War I did not make the US cryptologic community a permanent entity—there would be stops and starts before the discipline proved itself—but it did make the reputation of two early cryptologists. Both Herbert O. Yardley and William F. Friedman were products of this early cryptologic system. Their differing experiences, and how they used what they learned during the war, influenced their development as cryptologists in later decades.

World War I marked the first purposeful, organized effort by the US military to systematically collect and analyze enemy communications, building on the fledgling and disjointed work conducted during the Punitive Expedition in 1916. There was no one integrated national organization—work of a cryptologic nature was undertaken by the US State Department, the navy, the War Department's new Military Intelligence Division (MID), and the AEF itself. Although this story is largely one of the War Department (the army), the navy had a part to play. The cryptologists did work across organizational lines at times, but not always efficiently or effectively. In Washington, the benefits of a centralized organization for cryptanalytic work was acknowledged, and the War Department's Code and Cipher Section (MI-8) filled that role. In France, the AEF developed an interlocking system that was matrix-managed in a way that presaged a more modern cryptologic effort. The War Department employed the equivalent of a modern contractor, in the form of George Fabyan's Riverbank Laboratories, which helped to bridge knowledge and productivity gaps. There was not time to sit down and plan a seamless, cohesive national signals intelligence structure; the pressure of entering the war forced many efforts to be organized simultaneously, with each effort laying a foundation for the future. The cryptologic experience of the war particularly shaped US Army thinking about the structure of cryptologic organizations and led to a struggle between competing elements of the service that was not resolved until 1930. But the United States could not have developed its system so rapidly had it not been for the significant contributions of the United Kingdom (the Admiralty's Room 40, the War Office's MI1(b), and the British Expeditionary Forces I(e) wireless and cryptologic staff), as well as France (the Deuxième Bureau's Bureau du Chiffre and subordinate army cryptologic units). The work of all these organizations touch on each other to varying degrees.

Most importantly, the cryptologic story is not just a story of organizations but one of people.

Ambitious men—and some women—of all ages volunteered their skills for war service and found themselves creating a new intelligence discipline, guided by the steady hand of innovative senior personnel. This book provides a glimpse at some of the people who did the work, created the techniques, managed the enterprise, and had the vision to find intelligence in new ways.

Compared to the industrial-age cryptologic production that took place at Arlington Hall Station and Bletchley Park during the Second World War or the big data operation of modern intelligence organizations, cryptology in 1918 was a small-scale operation; the personnel were craftsmen. The concept of cryptology as a unified discipline did not exist during World War I, and the personnel assigned to the component parts—analysis, collection, code-making—found themselves in different organizations, working outside of hierarchical boundaries, to accomplish the mission. The experience of the war did not immediately lead the United States to establish a lasting, consolidated operation—that would not happen until 1952 with the formation of the National Security Agency (NSA)—but it left a memory and a documentary trail that, when examined, reveals the importance of collaboration across the boxes on an organizational chart.

What sort of inspiration can this story of specialized craftsmen have in the age of big data? The analysts of the time were the first to struggle with the problem of large volumes of data and small numbers of personnel, and designed their pre-computer workflow to increase efficiency. These cryptologists (and their British and French counterparts) developed analytic techniques and terminologies that were preserved, expanded, and used in later decades; their work provides the underlying structure for modern formatting and analysis of data. It is remarkable how the forms and logs devised in 1917 and 1918 are instantly recognizable by today's analyst. When the cryptologic story of World War I is told, it is often given in bureaucratic organizational charts and unattributed accomplishments. But it was the people who built the organizations—from the ground up—and went on to make extraordinary pioneering contributions to cryptologic progress during the war.

It is time to carefully examine American cryptology during the Great War and to assess where the effort succeeded and failed, and what challenges were faced and overcome. The art and craft of the war's cryptologic work can be better understood by linking the stories and the substance. In this volume, I link many nameless stories to the people doing the work and demonstrate the real impact of cryptologic work during the war. In tying together the dry bureaucratic reports and livelier firsthand accounts, I have examined the legends to separate truth from bluster and imagination. Historians have made little effort to integrate material about radio intelligence into broader histories of World War I, possibly because much of the primary source material remains difficult to locate and, when located, is more easily understood by a practitioner of cryptology than someone without that technical background. By taking a reasonably comprehensive look at the subject, derived from as much primary source material as possible, I am attempting to bridge the gap between the detailed technical record and the broader histories of the war. The goal of this book is to serve as a foundational work on American cryptology during the conflict so that the success and failure of the American efforts can be better understood, and a more complete story of World War I can be told.

Scope

This book examines the period April 1917 through July 1919—from the United States' declaration of war to the Treaty of Versailles. The focus is on the work of American cryptologists, although the influence of, and the American interactions with, the British and French play a key role in the story. To keep cryptologic issues at the forefront, I have assumed the reader has some familiarity with the events of World War I. Details on the origins

and course of the war, specific battles, personalities, weapons, and technology can be found in other studies of the conflict.

This work is part narrative, part guidebook, part reference book, part research guide; it is comprehensive but not exhaustive, as there are still many subjects that need closer examination. The book does not need to be read front to back to understand any particular section. A discussion of sources and a selected bibliography are included to further the research of others. I have tried to document the names of those who served in the earliest formal American cryptologic services, although, inevitably, there are gaps in the records and this list likely is not complete. Cross-references are provided to indicate where a subject is discussed in another part of the book. The material is current as of late 2018.[4]

The mechanics of codes and ciphers—how they were created or broken—will not be discussed in great detail, but source materials for further study are referenced. Some of the cryptologic organizations' records are preserved in far greater volume than other organizations, which makes their stories more complete than others.

Structure

In the beginning, there was the Zimmermann Telegram. **Part One** looks at early cryptologic exchanges between Britain and the US State Department and the US Navy, focused on the activities in London of American diplomat Edward Bell and US Navy Admiral William S. Sims. It also examines key issues that would drive cryptologic work on the home front—the problem of the German long-distance radio stations and the state of cryptologic organizations in Europe during the first part of the war.

Part Two focuses on organizations performing cryptologic functions in the United States, while **Part Three** looks at the organizations performing those functions in France. There was no single agency or bureaucracy in the United States at this time dealing with codemaking and codebreaking—no equivalent of NSA—so it makes sense to look at each organization: how they developed, how they were organized, the work they did, and the relationships they had with other organizations. There were many more joint operations among the three cryptologic organizations of the AEF—the G2A6, the Radio Section, and the Code Compilation Section—than between the others, but tendrils of connection linked all the organizations. Because of this organization-centric approach, there are places where the stories are so intertwined that similar types of work are discussed in more than one section of the book; the interconnectedness of the work means that some stories are shared by more than one organization. While each book section is loosely chronological, there are places where presenting information chronologically is not practical.

Part Four examines cryptologic challenges and successes during the war to include achievements of radio intelligence, communications security, and radio deception. Readers will find specific details of what worked and did not work—gathered first by discipline and then chronologically—with areas of cross-organizational success noted.

Part Five contains standalone articles on topics related to this period in cryptologic history: the question of the use of radio intelligence in AEF Siberia, changes in the practices of secrecy as a result of the war, the use of Native American codetalking, and women in cryptology.

Short **profiles** of important cryptologic personnel can be found throughout the book.

The **Appendices** contain a wealth of information on the people, codes, equipment, and other topics discussed in this book. Even cryptologic historians are hard-pressed to name the many men and women who did this work in the First World War; I attempt to correct this deficiency by supplying names and detailing their stories.

The selected **Bibliography** discusses the types and quality of sources available for future research.

Reference Tools

To assist the reader in following the story, which jumps across continents and organizations, in this introduction there is a quick-reference chart of the major cryptologic organizations and their leaders as well as a list of significant people who play a role throughout the narrative. Chapter 10 has a guide to the various wartime sectors of France used in the text. There is a general map of the area in which the cryptologists operated in France (introduction to part three) and detailed maps of the St. Mihiel area (chapter 11) and the Meuse-Argonne (chapter 11).

Terminology

Ciphers are systems where individual characters in a word are replaced by other characters through various methods. During World War I, the output of codes was often then enciphered, using a cipher developed in conjunction with the code, before transmission. **Code** denotes a system, usually using a book, where a word or group of words is replaced by a group of letters or numbers.

Cryptology encompasses a collection of activities: making codes and ciphers (**cryptography**); breaking codes and ciphers (**cryptanalysis**); collection or intercept of material to be analyzed; direction finding; traffic analysis; analysis of the intelligence contained in intercepted messages. The term *cryptology* was coined by William Friedman after World War I. While all of these activities were present in World War I, not all of them were accomplished by the same organization. The practitioners of code work (cryptanalysis) understood that there were connections among direction finding, collection, and traffic analysis with their work but did not understand it as one system as we do today.

Designators for the General Staff organization in the AEF will be presented as follows: G2, G2A, G2A6, etc., despite the fact that in contemporary sources these are often given as G2-A6 or even G-2-A-6. Similarly, British Army designators appear as commonly used today rather than the format used during the war, therefore MI1(b) rather than M.I. 1(b).

Goniometry was the term used during this era for radio direction finding. This book uses the terms radio goniometry, gonio, and direction finding interchangeably.

The Military Intelligence Division (MID) began as a section (MIS) in 1917 and then was called a branch (MIB) before being designated a division in 1918. For simplicity's sake, the organization will be called the Military Intelligence Division or MID throughout.

Military rank. The war was a period of rapid promotion. Additionally (and problematically), career army officers entered the war with one rank from the regular army and were promoted to higher rank in the newly created national army (and then reverted to their original rank at the end of the war). In the radio intelligence field, many men were rapidly promoted through the enlisted ranks and then commissioned. It would be difficult to accurately track the dates of rank for each of the individuals in this narrative and make correct references throughout, particularly when the narrative shifts in time. This book provides the ranks for these individuals the first time they are mentioned and at those points when ranks are needed for clarification. At other times first and last names or just last names will be used as appropriate. The only time that an individual will not be given a rank on first reference will be when that person was not yet part of the military at the time they join the story. Where the first reference involves a quote from a later period, a parenthetical comment about rank is included.

Radio intelligence is the term used for what is later called communications intelligence and, still later, signals intelligence. Radio intelligence describes the range of cryptologic functions performed during World War I.

Time. When time is not spelled out, it is referenced using the 24-hour clock; therefore, 9:00 a.m. will be represented as 0900. World War I was the first time the American military used the 24-hour clock.

War of position is used when forces are on a fixed front, with or without combat operations, where there are no significant territorial changes to the front line. **War of movement** describes periods where the front is changing rapidly due to combat operations. American radio intelligence efforts had to adapt from holding a position to rapid movement in September 1918.

Wavelength. It was typical during this period to identify radio communications by wavelength—shortwave, intermediate wave, longwave—rather than frequency.

World War I, the **First World War**, and **the Great War** are used interchangeably to name the conflict. The war was not known as the "first" world war until the beginning of the second war in 1939;

Quick Guide to World War I Cryptologic Organizations

Country	Organization	Service	Date formed	Leadership
United States	Code Compilation Section of the AEF Signal Corps	Army	January 1918	Howard R. Barnes
United States	First Army G2A6 (Radio Intelligence Section)	Army	June 1918	Charles H. Matz
United States	G2A6 (Radio Intelligence Section of the AEF General Staff)	Army	September 1917	Frank Moorman
United States	MI-8 (Code and Cipher Section of the Military Intelligence Division)	Army	Summer 1917	Herbert O. Yardley; John M. Manly
United States	MI-10E (Radio Intelligence Section of the Military Intelligence Division)	Army	March 1918	Carl Kinsley
United States	OP-58 (Code and Signal Section)	Navy	October 1917 (refocused)	Russell Willson
United States	Otter Cliffs Radio Station, Maine	Navy	August 1917	Alessandro Fabbri
United States	Radio Section of the AEF Signal Corps	Army	September and October 1917	Robert Loghry
United States	Riverbank Laboratories	Civilian	Before the war	George Fabyan
United States	Second Army G2A9 (Radio Intelligence Section)	Army	September 1918	Philip B. Whitehead
United Kingdom	British Admiralty Room 40	Navy	1914	William Reginald "Blinker" Hall
United Kingdom	British Expeditionary Forces MI1(e)	Army	1914	Oswald Hitchings
United Kingdom	British War Office MI1(b)	Army	1914	Malcolm Hay
France	Deuxième Bureau Code and Cipher Section	Army	Before the war	François Cartier

Quick Guide to Senior Organizational Leaders in Noncryptologic Organizations

Name	Position	Organization
Black, Hanson B.	Chief Signal Officer, Second Army AEF	US Army
Churchill, Marlborough	Chief, Military Intelligence Division (Van Deman's successor, June 1918)	US Army
Conger, Arthur L.	Nolan's Deputy Chief, G2, and Chief of the G2A, AEF General Staff	US Army, AEF
Daniels, Josephus	Secretary of the Navy	US Navy
Foch, Ferdinand	Commander in Chief of the Western Front, later Commander in Chief of Allied Forces	French Army
Harrison, Leland	Chief, Bureau of Secret Intelligence	US State Department
Hitt, Parker	Chief Signal Officer, First Army AEF	US Army
Nolan, Dennis	Chief, G2 Intelligence Section of the AEF General Staff	US Army, AEF
Russel, Edgar	Chief Signal Officer, AEF	US Army
Todd, Captain David W.	Director of Naval Communications	US Navy
Van Deman, Ralph	Chief, Military Intelligence Division	US Army

contemporaries would have used "the World War" or "the Great War" until that time.

Notes

1. David Kahn says for the core disciplines of cryptology, that is, cryptography and cryptanalysis, World War I "marked not a beginning but an end, had reaped no fulfillment but barrenness." He goes on to say that "so viable had the science become, however, that this very vacuum, this want, held promise." Still, Kahn agrees that war was a "great turning point" in the history of cryptology, and attributes this fact to the increase of radio communications, and the point at which the discipline becomes a "permanent major element of intelligence." David Kahn, *The Codebreakers* (New York: Scribner, 1996), 348, 350.
2. Also the birth of the modern American intelligence system. Michael Warner, *The Rise and Fall of Intelligence: An International Security History* (Washington, DC: Georgetown University Press, 2014), 74-75.
3. John Keegan, *Intelligence in War* (New York: Vintage Books, 2004), 143.
4. A list of all known Americans employed or trained in a cryptologic capacity during the war (current as of June 2021) is not included in this volume but will be published as a companion working aid on www.nsa.gov.

Part One

Distant Signals in the Ether

Introduction to Part One

Distant Signals in the Ether

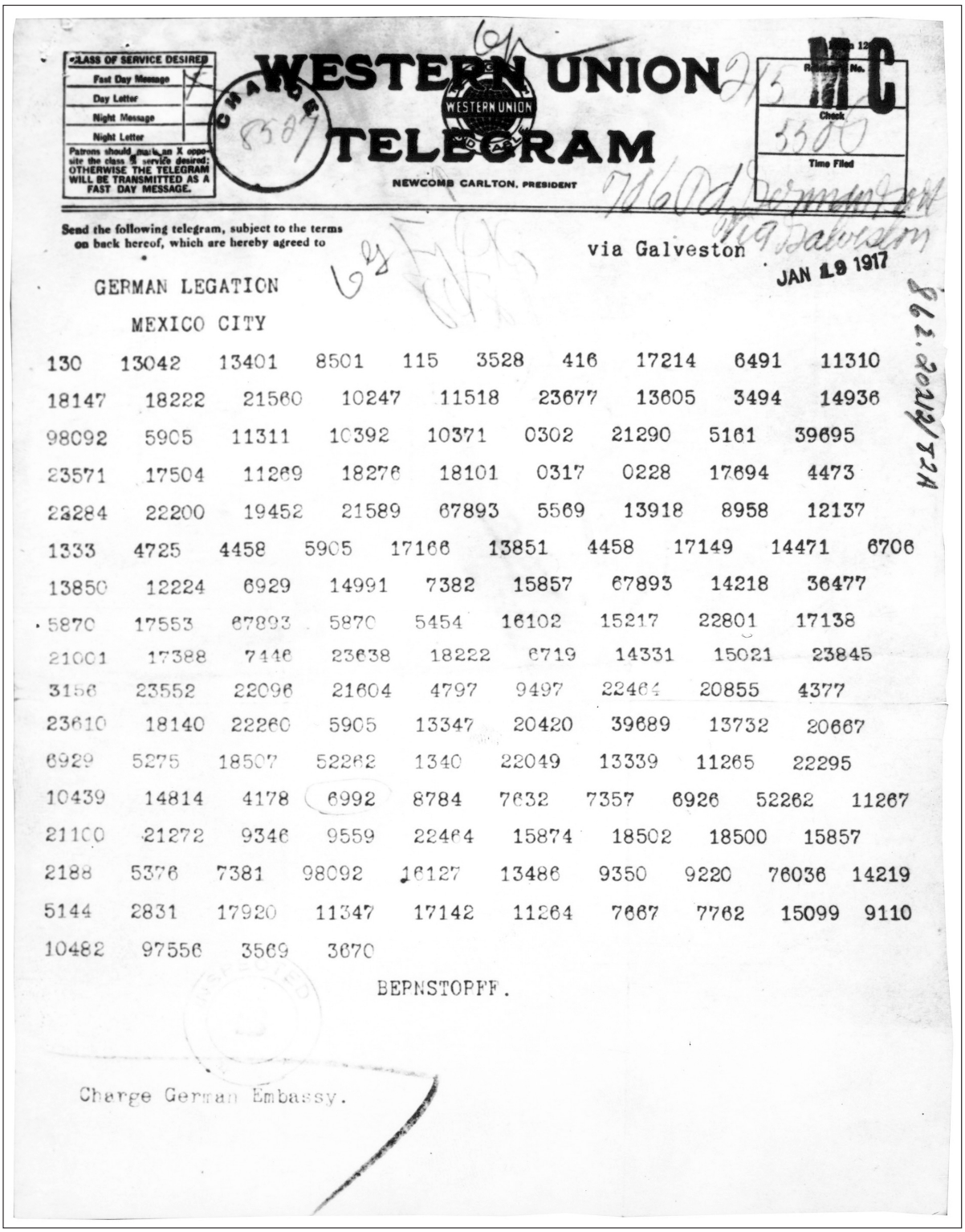
In August 1914, the French had an advantage that the other Allied powers lacked: decades of cryptologic expertise and an organization poised to put their abilities to use on the Western Front. The French military's existing Deuxième Bureau in Paris included a Bureau du Chiffre, and each French Army had a subordinate cipher organization. Additionally, the French were able to field military radio collection and direction-finding systems in the early years of the war. By contrast, having abandoned cryptologic work for decades, the British began again, establishing cryptologic organizations in the War Office, the Admiralty, and the British Expeditionary Forces. The two nations were actively cooperating on cryptologic matters by late 1914.[1] Cryptology was revolutionized by World War I, as were all other aspects of intelligence work.[2] For more than two-and-a-half years, this intelligence revolution had very little impact on the US government or military forces, but the concomitant technological advances in radio communication were closely monitored by the US military (particularly the navy), engineers, physicists, and private industry.

The effects of changing cryptologic practices began to reach the United States in early 1917, with the revelations of the Zimmermann Telegram. A cautious dialogue was opened with the British, and while the telegram itself did not prompt immediate action to establish an American cryptologic service, it may have opened minds to the possibility. Shortly after the United States declared war on Germany on April 6, 1917, the missions headed by British Foreign Secretary Alfred Balfour and French Marshal Joseph Joffre[3] initiated more formal cooperation between the nations.[4] At the same time, the US military began to pursue the means to monitor communications between Germany and Mexico.

Part one examines the early cryptologic relationship with Britain (chapter 1) and the dilemma of German high-power radio transmissions (chapter 2).

Notes

1. James Bruce, "'A shadowy entity': M.I.1(b) and British Communications Intelligence, 1914-1922," *Intelligence and National Security* 32, no. 3 (2017): 313-332.
2. Michael Warner, *The Rise and Fall of Intelligence: An International Security History* (Washington, DC: Georgetown University Press, 2014), 59.
3. While remembered as the Joffre mission, the delegation was actually led by former French Prime Minister René Viviani.
4. For discussion of US Navy efforts, see Phyllis L. Soybel, *A Necessary Relationship: The Development of Anglo-American Cooperation in Naval Intelligence* (Westport, CT: Praeger, 2005). For War



WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT

CLASS OF SERVICE DESIRED
Fast Day Message
Day Letter
Night Message
Night Letter
Patrons should mark an X opposite the class of service desired; OTHERWISE THE TELEGRAM WILL BE TRANSMITTED AS A FAST DAY MESSAGE.

Send the following telegram, subject to the terms on back hereof, which are hereby agreed to

via Galveston

JAN 19 1917

GERMAN LEGATION
MEXICO CITY

130 13042 13401 8501 115 3528 416 17214 6491 11310
18147 18222 21560 10247 11518 23677 13605 3494 14936
98092 5905 11311 10392 10371 0302 21290 5161 39695
23571 17504 11269 18276 18101 0317 0228 17694 4473
23284 22200 19452 21589 67893 5569 13918 8958 12137
1333 4725 4458 5905 17166 13851 4458 17149 14471 6706
13850 12224 6929 14991 7382 15857 67893 14218 36477
5870 17553 67893 5870 5454 16102 15217 22801 17138
21001 17388 7446 23638 18222 6719 14331 15021 23845
3156 23552 22096 21604 4797 9497 22464 20855 4377
23610 18140 22260 5905 13347 20420 39689 13732 20667
6929 5275 18507 52262 1340 22049 13339 11265 22295
10439 14814 4178 6992 8784 7632 7357 6926 52262 11267
21100 21272 9346 9559 22464 15874 18502 18500 15857
2188 5376 7381 98092 16127 13486 9350 9220 76036 14219
5144 2831 17920 11347 17142 11264 7667 7762 15099 9110
10482 97556 3569 3670

BERNSTOPFF.

Charge German Embassy.

The Zimmermann Telegram. National Archives and Records Administration, College Park, Record Group 59, Records of the Department of State, Central Decimal Files, 1910-1963, Box 9643A

Department actions, see Bruce Bidwell, *History of the Military Intelligence Division, Department of the Army General Staff: 1775-1941* (Frederick, MD: University Publications of America, 1986). For Van Deman's visit to the secretary of war, see James L. Gilbert, *World War I and the Origin of U.S. Military Intelligence* (Lanham, MD: The Scarecrow Press, 2012), 28. See, as well, David R. Woodward, *Trial by Friendship* (Lexington: The University Press of Kentucky, 1993) for a treatment of the subject of the British relationship and discussion of the Balfour and Joffre missions.

Chapter 1

The Influence of Britain

Two cryptologic relationships began in the early part of 1917, and both involved the British Admiralty's code and cipher effort known as Room 40—or, more specifically, the man who ran Room 40, Admiral Reginald "Blinker" Hall, director of the Admiralty's Intelligence Division. The first was a cryptologic exchange between the US State Department and Room 40 that started in February 1917 with the disclosure of the contents of the British-intercepted Zimmermann Telegram; this built on an existing intelligence relationship forged between Hall and a staffer at the US embassy in London. The second was established when Admiral William S. Sims of the US Navy arrived in Britain in April 1917; the relationship he developed with Hall focused on receiving both intelligence (derived from cryptology and otherwise) and appropriate cryptographic support in the form of codes, ciphers, and signals to be used by a combined naval effort. While these relationships were not formal cryptologic organizations, they are included here to better understand the full scope of American wartime cryptology.

US State Department and the Work of Edward Bell in London

The Zimmermann Telegram is the one cryptologic event that many readers can identify from World War I. But it is not an American cryptologic story, except in that the poor cryptography used in US diplomatic cables (and the lack of security of American submarine cables at the endpoint in the United Kingdom) enabled the British to obtain access to this coded German message. Although the story of the telegram and its dramatic role in the entry of the United States into the First World War has been told extensively in many other books and articles, this book starts here to examine how this event may have influenced American cryptologic efforts.[1]

German foreign minister Arthur Zimmermann's January 16, 1917, diplomatic message to the German ambassador in Mexico City directed the ambassador to make a bold proposition to the president of Mexico. If Mexico were to align itself with Germany and attack the southern US border, Germany would provide financing and support Mexico's claims to regain territory they had lost in the Mexican-American War of 1846-1848—namely, Texas, New Mexico, and Arizona. Zimmermann also requested that Mexico be encouraged to bring Japan into the plan.

The British intercepted this telegram on January 17, 1917. The United States had been allowing Germany to transmit their dispatches from Berlin as part of US embassy telegraphic communications, which were routinely routed through London before transiting to Washington via transatlantic submarine cable. These coded telegraphic messages were routed to the codebreakers of the British Admiralty, in Room 40 of the Old Admiralty Building.[2]

Once in Washington, the message was held for a day, where Secretary of State Robert Lansing, who did not like the fact that American diplomatic channels were carrying German diplomatic traffic, "baulked" at what he thought to be "an unusually long message." He did not pass the message on to the German ambassador in Washington, Count Joachim Heinrich von Bernstorff, until Lansing's assistant secretary William Phillips received assurances from President Woodrow Wilson's special advisor Colonel Edward M. House that he was in talks with the Germans, and that the message had to be sent through. Thus, the message did not go to Bernstorff until January 19. It was immediately re-encoded and arrived in Mexico City that same day.[3]

For the Berlin-Washington link, the Germans used a code designated 0075; the British called it 7500. It was a new code, and Room 40 codebreakers were still trying to recover the words. Once the telegram reached Washington, the German embassy decoded the message and then re-encoded it into code 13040 (the German designator) for transmission from Washington to Mexico City. The British had been working on 13040, an older code, for several years, and Room 40 had reconstructed much of the codebook. The British later obtained a copy of the message in this older code through the efforts of their chargé d'affaires in Mexico City, Edward Thurstan.[4] The telegram transited the American telegraphic system from Washington to Mexico City and, had the United States already been at war, very likely would have been spotted by the telegraphic censorship process that was instituted after April 1917.

Meanwhile, in early February 1917, the Germans reinstated unrestricted submarine warfare against neutral vessels in the Atlantic. This triggered the US decision to break diplomatic relations with the Germans on February 3; however, the United States did not declare war. This frustrated Admiral Hall, who requested that British Foreign Secretary Arthur Balfour be consulted about the telegram.[5]

The British decided that the best way to inform the US government of the message's inflammatory contents would be to share the decrypt of the 13040 version of the telegram. Using this version protected the fact that the British had obtained the Berlin-Washington 0075 version by intercepting US diplomatic messages. Edward Bell, the second secretary at the US embassy in London, was the liaison with British intelligence and, thus, was a logical point of contact. He was also an agent of the State Department's Bureau of Secret Intelligence (BSI). Special Agent Leland Harrison ran the day-to-day operations of the BSI.[6]

Bell, who had served as the second secretary since September 1913, had developed a close relationship with Admiral Hall since at least mid-1915.[7] In August of that year, Hall passed to Bell some papers British intelligence had seized relating to German plans for disruption and sabotage in American factories.[8]

On February 19, 1917, Hall showed Bell a copy of the decrypted Zimmermann message sent between Washington and Mexico City that the British had obtained through human intelligence.[9] Although Bell thought it must be a hoax, Hall convinced him that the message was real, but that nothing could be done with it until the British Foreign Office decided how to proceed. Hall did urge Bell to tell US ambassador to Britain Walter H. Page and convince Page not to act just yet.[10] Four days later, on February 23, Balfour gave Page a copy of the decrypted message, which Page forwarded to Washington the next day. Page also sent the data needed to obtain the text of the Bernstorff message from the telegraph company in Washington. Frank

Edward Bell

Edward "Ned" Bell was born in New York City on August 9, 1882. He graduated from Harvard University in 1904 and was a close friend and classmate of Franklin Roosevelt; the pair toured Great Britain in their junior year.

After working in a brokerage firm for a few years, Bell was hired by the Department of State and went to Cairo in July 1909, serving first as deputy consul general. After joining the Foreign Service in January 1911, he spent a year in Tehran, Iran, as secretary of the legation. Bell advanced quickly and became second secretary of the legation in Havana in 1912. By 1913, he was the second secretary of the embassy in London, where he served until early 1919. Emily Bax, a British woman who worked at the embassy, noted "apart from boiling up like a bottle of soda water whenever he was crossed, he was one of the most charming as well as amusing men who was ever at the Embassy, so dynamic, so unexpected, so thrillingly interesting!"

Bell's next stop was Tokyo for two years; he then was part of the American delegation to the Conference on the Limitation of Armaments in Washington in November 1921. After a short tour in Washington as chief of the Division of Current Information, he became counselor of the embassy in Peking (now Beijing) in November 1922. On the morning of October 28, 1924, he fell on the embassy steps, suffered a heart attack, and died. Bell is buried in Green-Wood Cemetery in Brooklyn, New York.

Sources

Ancestry.com. Vital records. Accessed August 22, 2018.

Bax, Emily. *Miss Bax of the Embassy* (Boston: Houghton-Mifflin, 1939), 248-249. Quoted in Kahn, David. "Edward Bell and His Zimmermann Telegram Memoranda." *Intelligence and National Security* 14, no. 3 (1999): 143-159.

Polk, a prominent lawyer who was in charge of the BSI, showed the message to President Wilson on February 25.[11]

The Zimmermann Telegram appeared in American newspapers on March 1. But that was not the end of the story. On the same day, the State Department asked the British to send them a copy of the German codebook, as they had now acquired additional German coded messages from Western Union. While the British were happy to decode the messages for the Americans, they were unwilling to hand over a copy of the codebook. Lansing wanted to have someone in the US embassy "personally decode" the message so that the State Department could claim it came from US sources rather than from the British.[12] On March 2, Bell, with the assistance of Room 40's Nigel de Grey,[13] decoded a copy of the telegram that Polk had obtained from Western Union in Washington.

At the time the United States learned of the Zimmermann Telegram there was no organized military cryptologic effort, but there were a small number of known experts in codes and ciphers. Among the untapped American expertise was William Friedman at Riverbank Laboratories, who would study the events surrounding the Zimmermann Telegram decades later.[14] In the War Department, Captains Joseph O. Mauborgne, Frank Moorman, and Parker Hitt had previously solved messages related to Germany and Mexico.[15] The State Department made no attempt to use this cadre of American experts to verify the accuracy of Brit-

ish codebreaking and were likely unaware of their existence; they trusted Bell and his relationship with Admiral Hall and had no reason to look elsewhere for assistance.

Did the Zimmermann Telegram change the course of US cryptologic work as the country moved toward war in 1917? Probably not, though one might speculate that the example of a coded message influencing the course of events might have inspired the new American cryptologic workforces of 1917 and 1918 and reminded them of the importance of their work. But there is no evidence that the telegram affected either the pace of Major Ralph Van Deman's effort to establish a formal military intelligence code and cipher section or his resolve to do so.

Bell's role in cryptology did not end with the Zimmermann Telegram. Though not a code or cipher expert, he functioned throughout the war as what could be considered the first US cryptologic liaison officer. He continued to be the conduit between Harrison's BSI and Room 40. Hall used Bell to pass intelligence to the State Department, particularly on matters that furthered Britain's interests, with the hope that the Americans would expose the intelligence to the press.[16]

In turn, throughout the duration of the war, Bell supplied Room 40 with coded and ciphered messages obtained from various State Department sources, and Room 40 provided decrypts back to Bell. On at least one occasion, in October 1917, Bell received from Washington a decoded "cipher wireless" message between the Foreign Office in Berlin and the German embassy in Madrid.[17] This message was probably intercepted by the US Navy's radio station at Otter Cliffs, Maine. During much of 1917, Harrison also used Riverbank Laboratories to break messages obtained through the censorship process or from liaison agents, with some messages routed through Van Deman, the chief of the Military Intelligence Division (MID). By the end of November 1917, the MID's Code and Cipher Section (MI-8), not Riverbank, was providing this service for the State Department.[18]

Among the material Britain provided to Bell were a number of cases of interest. One of the best-known cases concerns the Luxburg Telegram, one of a series of messages intercepted by the British that enumerated the activities of the German ambassador to Argentina Count Karl von Luxburg. In August 1917, Hall explained to Bell how the British intercepted messages that the Germans passed in Swedish diplomatic channels (an arrangement similar to what the Germans had with the Americans until early 1917 and known as the Swedish Roundabout). Hall also shared messages showing how Luxburg was attempting to keep Argentina as a friendly, if neutral, nation by reducing or eliminating U-boat attacks on Argentine ships. Britain's three-part objective was to have Argentina either come into the war on the side of the Allies or at least break diplomatic relations with Germany, discredit the pro-German party in Sweden by revealing their complicity in allowing German messages to be sent via Swedish channels, and reveal the "clumsiness" of German methods to their supporters and neutral nations. America leaked the intelligence to the press in the autumn of 1917. Argentina broke off diplomatic relations with Germany and expelled Luxburg. As a side effect, the Germans realized that their 13040 code had been compromised, and they stopped using it.[19]

In May 1918, Bell alerted the State Department that there was intelligence that German authorities in Spain had obtained a copy of a cipher message, enciphered in the department's Red Cipher and sent from Washington to the consul at Valencia, and that this message had been deciphered in Berlin. Bell noted the fact that the Germans could read it was "neither surprising nor alarming" and that he would monitor to see if the Germans showed the ability to decipher other codes. He suggested the department use "the greatest care" so that critical information was not put in the Red Cipher for messages to Spain and other neutral nations. Bell also warned Harrison not to do anything to compromise the source of the information.[20] Though the United States was inter-

cepting the high-power radio link between Nauen, Germany, and Madrid, Spain, Bell was probably trying to protect the fact that the British were doing so as well.[21]

Hall exploited his relationship with the State Department, using the United States to reveal information Room 40 had discovered while working through older, previously unbroken messages. Some of these messages concerned defeatist French citizens anxious to bring the war to a quick conclusion. A former French prime minister, Joseph Caillaux, was linked to a "shady individual of Egyptian extraction," Bolo Pasha, who was being paid by the Germans and had been associated with left-wing French newspapers. Caillaux, Pasha, and others were arrested by French authorities based on this material, which the US ambassador in France shared with French Prime Minister Georges Clémenceau at Hall's request. The French prosecution used the telegrams shared by the Americans. Pasha was executed in February 1918. Caillaux, who was not tried until 1920, lost his civil rights for 10 years following a short prison sentence. This was all done without the French government learning that the source of these decoded messages was actually the British government.[22]

Harrison did not always react as Admiral Hall desired. In mid-April 1918, Hall tried to get the State Department to publish cryptologic intelligence on the Irish situation, but the United States did not take the bait. Bell received 32 decoded communications between Bernstorff, Germany's ambassador to America, and the German government; Hall believed these messages showed that the Germans were involved in both the Easter Rising of 1916 and an insurrection planned for February 1917 (which was later cancelled). Bell seems to have been under some pressure from Hall, for he repeatedly asked Harrison for a reply. On May 20, Harrison let Bell know that President Wilson was "not prepared to publish these documents at this time and is not willing publicly to sanction their publication." The British government released the files to the press, and they appeared in the papers in Britain on May 25.[23]

Admiral Sims's US Navy Offices in London

Bell was not the only American working with Room 40. Admiral William S. Sims sailed to England in early April 1917 disguised as passenger V. J. Richardson, along with an aide, to represent the US Navy and develop a policy of cooperation with the Allies. He arrived in Liverpool on April 9, three days after the US declaration of war.[24] Sims set up his headquarters in several renovated houses in Grosvenor Gardens, London, and dubbed the enterprise the "London Flagship."[25] By early August 1917, he had received his own Navy Cipher Box and related ciphers and thus had secure communications with Washington.[26]

Sims built a relationship with Admiral Hall and had some degree of access to cryptologic intelligence from Room 40, passing the same to Washington. Room 40 had great success against German (and other) naval systems as well as diplomatic communications. Hall briefed Sims each day and, as he did with Bell, used him to pass information on Room 40 decodes concerning German activities affecting the US Eastern Seaboard.[27] Sims, however, never knew the source of this information and seems not to have known the extent of Room 40's work.

Details are scarce, but two examples of intelligence sharing from late 1917 can be found in navy records. On September 10, 1917, the director of the British Naval Staff's Intelligence Division notified Sims that Gibraltar knew of an Italian ship's intercept of an undecipherable message on September 2, and that two Danish steamers were using the same station the next day. The British suggested Sims look into these ships, which were bound for the United States.[28] Later, in December 1917, the director of US Naval Intelligence sent information on a probable enemy code to the naval attaché in London; the code was thought to be used by the Germans to tell

their services in Barcelona information about troop transports.[29]

While Sims received naval intelligence from Room 40, he was not aware of the work the organization was doing on diplomatic traffic. His ignorance of this intercept caused a problem for Bell and could have caused the loss of a key intercept source. Sims had convinced all the US naval attachés in Europe to send their reports to him before sending them to Washington, with the idea that he could check the information against British intelligence. In December 1917, the attaché in Madrid reported to Sims that the Germans "were sending wireless messages from every important town in Spain."[30] Sims took that information, informed the US embassy in Madrid about the ciphered radio messages from Berlin to Madrid, and requested that the ambassador have the Spanish government halt communication with Germany. Of course, the Nauen-Madrid radio link that carried the Berlin messages was a critical source of intelligence for the British at the time. When Bell learned of Sims's request to the ambassador in Madrid on February 16, 1918, he wrote to Harrison, urging him to tell the ambassador not to act, which Harrison did. While there was some confusion on the part of the State Department as to the extent of Sims's involvement, Bell was glad that they had averted the potentially catastrophic loss of the communications link.[31]

The American Expeditionary Forces (AEF) intelligence staff (G2), at Frank Moorman's instigation, forwarded coded German naval messages to Lieutenant Commander John R. Roys in Sims's office, noting that "our force is not sufficient to permit us to do any work with this code, but it is thought possibly the messages may be of service to you."[32] The Radio Intelligence Section of the AEF General Staff, G2A6, formalized this process in April 1918, adding Sims's office to its Distribution C so he could receive copies of diplomatic code and cipher messages (see chapter 8). In mid-July, Sims asked that the US Navy Code and Signal Section in Washington be included in this distribution.[33] Moorman continued to forward items of special interest, including a message in cipher from the German Admiralty staff in May.[34] By June 1918, the G2A6 was sending 10 to 30 reports a day regarding German naval codes to Sims's office.[35]

Sims also facilitated evaluation of Lieutenant Commander Russell Willson's Navy Cipher Box by experts under his command (see chapter 6).

In March 1932, Sims was unable to attend a dinner given in Hall's honor in New York but wrote "Please … express to him my profound admiration for him as a man and as a naval officer, and the gratitude of all the Yankee sailors whose efforts in co-operating with John Bull's Navy were so greatly aided by his vision and advice, and by his secret knowledge of enemy intentions."[36]

Sims and the London Flagship were only a high-level consumer of communications intelligence, as no evidence seems to exist of his organization breaking codes and ciphers or tasking collection.

Conclusion

The British Admiralty's relationships with the US State Department and the US Navy focused on the supply of information derived from cryptologic intelligence produced by Room 40. There was no exchange of techniques between Room 40 and cryptologic elements in Washington; the relationship did not focus on improving American cryptologic capabilities or sharing techniques. Admiral Hall provided decrypted intelligence to the State Department based on his interests and priorities and used the coded and ciphered messages supplied by the United States to increase British intelligence capabilities. But Hall, despite repeated requests from the US Navy and the State Department, would not assist the Americans in developing their own capabilities.[37] Still, the State Department received some very interesting material to guide its actions during the war. While the material sometimes directly affected US interests, such as the German ability to decipher the Red Cipher, the lack of a fully functional cryptologic organization in the United

States led to Hall using Bell and Harrison to take political actions of benefit to the United Kingdom while protecting Britain's source of communications intelligence.

The information that Sims received was directly proportional to the need of the Admiralty to ensure that the US Navy could operate in conjunction with the British fleet. The failure of Room 40 to inform Sims of their diplomatic codebreaking effort, while perhaps a good security initiative, inadvertently endangered that effort when Sims, using the naval attaché system, tried to manipulate the German communications in Spain. This instance of the two allied nations inadvertently working at cross purposes is an early example of the dangers of a lack of transparency between cryptologic partners.

But the British Admiralty and the Americans did not have a full cryptologic partnership. While Leland Harrison desired complete cooperation among the American, British, and French cipher bureaus, Admiral Hall's concerns about compromising his sources of signals intelligence, in addition to the fact that the Americans had nothing valuable to offer in exchange, hampered the level of exchange.[38] The relationship between the British Admiralty and US cryptologic efforts in Washington differed greatly from the level of cooperation that developed between the British War Office and the AEF in France (see chapter 8).

Notes

1. David Kahn, *The Codebreakers* (New York: Scribner, 1996); Thomas Boghardt, *The Zimmermann Telegram: Intelligence, Diplomacy, and America's Entry into World War I* (Annapolis: Naval Institute Press, 2012); and Barbara W. Tuchman, *The Zimmermann Telegram*: *America Enters the War, 1917-1918* (New York: Viking Press, 1958) to mention only a few.
2. The telegram left Berlin late on January 16, 1917, transited Copenhagen and then London before reaching Washington after office hours on January 17. Peter Freeman, "The Zimmermann Telegram Revisited: A Reconciliation of the Primary Sources," *Cryptologia* 30, no. 2 (2006), 116.
3. Freeman, "Zimmermann Telegram," 117.
4. Freeman, "Zimmermann Telegram," 122.
5. Freeman, "Zimmermann Telegram," 124.
6. Boghardt, *Zimmermann Telegram,* 109.
7. David Kahn, "Edward Bell and His Zimmermann Telegram Memoranda," *Intelligence and National Security* 14, no. 3 (1999), 147.
8. Patrick Beesly, *Room 40: British Naval Intelligence 1914-1918* (London: Hamilton, 1982), 229.
9. Sir Thomas Hohler, the British chargé d'affaires in Mexico City, had in the period 1914-1916 convinced an official at the Mexico City telegraph office to provide German telegrams, reportedly by intervening with authorities in a convoluted case involving an English printer, forged currency, and the printer's brother who worked in the telegraph office. Edward Thurstan took Hohler's place in September 1916 and, on February 5, 1917, was asked to obtain all telegrams from the German embassy in Washington to the German minister in Mexico. Thurston did so. See Freeman, "Zimmermann Telegram," 122-123.
10. Beesly, *Room 40,* 217.
11. Boghardt, *Zimmermann Telegram*, 116-117, 259-260.
12. Page 127 in Freeman quotes Lansing and cites National Archives and Records Administration, College Park (NARA CP) Record Group (RG) 84, Records of the Foreign Service Posts of the Department of State, 862.20212/82A.
13. Page 128 in Freeman presents de Grey's recol-

lection from his 1945 memoir that he had done the bulk of the work, which is evidenced by the change in handwriting on the decrypt.

14. William F. Friedman and Charles J. Mendelsohn, *The Zimmermann Telegram of January 16, 1917 and Its Cryptographic Background* (Washington: Government Printing Office, 1938). Copies annotated by Friedman are in Friedman's personal papers at the George C. Marshall Foundation Library (Item 1057) and in his official papers released by the National Security Agency (Document A491080). David Sherman, "Barbara Tuchman's *The Zimmermann Telegram*: secrecy, memory, and history," *Journal of Intelligence History*, 19, no. 2 (2020), 125-148, DOI: 10.1080/16161262.2020.1778325 (https://www.tandfonline.com/doi/full/10.1080/16161262.2020.1778325?scroll=top&needAccess=true).
15. Samuel Reber to Parker Hitt, January 4, 1915; Hitt to Reber, January 8, 1915; Adjutant General of the Army to Hitt, October 7, 1915; Reber to Hitt, October 11, 1915; Hitt to Reber, October 20, 1915; Army Chief of Staff to Hitt, June 28, 1916; Hitt to Army Chief of Staff, September 26, 1916; Hitt to Reber, March 10 and 25, 1917; all in National Cryptologic Museum Library, David Kahn Collection, Parker Hitt Papers. David A. Hatch, "The Punitive Expedition Military Reform and Communications Intelligence," *Cryptologia*, 31, no. 1 (2007), 38-45. Correspondence between Ralph Van Deman and George Fabyan, multiple dates in April 1917, NARA CP RG 165, Records of the War Department General and Special Staff, Entry 65, Box 2241.
16. David Ramsay, *'Blinker' Hall SPYMASTER: The Man Who Brought America into World War I* (Cheltenham, UK: Spellmount Limited/The History Press, 2008), 255.
17. Edward Bell confidential papers, NARA CP, RG 59, General Records of the Department of State, Box 199. None of the material Bell supplied to Room 40 seems to have been sensational, although many of these appear to be related to the Luxburg case and obtained by the United States from Swedish sources independent of the British intercept of Swedish traffic.
18. Ralph Van Deman to Leland Harrison, memo, July 19, 1917, passing on a Riverbank decipherment; Van Deman to Harrison, memo, about MI-8, November 26, 1917. Both, NARA CP, RG 165, Entry 65, Box 2241. Also see chapter 4.
19. Beesly, *Room 40,* 237-241; Ramsay, *'Blinker' Hall SPYMASTER*, 254-257; Bell confidential papers.
20. Bell confidential papers.
21. Collection against the Nauen-Madrid line was done by the AEF G2A6 Press Intercept station at Chaumont, France, as well as by the US Navy's radio station at Otter Cliffs, Maine. See chapters 6 and 10. Chapter 6 discusses Otter Cliffs; chapter 10 discusses press intercept stations.
22. Beesly, *Room 40,* 242-245; Bell confidential papers. Also see Ramsay, *'Blinker' Hall SPYMASTER*, 261-262.
23. Beesly, *Room 40,* 244. Quote from Bell confidential papers, file 102. President Wilson was unprepared to antagonize the large voting bloc of Irish-Americans.
24. "Biography of William S. Sims," Navy History and Heritage Command, accessed May 14, 2018, https://www.history.navy.mil/research/histories/biographies-list/bios-s/sims--william-s-/sims-william-s-text.html.
25. William Sowden Sims, *The Victory at Sea* (London: John Murray, 1920), 205.
26. Captain J. S. Holtwick, Jr., USN ret., *Naval Security Group History to World War II*, Special Research History 355, Volume I, NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 94.
27. Beesly, *Room 40,* 246.
28. Message, Royal Navy Staff, Intelligence Division, to Sims, September 10, 1917. Center for Cryptologic History files Series II.I.20, NARA CP, RG 45, Naval Records Collection of the Office of Naval Records and Library, Sub-file 1911-27.
29. Director of Naval Intelligence to Naval Attaché, London, December 17, 1917, "Probable Enemy Code." Center for Cryptologic History files Series II.J.5, NARA CP, RG 45, Sub-file 1911-27.
30. The naval attaché in Madrid appears to have had a source who supplied copies of coded German messages, for on February 1, 1918, he sent a

detailed message about enemy codes to the director of Naval Intelligence. It is not known if the attaché or the embassy had a radio station to copy these messages in-house, or if they were instead relying on informants or radio amateurs. Memo on "Enemy Codes" dated February 1, 1918, NARA CP, RG 38, Records of the Office of the Chief of Naval Operations Intelligence Division Attaché Reports, Box 1353.

31. Beesly, *Room 40,* 246-247. In the Bell confidential papers, see file 103 for memos on February 16, February 21, March 4, and March 6 of 1917.
32. Dennis Nolan to Lieutenant Commander John Roys, message, March 4, 1918, NARA CP, RG 120, Records of the American Expeditionary Forces, Entry 105, Box 5761.
33. Sims to Moorman ("German messages intercepted by GHQ_AEF"), message, July 15, 1918, NARA CP, RG 120, Entry 105, Box 5761.
34. Moorman to Sims, message, May 16, 1918, NARA CP, RG 120, Entry 105, Box 5761.
35. Sims was also added to distribution for German naval codes and ciphers. Weekly Code Section Report for June 16, 1918, NARA CP, RG 120, Entry 105, Box 6696.
36. Ramsay, *'Blinker' Hall SPYMASTER*, 283; quoting Sims to Peaslee in Sir William Reginald Hall and Amos Jenkins Peaslee, *Three Wars Against Germany* (New York: G. P. Putnam's Sons, 1944), 150-151.
37. Beesly, *Room 40,* 247; Phyllis L. Sobel, *A Necessary Relationship: The Development of Anglo-American Cooperation in Naval Intelligence* (Westport, CT: Praeger, 2005), 12-13, in which the author discusses this as a pattern of behavior for the British Admiralty during the war.
38. Beesly, *Room 40,* 248.

Chapter 2

The Problem of German Long-Distance Radio

The existence of German high-power, long-distance radio communications to the Western Hemisphere was a significant concern driving American cryptologic efforts. Germany had aggressively developed long-distance radio communications prior to the war to provide redundancy for its undersea cables and to maintain contact with its colonies in Africa and the South Pacific, as well as its embassies and consulates worldwide. The Germans were correct in thinking that the coming war would involve information warfare on a scale not yet observed in the electronic age; one of the first actions taken by Britain upon entering the war in August 1914 was systematic destruction of German-owned submarine cables and radio nodes.[1]

The German radio company Telefunken was a world leader in radio technology and worked with many smaller nations to implement their long-distance and internal radio systems. Telefunken, through an American subsidiary, operated a station in Sayville, New York, from 1912 that communicated with the German station at Nauen, just outside Berlin. Another German company built a station at Tuckerton, New Jersey, which opened in 1914 but was never turned over to its intended French owner. Tuckerton communicated with the German station at Eilvese, outside of Hanover.[2]

Well before the start of the Great War, then Lieutenant Stanford C. Hooper, the naval radio pioneer, expressed concern about Telefunken's Sayville station and the potential for such stations to be used by spies to disrupt critical naval radio traffic. In 1913, Hooper, a man ahead of his time, suggested that the United States set up a station in Germany to monitor and intercept German radio traffic.[3]

The US Navy clearly had the lead in understanding, using, and controlling radio, for it had broad de facto control of radio operations in the United States. The US Army had been permitted to control radio needed for its purposes. As early as 1904, the navy's interests in radio were recognized as paramount to all others, but the army retained the right to use radio as needed for operations. The navy led the way on thinking about the strategic value of radio, radio intercept, and improved radio technology; they used their ability to charge lower rates for some commercial traffic to incentivize shipping companies to shift from older Spark systems to the navy's preferred continuous wave radio technology.[4]

Long-distance radio communication became particularly critical to Germany on August 4, 1914, when the British cut German undersea cable communications. President Woodrow Wilson, concerned with preserving US neutrality, immediately ordered the navy to prohibit transmission of "unneu-

tral messages" from radio stations on American soil. By executive order, on September 10 the navy took over the station at Tuckerton to prevent Germany from using it to send coded or ciphered messages. The Sayville station, though technically American-owned, was refused an operating license because of a recent transmitter upgrade and sat idle until July 1915, when the navy put it into commercial service with Nauen.[5]

In the wake of the revelations of the 1917 Zimmermann Telegram, the United States became more aware of the criticality of German radio links to Mexico; both the army and navy wished to intercept these communications. The entire American cryptologic system of 1917—from Washington to London to American Expeditionary Forces (AEF) headquarters in Chaumont, France—realized that the high-power German radio transmitter at Nauen was an important source of information, and all parties collected, or tried to collect, communications from this transmitter. The station at Nauen was the jewel of Telefunken stations and the heart of German long-distance communications and propaganda. Built in 1906 as a research station, it achieved the first radio communications with the German colony of Togoland (a combination of today's nation of Togo and part of today's Volta Region of Ghana) in 1911. The station was upgraded in February 1914. At that time, its antenna measured 1,037 meters, supported by one 260-meter mast and two 120-meter masts. The antenna size was increased and additional long wave transmitters were installed in 1916.

Mexico, like many other nations, had an existing relationship with Germany, under the auspices of Telefunken, for radio technology. With the US Navy in control of high-power radio stations on the US East Coast in 1916, the German resident minister in Mexico, Heinrich von Eckardt, believed that building a high-power station in Mexico City would make it possible to bypass those stations, reestablish communications links to North America, and use Mexico as a base for spying and propaganda operations against the United States and Latin America.[6]

A French-built transmitter, for the use of the Mexican armed forces, had existed at Chapultepec Castle in Mexico City since 1911. Chapultepec was chosen for a new high-power transmitter, built by a German engineer who had been forced out of the Sayville station. By late April 1917, the receiving station (at Iztapalapa) was getting messages from Nauen. By the fall of 1918, the 540-foot transmitter tower was able to send communications to Nauen. These German–Mexican radio transmissions were of immediate interest to the US cryptologic community.[7]

Even before the army's Military Intelligence Division (MID) had formed a radio intelligence service, the MID and the Signal Corps were investigating the stations at Nauen and Chapultepec and contemplating coordination with the navy.

Colonel Nugent H. Slaughter, the head of the Radio Development Section for the Signal Corps, recommended in the spring of 1917 that a force of radio operators be created to detect radio communications across the border between Mexico and the United States. Slaughter contracted with the Western Electric company for six sets of receiving equipment.[8] Ready in the fall of 1917, "special radio apparatus" and teams of four operators[9] were sent to Fort Brown (Brownsville, Texas), Fort McIntosh (Laredo, Texas), Fort Sam Houston (San Antonio, Texas), Fort Bliss (El Paso, Texas), and Fort McArthur (Los Angeles, California).[10] At first, the special intercept teams were kept separate from the posts' Signal Corps radio stations and operators. But the teams had not been properly trained on the equipment and were unable to intercept the relevant transmissions.[11] To combat the deficiency, the special teams were combined with the existing post radio stations and the new equipment used for regular station business rather than intercept. As a result, the army made little progress in intercepting cross-border communications, though the quality of communications between posts improved.[12]

The work was not completely futile, for during this investigation the US radio station at Fort McIntosh received one piece of traffic from Chapultepec on September 23, 1917. This material arrived at the MID's Code and Cipher Section (MI-8) in Washington on September 28, 1917, and was deciphered by Herbert O. Yardley on September 29; a copy of the message—official Mexican government traffic involving President Venustiano Carranza—was given to the Naval Communications Office on October 26, 1917.[13] But Slaughter's planned investigation of cross-border radio traffic was, on the whole, unsuccessful and was abandoned after only a few months. The failure and "fragmentary" intercept results were blamed on a lack of supervision and the colocation of interceptors with those doing the official business of the post.[14]

As this initial Signal Corps investigation was winding down, Major Robert M. Campbell, the military attaché at Mexico City, wrote to Major Ralph Van Deman, chief of the MID, on November 16, 1917, about the possibility of intercepting Nauen's signal using radio equipment already at the embassy. Campbell suggested that perhaps the navy radio station at Arlington, Virginia, could devote 24 hours to monitoring the airwaves for Nauen's broadcast.[15]

Van Deman got in touch with Captain David Reeves, who had recently returned from work in the attaché office in Mexico City and was now stationed at Camp Alfred Vail in Little Silver, New Jersey. Reeves agreed that Arlington was the best option but noted that Arlington was so busy with regular radio work that some other means of interception would have to be devised.[16]

By mid-December, Reeves had a plan. He suggested to Van Deman that Signal Corps stations at San Diego, Galveston, Laredo, and Key West provide the needed frequency coverage by assigning two or more expert operators to listen each night for specific, tasked wavelengths. If Signal Corps stations were not available, Reeves thought that amateur radio operators should be asked to assist. Meanwhile, Reeves suggested replacing the antenna at the embassy in Mexico City with a loop antenna "excellent for long distance work" that could "be put in a room and kept out of sight."[17]

Near the end of December, Van Deman confirmed to Campbell that Arlington could not be used exclusively for 24 hours for radio detective work. Van Deman shared Campbell's and Reeves's ideas with Commander Edward McCauley, Jr., acting director of the Office of Naval Intelligence (ONI), and Slaughter, both of whom were still interested in finding German propaganda sent by wireless to Mexico.[18] On December 29, 1917, Slaughter directed Captain Carl Kinsley (see sidebar) in the Office of the Chief Signal Officer (CSO) in Washington to take on the work.[19] Kinsley went to inspect the Signal Corps stations along the Mexican border and, upon his return, discussed the matter with Van Deman.[20]

Van Deman did not let the matter rest and sent a memo to Campbell telling him what the Signal Corps was doing and reporting that Ambassador Henry Fletcher in Mexico City was anxious to get a "first class wireless operator" for the embassy to take Reeves's place, as well as an assistant for Major Campbell.[21] He also advised the State Department about the situation.[22]

McCauley had been busy as well, and he provided Van Deman with a message from the ONI, signed by Lieutenant Reed M. Fawell, assistant director of Naval Communications. Fawell believed that Reeves's recommendation was not practical "as the radio signals from Nauen will not reach Mexico on wavelength lower than 4000 meters, except under the most extraordinary conditions. The radio station at Nauen now transmits on wavelengths of 6300, 11000 and 12600 meters." The navy had already tasked the listening station at City College, New York, with collecting signals from Nauen, according to Fawell, and this information was forwarded to the ONI. Fawell suggested that someone, perhaps the MID, should compare propaganda published in Mexican papers with the material that ONI was receiving from the City College collection (see chapter 6). Though the navy shared informa-

Carl Kinsley

Carl Kinsley was an electrical engineer and physicist who was a pioneer in the field of radio. Born on November 25, 1870, in Lansing, Michigan, he grew up in Falls Church, Virginia. Like his parents, Kinsley attended Oberlin College, graduating with a bachelor of arts in 1893 and a master of arts in 1896. He then obtained a master of engineering degree at Cornell University.

While teaching physics at Washington University in St. Louis (1894-1899), Kinsley began experimenting with radio transmission. He installed the first radio station in the United States at Fire Island, New York, and took part in the nation's first commercial broadcast. Kinsley also studied at Johns Hopkins University (1898-1899) and at the Cavendish Laboratory in Cambridge, England (1905).

Kinsley first worked with the War Department from 1899 to 1901 and then taught physics as an associate professor at the University of Chicago. He was commissioned as a major in the Signal Corps in 1917 and assigned to the Military Intelligence Division in February 1918, where he led MI-10E, the Radio Intelligence Section, until his discharge in July 1919.

After the war Kinsley was a private consulting engineer and developed a printing telegraph. He joined US Steel in 1931 and retired in 1937. A fellow of the American Physical Society and a member of the American Association for the Advancement of Science, Kinsley held more than 30 patents concerning radio and high-speed telegraph printing and published more than 30 papers.

Kinsley died on January 30, 1959, and is buried in Oakwood Cemetery in Falls Church.

Kinsley as a member of the physics department at the University of Chicago. University of Chicago Photographic Archive, [apf1-05547], Special Collections Research Center, University of Chicago Library. Used with permission.

Sources

Ancestry.com. Vital records. Accessed August 7, 2018.

Herald-Press (St. Joseph, Michigan). "Carl Kinsley, Radio Pioneer Dies; Leaves Daughter Here." January 31, 1959. Accessed August 7, 2018.

Oberlin College. *Oberlin Alumni Magazine*, May 1959, 34. Accessed August 10, 2018.

tion about their work at City College, they appear not to have told the army about intercept efforts against Nauen then underway at the navy's radio station at Otter Cliffs, Maine.[23] Van Deman asked McCauley to pick a week in the future for which all intercepts from City College would be sent to the MID; he would ask the attaché in Mexico City to keep a complete file of all the pro-German newspapers for that same week so that an opinion could be formed as to whether the propaganda originated with Nauen.[24]

Meanwhile, Van Deman continued to work with Kinsley from the Office of the CSO and likely met with Kinsley in late January 1918 about his visit to the border. Kinsley's report of January 17 called for a "complete reorganization of the service and its separation from the intercommunicating radio organization of the Army," complete with its own special equipment.[25] On January 23, Kinsley ordered First Lieutenant Frank Lankford,[26] who had been a civilian radio engineer employed by the Signal Corps at Laredo prior to the war, to go to Fort Sam Houston, to establish a listening-in (that is, a radio intercept) station there. The station would have an 80-foot antenna, ground antenna, direction finders, and multiple receiving sets. Lankford was directed to set up a station a mile or so from the Signal Corps station on the post, preferably directly east or west of the station, and he was to have his own equipment and personnel, including a testing laboratory, repair shop, and stock room.[27] Kinsley's letter of January 23 is the earliest evidence that the army—either the Signal Corps or the MID—was contemplating a network of stations specifically for the purpose of radio intelligence despite the failed intercept experiment of late 1917.

Kinsley instructed Lankford to take everything he had at Laredo to Fort Sam Houston; the rest of the equipment would be sent to him. Lankford initially was to report to the US Army CSO General George O. Squier, three times a week, with additional requirements to be determined once the station was operational. "The opportunity for independent work is a very unusual one," said Kinsley, adding "if you make the best use of it you will spare no personal effort to produce the desired results and to keep this office fully informed."[28]

Transmissions from Nauen continued to interest and frustrate all parties. In the spring of 1918, there was discussion about the inability to decipher enciphered messages coming from Nauen. In early June, US Navy Lieutenant John C. Cooper, Jr., and Lieutenant Maurice Paternot of the French Army visited Van Deman at the MID office in Washington to recommend that a "serious effort" be made to break the four-letter code (sometimes referred to as the Umlaut Code because three of the four letters had umlauts) used by Nauen to send messages in the middle of their press broadcasts. Van Deman ordered MI-8 to work closely with ONI in this matter, and MI-8 began gathering traffic and searching for staff (see chapter 5).[29]

The possibility of intentionally interfering with the Nauen transmissions in order to stop the messages from getting to their intended recipients was discussed at a May 31, 1918, conference attended by Colonel John J. Carty from the Office of the CSO in Washington, Director of Naval Communications Captain David W. Todd, navy Lieutenants Tunis Augustus Mcdonough Craven[30] and Cooper, Major Clarence C. Culver of the Signal Corps, and Paternot. The group decided that the question needed to be put to the Interallied Radio Commission "in view of the grave situation which might be created if action were taken which might precipitate intentional radio interference on the part of the enemy."[31] In the end, Carty concluded that even if interference seemed warranted it would just cause the Germans to retaliate against both transatlantic radio and AEF radio operations in France. Carty urged British, French, and American cipher bureaus to share information that would help everyone figure out the contents of the messages because "if these messages could be deciphered it would probably be more advantageous to intercept them than to interrupt them." Collecting the radio traffic and understanding it won out over

the urge to destroy the adversary's ability to maintain secret communications.[32] By September 3, 1918, the AEF was working to set up bilateral exchanges of diplomatic and commercial messages to and from the Western Hemisphere with the British, French, and Italian cipher bureaus.[33]

Conclusion

Germany's high-power, long-distance radio transmissions influenced the direction that US cryptologic organizations would take on the home front. The desire to obtain communications traveling from Mexico to Germany (and potentially to agents in the United States) led both the army and the navy to adapt existing organizations to accommodate the need for signals intelligence.

In the army, the MID established intercept facilities along the US-Mexican border (see chapter 5). Kinsley, who had been commissioned in the fall of 1917, eventually would be assigned from the Signal Corps to the MID on February 16, 1918, where, joined by Lankford, he took charge of the MID's Radio Intelligence Section, MI-10E, and the border collection sites.[34] The assignment of signal intercept duties to the MID rather than Signal Corps appears to have been by mutual agreement and was both expedient and made logistical sense at the time. Though the Signal Corps' technological expertise exceeded that of the MID, the transfer of Kinsley and Lankford bridged that gap; at the same time the Corps was scrambling to send qualified radio operators to France to fill combat support positions. The assignment of signals intelligence duties to the MID in early 1918 would result in an intraservice conflict regarding the proper place for that work for a decade after the war ended (see conclusion to part one).

The navy had the ability but not the capacity to intercept radio signals from Germany at its existing radio facilities. The service increased capacity by adding a station at Otter Cliffs and co-opting civilian resources at City College, New York. Intercept from navy collection facilities was, by mid-1918, forwarded to MI-8 for decryption when the service realized they could not duplicate army efforts (see chapter 6). This spirit of cryptologic cooperation would fade near the end of the war when the navy believed the army was treading on its toes (see chapter 7), but in the early months of the war both services made an effort to get along on the home front.

Notes

1. A good discussion of the subject can be found in Jonathan Reed Winkler, "Information Warfare in World War I," *The Journal of Military History* 73 (July 2009): 845-867.
2. Hugh G. J. Aitken, *The Continuous Wave: Technology and American Radio, 1900-1932* (Princeton, NJ: Princeton University Press, 1985), 283.
3. Aitken, *The Continuous Wave,* 284.
4. Jonathan Reed Winkler, *Nexus: Strategic Communications and American Security in World War I* (Cambridge, MA: Harvard University Press, 2008), 60-63. *Radio Act of 1912* [Public Law 264] 62 Congress August 13, 1912, accessed April 16, 2021, http://earlyradiohistory.us/1912act.htm. L. S. Howeth, *History of Communications-Electronics in the United States Navy* (Washington, DC: Government Printing Office, 1963), 150-152.
5. Aitken, *The Continuous Wave,* 284, 286. When the United States declared war, the US Navy also took control of private radio stations owned by Marconi and the Federal Company.
6. J. Justin Castro, *Radio in Revolution: Wireless Technology and State Power in Mexico, 1897-1938* (Lincoln: University of Nebraska Press, 2016), 87-88.
7. Castro, *Radio in Revolution*, 51, 92-93, 97.
8. *History of the MID,* July 21, 1918, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 319, Records of the Army Staff, Entry EUD1071, Box 21A, 1407.
9. I could not locate the names of these men.
10. Ralph Van Deman, "Memorandum," April 8, 1949, 62, in "FOIA: Van Deman, Ralph H. HQ 2," Internet Archive, accessed February 22, 2018, https://archive.org/details/foia_Van_Deman_Ralph_H.-HQ-2, 86.

11. *History of the MID,* 1407.
12. *History of the MID,* 1407.
13. This and other examples can be found in NARA CP, RG 165, Records of the War Department General and Special Staff, Entry 65, Box 2241.
14. Van Deman, "Memorandum," 86.
15. Major R. M. Campbell to Van Deman, letter, November 16, 1917, NARA CP, RG 165, Entry 65, Box 3449.
16. Van Deman to David Reeves, letter, December 8, 1917, NARA CP, RG 165, Entry 65, Box 3449.
17. Reeves to Van Deman, letter, December 16, 1917, NARA CP, RG 165, Entry 65, Box 3449.
18. Van Deman to Campbell, letter, December 27, 1917; Van Deman to Edward McCauley, Jr., letter, December 27, 1917; Van Deman to Major Nugent H. Slaughter, letter, December 27, 1917. All in NARA CP, RG 165, Box 3449. All letters reference the German propaganda being sent "direct, or relayed, by wireless from Germany to Mexico."
19. *History of the MID,* 1408.
20. Slaughter to Van Deman, letter, January 2, 1918, NARA CP, RG 165, Entry 65, Box 3449.
21. Van Deman to Campbell, letter, January 8, 1918, NARA CP, RG 165, Entry 65, Box 3449.
22. Van Deman to Hon. Henry P. Fletcher, letter, January 8, 1918, NARA CP, RG 165, Entry 65, Box 3449.
23. McCauley to Van Deman, letter, January 10, 1918, NARA CP, RG 165, Entry 65, Box 3449. The McCauley letter provides a letter from the director of Naval Communications (DNC). This message, dated January 8, 1918, is on the subject "Communications between Germany and Mexico by Wireless" and references ONI letter 20948-46 (January 3, 1917 [*sic*; 1918 likely intended]) to DNC, which is not included.
24. Van Deman to McCauley, letter, January 25, 1918, NARA CP, RG 165, Entry 65, Box 3449.
25. Captain Carl Kinsley to Van Deman, letter, January 19, 1918, NARA CP, RG 165, Entry 65, Box 3449.
26. Frank Edward Lankford was born in Paris, Illinois, in August 1888. He served in the US Navy for four years, some of that time on the USS *New Orleans*, then worked for Coast Counties Gas and Electric Company in Watsonville, California, before serving in the US Army (July 1914–October 1916). He later worked for the army as a civilian radio engineer at the Signal Corps Laboratory at the National Bureau of Standards. He was commissioned in 1918. Nothing is known of his life after leaving the service of the MID Radio Intelligence Section (MI-10E).
27. Kinsley to Lankford, letter, January 23, 1918, NARA CP, RG 165, Entry 65, Box 107.
28. Kinsley to Lankford, letter, January 24, 1918, NARA CP, RG 165, Entry 65, Box 107.
29. "Weekly Report of MI-8," June 9-15, 1918, NARA CP, RG 165, Entry 65, Box 3533.
30. Known as T. A. M. Craven (1893-1972), the lieutenant was the great-grandson and namesake of Admiral Tunis Augustus Mcdonough Craven who died at the Battle of Mobile Bay in 1864.
31. "German Radio Telegraphic Cipher," July 7, 1918, NARA CP, RG 111, Records of the Chief Signal Officer, Entry 45, Box 1727.
32. "German Radio Telegraphic Cipher," July 7, 1918.
33. A variety of correspondence relating to the decision of the Interallied Radio Commission, NARA CP, RG 120, Records of the American Expeditionary Forces, Entry 2040, Box 123.
34. *History of the MID,* 1408.

Conclusion to Part One

Radio technology and the German (and Mexican) threat to the United States were factors drawing the nation into war. When the British Admiralty revealed the contents of the Zimmermann Telegram to Edward Bell, a policy decision based on the codebreaking success of Room 40, the British and Americans began a cryptologic entanglement that would wax and wane for several decades before cementing into the closest of alliances.[1] The Anglo-American cryptologic relationship between the Admiralty and the State Department (and then MID) diminished as the United States began its own work on the home front but grew considerably stronger on the Western Front with the War Office working with the AEF Radio Intelligence Section (G2A6).

The contents of the Zimmermann Telegram heightened US government concerns about the relationship between Germany and Mexico and Germany's long-distance radio broadcast capability. The Mexican angle drove the US Navy and the US Army to investigate how to intercept and decrypt these high-power radio transmissions and led to the establishment of radio intercept facilities within the United States. Whether anyone in the US government realized it at the time, the work of the German foreign minister and a radio station outside of Berlin provided the impetus for the beginning of the US cryptologic system.

Note

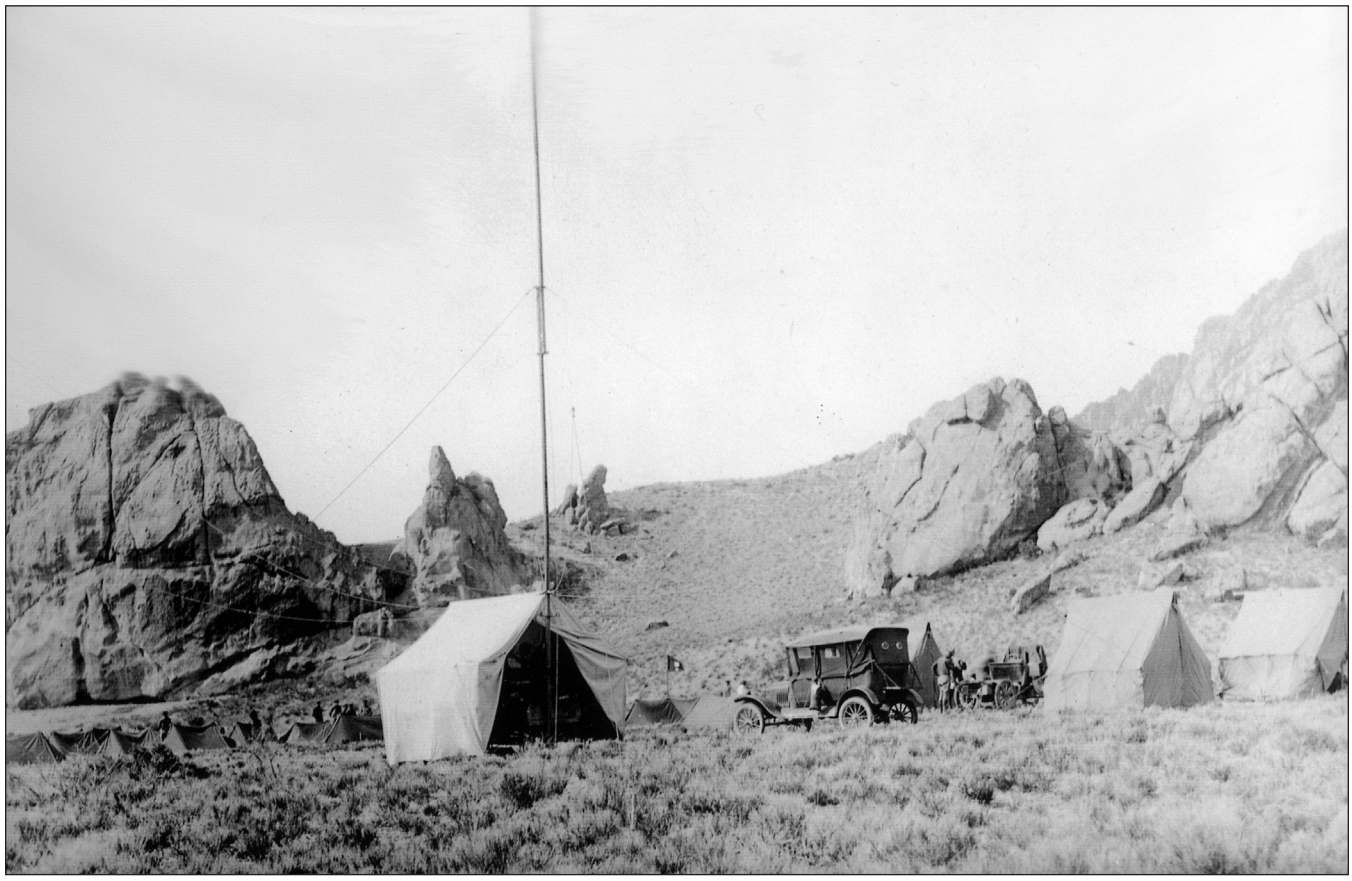
1. It should be understood that there was no centralized cryptologic organization in the UK before 1919; the Admiralty's Room 40 and the War Office's MI1(b) did not work together in most circumstances and conducted their own relationships with US cryptologic organizations. When the US-UK cryptologic relationship began again in 1941, the United States did not have a unified organization, and the British found it awkward to have to maintain a bilateral relationship with both the US Army and US Navy cryptologic agencies. Further explanation of the liaison efforts may be found in Robert Louis Benson, *A History of U.S. Communications Intelligence during World War II: Policy and Administration* (Ft. Meade, MD: Center for Cryptologic History, 1997).

Part Two

American Cryptologic Organizations and Operations on the Home Front

Introduction to Part Two

American Cryptologic Organizations and Operations on the Home Front



Radio Tractor Unit 46, Las Cruces, NM. New Mexico State University Library. Archives and Special Collections. Hobson-Huntsinger University Archives: 07090003.

It is clear from the way things were first organized in the US Army and the US Navy that cryptologic functions were viewed as very separate things in different organizations—and not as a consolidated US cryptologic effort. Although not consolidated, these efforts were not isolated. The stories of these organizations, at home and abroad, are intertwined and interlocking. There was collabo-

ration and competition, exchange and withholding of information, and organizational and personal jealousies. Collaboration usually won out, with the war effort holding the trump card. There was no time to confer, no time to form a central organization, and no time to carefully consider the long-term strategy behind each organization. Each service or agency did what it believed was the best thing to do. And sometimes common sense prevailed.

The early American cryptologic organizations can be divided into two groups: those that operated on the home front, within the United States (addressed here in part two), and those that operated in France as part of the American Expeditionary Forces (AEF), which are covered in part three. Work performed on either side of the Atlantic Ocean generally functioned independently, although there was some communication, discussion, and exchange of views. For the most part, entities in the United States had more time to consider problems and issues regarding the AEF; the AEF was focused on the immediacy of the front lines and only rarely solved a problem for those at home.

In one sense, the AEF cryptologic work was focused on tactical intelligence supporting the war fighter, and the War Department's Military Intelligence Division (MID) had a somewhat more strategic view, looking at German influence within the United States. But these lines were wobbly; the AEF collected, analyzed, and reported information related to the bigger picture of the war when they had it, and the day-to-day work of MI-8—the MID Code and Cipher Section—had tactical application in identifying spies and saboteurs. Each organization's role was restricted more by the practical realities of access to coded and ciphered material; geography and the laws of physics defined their turf far more than an intellectual construct about the type of intelligence on which they should focus.

There was one glaring organizational difference between the way the War Department's MID handled collection of signals intelligence (radio intelligence) and the way it was handled within the AEF in France. MID, an element of the Army General Staff, eventually formed an in-house Radio Intelligence Section, MI-10E, to collect communications. It largely did not rely on Army Signal Corps communicators located at the border forts to practice intercept as a secondary task, as the army had done through the Mexican border disturbances in 1915-1917. MID was the first organization to integrate a cryptanalytic workforce with a source of information under its own control; it also had its own codemaking effort. Collection tasking was minimal but did occur.

In France, the job of analyzing intercepted communications fell to the G2A6, a General Staff organization, and the job of intercept belonged to the AEF Signal Corps' Radio Section; codemaking belonged to the AEF Signal Corps' Code Compilation Section. While the two AEF organizations worked well together and functioned in a matrix-managed way with the establishment of the First Army, they were not the same organization. The conflict in these differing operational concepts or doctrines governing the conduct of cryptology as a whole would influence the army's postwar discussion of how a modern cryptologic system should work. In 1920, the MID's Radio Intelligence Section was dissolved and subordinated to the Signal Corps (following the AEF model); by 1929, the army consolidated all cryptologic functions in one organization again, but under the control of the Signal Corps (see "Closing Thoughts").

There was also a process difference. Traffic analysis was practiced on the Western Front where the enemy's radios were often on the move on the ground or in the sky and where call signs and codes changed regularly. This cryptologic art was not needed in the United States where collectors were intercepting broadcast stations from fixed facilities. Direction-finding techniques were used on both sides of the Atlantic, but they differed in scope and technique. On the Mexican border, it was important to locate new fixed stations to better understand the signals environment and determine what was worthwhile to monitor. In France, direction finding was needed to maintain

continuity of stations, which changed call signs daily and whose movement might indicate an upcoming offensive or withdrawal. Direction finding in the navy generally was not a cryptologic function but an operational one; the technology was used to locate the enemy and to provide navigational guidance.

The navy system differed from that of the army; by 1918, the navy used the MID's Code and Cipher Section (MI-8) to decrypt messages from its limited radio intelligence collection effort. The navy focused on strong cryptography and had a good exchange with the British Admiralty on communications security issues; this was in the British interest, as American ships were part of the British Grand Fleet and had to communicate within that structure.[1] The US Navy, however, did not have an open exchange of cryptologic intelligence with the British; neither did the MID. The AEF, while relying on its British and French counterparts for training, guidance, and equipment, did establish close cooperation in cryptanalytic and traffic analytic work. Additionally, both the army and the navy relied on civilian institutions and recruitment of civilians into the military for some part of their home front cryptologic work.

On the home front, two organizations with cryptologic functions ended up working together to some degree: the War Department (army) and the navy. But other government agencies had an interest in code- and cipher-breaking and would come to rely on other efforts to help them out. The State Department, the Department of Justice, and the various censorship activities all needed some sort of cryptologic support at some time during the war. While the State Department and the navy received codebreaking support from the British Admiralty (as described earlier in this book), those in charge recognized the need for an American organization. A civilian institution, Riverbank Laboratories in Illinois, had expertise that many government entities used to bridge the gap between the declaration of war in April 1917 and the point in November 1917 when MI-8 had the personnel to take on cryptologic work. Riverbank's work led many to consider the goal of a combined cipher bureau.

While the State Department did not have the internal capacity to break codes and ciphers of other nations, they did maintain a codemaking effort. While some sources date this effort to Benjamin Franklin's numerical code, the first State Department codebook was issued in 1876, followed by codebooks in 1894, 1910, 1918, 1920, 1927-28, and 1938. This cryptographic work was transferred from the Bureau of Accounts to the Division of Indexes and Archives in 1909.[2] (This book does not discuss State Department codemaking.)

Part two first looks at the proposals to consolidate code- and cipher-breaking work on the home front (chapter 3). Then follows a more in-depth examination of Riverbank's work prior to the consolidation of cryptologic work and afterward (chapter 4). It then examines the cryptologic elements of the Military Intelligence Division, including both MI-8 and MI-10E (chapter 5). Much has been written about MI-8 and Herbert O. Yardley; this chapter attempts to reconcile the material found in personal recollections with archival records and put the work of this organization in a new context. The largely cryptographic (rather than cryptanalytic) work of the navy follows in chapter 6. Chapter 7 will address the conflict and competition between the army and the navy.

Notes

1. Captain Linwood S. Howeth, *History of Communications-Electronics in the United States Navy* (Washington, DC: Bureau of Ships and Office of Naval History, 1963), 293-94.
2. Jean F. Pearce, War History Section, State Department, *History of the Division of Cryptography*, February 1945, accessed October 5, 2018, http://chris-intel-corner.blogspot.com/2013/09/mister-david-asalmon-state-departments.html. Also available at National Archives and Records Administration, College Park, Record Group 59, General Records of the Department of State.

Chapter 3

The Quest for a Central Cipher Bureau

It is not known exactly where or how the idea of a central US government cipher bureau originated. Possibly Colonel Ralph Van Deman realized a central bureau was a commonsense approach to the difficulties of finding codebreaking and cipher-breaking talent and thought the Military Intelligence Division's (MID) Code and Cipher Section (MI-8) might fill that role. By summer 1917, driven by the fact that George Fabyan's Cipher Department at Riverbank Laboratories in Geneva, Illinois (see chapter 4), was doing cryptanalytic work for multiple government departments, a push began to consolidate American cryptologic efforts. Leland Harrison, who ran the day-to-day operations of the State Department's Bureau of Secret Intelligence (BSI), which had been Riverbank's primary customer, made a case in August to move the Riverbank staff to Washington.[1] In November, the work to create a de facto centralized bureau was underway in earnest.

John A. Powell (see sidebar), part of the Riverbank staff and soon to be commissioned as a captain in the reserves, learned of Harrison's idea during a visit to Washington. Upon his return to Riverbank, Powell told Fabyan what the BSI had in mind. Fabyan was not happy; he felt Riverbank's Cipher Department was an "integral portion of a smoothly operating machine" and he was unwilling to lose control of his people and their work.[2] Van Deman sympathized with Fabyan, admitting to Harrison that it would simplify things quite a bit "if the plan we have in mind could be carried out"; he did not want to press the issue if Fabyan was unwilling. Van Deman, who was still struggling to get MI-8 organized to take on all its code and cipher work, was willing to put off the consolidation of Riverbank cipher staff in Washington for a little while. Meanwhile, he apprised Harrison that a laboratory at Harvard University was working on sympathetic inks (also known as secret inks and invisible inks), and that the MID would use them for work of that kind while the "more difficult cipher work" would continue to go to Riverbank. But Van Deman had also asked to have Powell made a captain in the Officer's Reserve Corps with the idea of having him assigned to Riverbank, which "will give us an official hold on the place, which at present we do not possess."[3]

By October 1917, sensing that he was not getting all of the cipher messages the State Department might have, Fabyan sent a gentle reminder to Harrison that Riverbank would be happy to have more work, even "unsolved old messages."[4] It is hard to determine if Harrison was trying to cut Riverbank out of the work, was satisfied with the results he was getting from MI-8 and from Room 40 (via Edward Bell), or whether there just were fewer pieces of traf-

John Arthur Powell

Very little is known about John Powell, although he was given a great deal of responsibility by the Military Intelligence Division (MID). Powell was born in Lille, France, on March 9, 1866; his father was an American from Virginia named Hanmer Powell. What the family was doing in Lille is unknown. It also is not known what formal education John received.

By 1907, Powell was in Chicago working as a writer and editor. In 1913, he teamed with the chair of the Department of English at the University of Chicago, John Matthews Manly, to write *A Manual for Writers.* When, in 1916 or 1917, Manly, assisting George Fabyan's Riverbank Laboratories, needed someone with expertise in typography, he called on Powell, and Powell came to work for Riverbank.

In July 1917, Fabyan agreed, somewhat reluctantly, to allow Powell to go to Washington, DC, to meet with Ralph Van Deman. Powell received a reserve commission as a captain and made several trips to Washington to assist MID efforts, including coordinating with the State Department. He traveled to Europe on a diplomatic passport in early 1918, acting as a liaison among the MID, the British War Department, the British Admiralty, the French Cipher Bureau, and the G2A6.

In September 1918, Powell was transferred to Vladivostok, Russia, to serve as chief censor of mails. Nothing is known of his time there. He returned to the United States in early 1919. After the war Powell wrote two books on business writing, one with Manly for F. J. Drake Press in 1921, and another by himself for the University of Chicago Press in 1925.

Powell in 1917. National Archives and Records Administration, College Park, Record Group 165, Records of the War Department General and Special Staff, Entry 65, Box 2241

Powell died on March 24, 1928, from pneumonia. He was survived by his wife Charlotte and one son, Murray Arthur Bacon Powell, who was possibly named in tribute to the Baconian cipher work at Riverbank. He is buried in Mount Greenwood Cemetery in Chicago.

Sources

Ancestry.com. Vital records. Accessed August 15, 2018.
Suburbanite Economist (Chicago, IL). "John A. Powell is buried with Full Military Honors." April 10, 1928, 4.

fic to be had. Perhaps Harrison was using the flow of messages to subtly get the Riverbank staff to Washington, or perhaps there were just administrative or technical difficulties.

The matter lingered until early November 1917. Reed M. Fawell, the assistant director of Naval Communications, approached Fabyan and asked him to provide someone to assist the US Navy. Fabyan claimed it was "impossible" for him to provide someone because of the work that he was already doing for the government and recommended a young officer working in communications, Lieutenant William Ward Smith. Of Smith, Fabyan said, "the government has sufficient number of people with ability in this direction now employed in Washington in the different departments to supply the demand for almost any emergency, also any number of codes which are better than any outsider can build." He suggested that the navy might want to recommend the government establish a centralized interdepartmental cipher bureau based at the War Department, where work was already underway. Fabyan noted Riverbank would be happy to assist such an organization with "[p]aper or ciphers, keys, codes or anything else possessed by Riverbank."[5]

That same day, Fabyan wrote to Van Deman, praising Lieutenant Smith's work and commenting that "if Lieutenant Herbert O. Yardley [of MI-8] knows what Lieutenant Smith knows he should be an excellent man." Fabyan mused that it might be better to increase the MID facilities to do the work in Washington rather than sending civilians or officers to Riverbank. He offered Van Deman the services of Clara Jensen, "who knows the clerical part of deciphering," a competent teacher whom he could send to train officers in Washington for up to a month. But Fabyan stressed that if Van Deman wanted to send Yardley or anyone else to Riverbank for four or five days he would be glad to do some training, and he would pick up their transportation costs.[6] This marked the beginning of the plan to have the MID send men to Riverbank for training, which would begin later that month (see chapter 5).

During that busy first week of November 1917, Victor Weiskopf was loaned from the Department of Justice's Bureau of Investigation (BOI), the predecessor to the Federal Bureau of Investigation, for a visit to Riverbank for an exchange of code- and cipher-breaking techniques. Fabyan thanked Weiskopf's boss, Alexander Bruce Bielaski, the chief of the BOI, for allowing the exchange and urged him to push for a centralized cipher bureau that could do cipher work for the entire government.[7] Bielaski did not take much convincing, for two days later he sent Fabyan's letter to Van Deman, along with his thoughts on the subject. Bielaski believed the idea of a cipher bureau in Washington was a good one, given the amount of work to date and thinking of the future; he felt that "at least in war times" Van Deman's office was the right place for such an office and asked for Van Deman's view. Bielaski offered the BOI's cooperation "without any desire for control" in such an effort.[8]

The concept that began with Harrison's idea in August to move Riverbank personnel to Washington quickly gained momentum. On November 9, the same day Bielaski wrote to Van Deman, Fabyan also sent a missive to Van Deman, concluding that there could be two or three more years of war and that a "Central Bureau at Washington is a necessity." Fabyan believed that this effort should be concentrated in the MID and was willing to begin lobbying Congress on the matter; he wanted Van Deman to send him all the important details and requirements for such an organization so that he would have the facts straight.[9]

Monday, November 12, was a full day for Van Deman. He first called Assistant Director of Naval Intelligence Edward McCauley to discuss handling the "cipher messages of all Government departments by a central organization located in Washington" and received McCauley's approval and agreement to cooperate with the MID by sending MI-8 messages for decipherment and by providing any necessary information in connection with decipherment.[10]

Van Deman then followed up with Bielaski on

the same subject, noting that the plan suggested by Fabyan "seems not only desirable but absolutely necessary." He was adamant that the centralized bureau should be in Washington to make communications easy and to take advantage of all accessible information. MI-8 was now prepared to handle all cipher messages from all the departments of the government, but Van Deman added that messages obtained on the Mexican border would still go to the headquarters of the Southern Division and that there might be other cases where immediate decipherment in a location could be needed. This plan did not include Riverbank Laboratories; no more government messages would be sent there. And Van Deman hoped that the best workers from Riverbank would be transferred to work in the MID. MI-8 would be a "clearing house, for the gathering of all information relating to cipher messages and for the transmission to detached workers of all discoveries that may aid in their work." Van Deman told Bielaski he thought he would need a staff consisting of Lieutenant Yardley and his deputy Captain John Manly, Captain Powell, two civilians from Riverbank, and two clerks as well as "such skilled decipherers as can be furnished by any of the government departments." This staff, thought Van Deman, "will be able to handle promptly all the cipher messages of all government departments, and with the cooperation of all departments in sending messages to it for decipherment, its efficiency can soon be brought to the highest degree."[11] He also wrote to Harrison on the same subject.[12]

Finally, Van Deman wrote to Fabyan, thanking him for the valuable services Riverbank had given the government and the "patriotic spirit" that inspired Fabyan to offer to incorporate some of his workers into a centralized government cipher bureau. Van Deman did not believe he would need Fabyan's cipher clerks but wanted Captain Powell to come with a few others.[13] Van Deman had not received Fabyan's November 9 letter at this point; he followed up on that correspondence days later, telling Fabyan that he did not believe political influence would be needed. The MID had enough money to run until the end of June and had asked for twice the funding for the following fiscal year. Van Deman thanked Fabyan again for being willing to transfer the work, which he had "so thoroughly and patriotically done from the very beginning." He also noted that with Fabyan's support, MI-8 would be on the way to being organized so that soon they would "be in as fully good shape as our brothers across the waters."[14]

At the State Department, Harrison was delighted by the news and congratulated Van Deman on obtaining Fabyan's consent to send some members of the Riverbank staff to Washington. He emphasized that his department would cooperate in every possible way and assist in obtaining "any financial support that you may require." Harrison was ready to start sending material whenever "the staff of the [Riverbank] Laboratories has arrived in Washington." He suggested that Powell bring with him all the messages received from the State Department, which were now at Riverbank. Harrison was a forward-thinking man; he told Van Deman that the staff should be selected "with a view to keeping them on after the war is over" and asked if the MID was planning such an arrangement and able to ensure permanent employment for the staff.[15] Van Deman agreed with Harrison that MI-8 should be a permanent section to be maintained in peacetime. Personnel numbers and financial questions, however, could be decided upon after the war when there was a better sense of available work. Van Deman believed that MI-8's existence would depend on the demand for its services.[16]

On the question of staff, Fabyan was convinced that Van Deman's numbers, while they might be adequate in times of peace, were extremely low. He thought MI-8 should have between 50 and 100 operators (cipher experts and clerks), not counting any experts that remained in other government departments. Fabyan felt strongly that the Cipher Section should detail personnel to government departments to work their missions for three

to six months on rotation, with work in the bureau in between assignments to receive training and to avoid "becoming 'sour'." He encouraged Van Deman to use the Riverbank staff in this way, moving them to Washington for a few months of work and then back to Illinois for "reloading." There were only 20 people employed in this work at Riverbank, and Fabyan believed he could have used 20 more, but the "cipher sense" was scarce in this country. His understanding was that the British had 270 cipher personnel and the French even more, and that the United States should have at least 100 staff.[17]

On November 26, 1917, Van Deman advised Harrison that Captain Powell was in Washington and that MI-8 was "now in condition to handle promptly any messages you may send to it" and urged Harrison to begin as soon as he found it convenient.[18] He also informed the director of Naval Communications that MI-8 was prepared to take any messages sent to it from the navy and that he promised the bureau "will give you prompt and satisfactory service." Van Deman reminded the navy of its desire to obtain personnel from Riverbank; he noted that Captain Powell was now part of MI-8 and would be going abroad for a conference with the British and French and that his reports would be available upon his return.[19]

Conclusion

The vision of Van Deman, Harrison, Bielaski, and Fabyan came to fruition; by December 1917, the MI-8 Code and Cipher Section was prepared to receive information from the State Department, the Bureau of Investigation, the navy, and the War Department, and to provide their services on an equal basis to all. Cipher material from the Post Office's Censorship Board and other official and semiofficial organizations would soon follow.[20]

In retrospect, George Fabyan might have just as easily pushed for a centralized cipher bureau to be established at Riverbank, but even he acknowledged it was an unrealistic plan. He had a cordial relationship with Van Deman and used every opportunity to encourage other government agencies to look upon the War Department's MI-8 as the centralized cipher bureau for the United States government, feeling that it was the best use of resources to consolidate these special skills in one place. While MI-8 would in large part serve as the government's main code- and cipher-breaking organization during World War I, it would not be until the establishment of the National Security Agency in 1952 that the grand idea of late 1917 was realized.

But what work had Riverbank been doing, and what would they continue to do? And why had MI-8, established in June 1917, taken so long to become operational?

Notes

1. John Powell to Leland Harrison, letter, August 11, 1917, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 59, General Records of the State Department, Entry 349, Office of the Counselor/ Undersecretary and the Chief Special Agent, Box 1, Classified Case Files 1915-24.
2. Powell to Harrison, August 11, 1917.
3. Ralph Van Deman to Harrison, letter, August 23, 1917, NARA CP, RG 165, Records of the War Department General and Special Staff, Entry 65, Box 2241.
4. George Fabyan to Harrison, letter, October 15, 1918, NARA CP, RG 59, Entry 349, Box 1.
5. Fabyan to Reed Fawell ("Operator, Signal Section in connection with codes and ciphers"), letter, November 6, 1917, NARA CP, RG 165, Entry 65, Box 2241.
6. There is no record of what the "absolutely reliable and dependable" Clara Jensen thought of Fabyan's offer, although he was careful to stipulate that she would need a suitable boarding place within walking distance of the War College. Fabyan to Van Deman, letter, November 6, 1917, NARA CP, RG 165, Entry 65, Box 2241.
7. Fabyan to A. B. Bielaski, letter, November 7, 1917, NARA CP, RG 165, Entry 65, Box 2241.
8. Bielaski to Van Deman, letter, November 9, 1917, NARA CP, RG 165, Entry 65, Box 2241.
9. Fabyan to Van Deman, letter, November 9, 1917, NARA CP, RG 165, Entry 65, Box 2241.
10. Van Deman to Edward McCauley confirming the content of the telephone conversation, November 12, 1917, NARA CP, RG 165, Entry 65, Box 2241.
11. Van Deman to Bielaski, letter, November 12, 1917, NARA CP, RG 165, Entry 65, Box 2241.
12. Van Deman to Harrison, letter, November 12, 1917. This note cannot be found with the others but is referenced in Van Deman to Fabyan, letter, November 12, 1917, NARA CP, RG 165, Entry 65, Box 2241.
13. Van Deman to Fabyan, letter, November 12, 1917.
14. Van Deman to Fabyan, letter, November 14, 1917, NARA CP, RG 165, Entry 65, Box 2241.
15. Harrison to Van Deman, letter, November 16, 1917, NARA CP, RG 165, Entry 65, Box 2241.
16. Van Deman to Harrison, letter, November 26, 1917, NARA CP, RG 165, Entry 65, Box 2241.
17. Fabyan to Van Deman, letter, November 16, 1917, NARA CP, RG 165, Entry 65, Box 2241.
18. Van Deman to Harrison, letter, November 26, 1917.
19. Van Deman to Director of Naval Communications, letter, November 26, 1917, NARA CP, RG 165, Entry 65, Box 2241.
20. Herbert O. Yardley, "The Achievements of the Cipher Bureau (MI-8) During the First World War," *Cryptologia* 8, no. 1 (1984): 64.

Chapter 4

Riverbank Laboratories

George Fabyan had a thriving cryptanalytic enterprise in Geneva, Illinois, at the time the United States entered the war. Riverbank Laboratories employed two people who would, after the war, become stars of the nation's cryptologic community—William Frederick Friedman (see sidebar) and Elizebeth Smith. They married just weeks after the United States entered the war in 1917.

Although the work of Riverbank's cipher department concentrated on Elizabethan ciphers, particularly Francis Bacon's biliteral cipher, Fabyan, a patriotic man, was quick to volunteer the minds of his unique workforce to the government. On March 15, 1917, two weeks after the publication of the Zimmermann Telegram in American newspapers, Fabyan sent a two-page letter addressed to "The Intelligence Office" of the War Department. He explained his interest in ciphers and his collection of books on the subject and wondered whether the material might be of use to the government, musing that the Germans could be using some old ciphers.[1]

Admitting that it might be "egotistical" to think he had information that the Intelligence Office did not have, or that he might be "considered a crank," Fabyan wished to offer "anything I have to the government." To establish his bona fides, he noted that his late business partner, Cornelius N. Bliss, was a former secretary of the interior; Fabyan also proclaimed that he had nothing to sell and no cipher patents to exploit.[2]

For all practical purposes, there was no "Intelligence Office" to answer Fabyan's letter. The US Army had appropriated only $11,000 for intelligence in fiscal year 1917, and the concept of military intelligence in those prewar days later would be considered something of a joke.[3] Ralph Van Deman, the officer in charge of military intelligence and one of only two officers working in the Army War College Division on intelligence matters, replied to Fabyan on March 24 in what would be the start of a regular exchange between Fabyan and Van Deman. (This exchange would be continued by Van Deman's successor as chief of the Military Intelligence Division [MID], Brigadier General Marlborough Churchill.)

Van Deman thanked Fabyan and let him know that his letter would be passed to the Army Service Schools at Fort Leavenworth, Kansas, where they had been conducting a course in cipher work for some time. He explained to Fabyan that the [school's] intelligence section had "very limited personnel" and could not take up the study of or work on ciphers. Lest Fabyan think there would be a quick reply, Van Deman told him that the school at Leavenworth was not currently in session, as the officers

William Frederick Friedman

Wolf Frederick Friedman was born on September 24, 1891, in Kishinev, Russia. A few years later he, his older sister, and his mother Rosa came to the United States to join his father, Frederick, in Pittsburgh, Pennsylvania. Wolf's name was anglicized to William, and during his life he was variously known as Willie, Billie, and Bill.

He received a bachelor's degree from Cornell University in genetics in 1914 and stayed on as a graduate student in the College of Agriculture, first with the intent of obtaining a PhD and then switching to a master's course. When in May 1915, his academic supervisor shared with him a letter about a position running the Department of Genetics at Riverbank Laboratories under George Fabyan, Friedman accepted. Although his work first involved genetics, he was co-opted to use his amateur photography skills to assist another project on the estate. While taking photographs of documents, he met and later married Elizebeth Smith who was working in Riverbank's Cipher Department. William was intrigued by her work on Elizabethan-era ciphers, and soon he was working alongside her.

William Friedman, 1918. Courtesy of the George C. Marshall Foundation, Lexington, VA. Item F-306A, William F. Friedman Papers, George C. Marshall Foundation Research Library

Despite the fact that Riverbank began doing war-related code and cipher work for the government, William was not content to remain on the home front and struggled to get an army commission. Fabyan did not want to lose his star cryptologist and blocked his efforts, but Friedman prevailed and finally arrived in France as a second lieutenant in July 1918. He was stationed at the headquarters of the American Expeditionary Forces (AEF) in Chaumont, working for the Radio Intelligence Section, the G2A6. Friedman said that when given the choice between working codes or ciphers, he chose codes because he felt it was an area he needed to learn; the historical record shows that he was not given that choice, but he made the most of the situation. Friedman was not the most senior, or expert, of those working on German codes, but perhaps he was the most observant. He remained in France until February 1919 and used the many months post-Armistice to help document the work of the section. The reports he wrote are still used by scholars of WWI cryptology today. The letters he sent home from France shed light on the pace of the work and the personalities of his colleagues.

After the war and a short stay at Riverbank Laboratories, Elizebeth and William settled in Washington, DC, where they both worked as contractors for the Army Signal Corps. William was hired on as a cryptana-

lyst with the Signal Corps and stayed within the army cryptologic system until it became part of a national organization. In 1930, he was chosen to lead the army's Signal Intelligence Service and ran that service until the early days of World War II.

The Friedmans were on the leading edge of the development of modern cryptology. William was not just a codebreaker and cipher breaker; his work contributed to the creation of cipher machines that protected US communications—including the SIGABA machine, used during WWII and well into the next decade and never solved by an adversary. In 1944, he received the War Department's highest civilian decoration, the Exceptional Civilian Service Award. In 1946, he was awarded a Presidential Medal for Merit for his work from 1939 through 1945. William Friedman worked at NSA from its founding in 1952 until his retirement in 1955. He continued to serve the profession as a consultant to the NSA Scientific Advisory Board and to write about and engage with the field he did so much to advance. He died on November 2, 1969, and is buried in Arlington National Cemetery.

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were on Mexican border duty, but that he was sure Fabyan would hear from the commandant.[4] The commandant received a copy of Fabyan's letter the same day Van Deman wrote to Fabyan.[5]

Lieutenant Colonel James W. McAndrew,[6] the acting commandant of the service schools, sent a letter to Fabyan on April 2, enclosing Joseph O. Mauborgne's pamphlet on the Playfair cipher and Parker Hitt's *Manual for the Solution of Military Ciphers*. Stating that "our knowledge of the various forms of ciphers cannot be too complete," he notified Fabyan that Mauborgne, then the acting director of the Army Signal School, had "made a hobby of ciphers," and would be contacting Fabyan on the subject.[7] Mauborgne was soon in touch with Fabyan.

Late on the evening of Friday, April 6, 1917, the day that Congress declared war on Germany, Fabyan telegraphed the Army War College that he would pay all expenses for Mauborgne to visit Riverbank the next Sunday, April 8, to see the material and meet the staff, as it was impossible to send the material to Fort Leavenworth. Fabyan expressed his willingness to enlarge his cipher department in the service of the army and suggested that an officer be detailed to direct the operation.[8]

Mauborgne traveled to Riverbank and provided a full report on its "remarkable facilities" to the Army Service Schools and the War College Division on April 11. Fabyan, he wrote, is "a gentleman of means who has made a hobby of collecting all available works on ciphers." Fabyan's workforce of eight or ten experts "spend their time delving into the works of antiquity, discovering historical facts hidden away in the classics and other works, which result in many discoveries valuable to literature and sciences."[9]

As Fabyan was willing to turn over equipment and workforce "without compensation," Mauborgne recommended that the government "make use of his offer at once" and suggested the ways Riverbank could be used. The Justice Department, he thought, "should be urged" to use Riverbank to the fullest extent "for the solution of difficult ciphers princi-

pally those which are hidden in letters sent through the mail." The War Department should seriously consider sending suitable officers to the facility for training "without delay." And, most importantly, Mauborgne believed that the General Staff's MID should take advantage of Fabyan's offer to decipher messages. He assessed the facility as secure, felt the Riverbank staff could be trusted with confidential communications, and believed that Fabyan would react favorably if the government requested the detail of Riverbank staff to government offices given the national emergency.[10]

Van Deman did not waste time acting on Mauborgne's recommendations. While he was still struggling to establish an intelligence organization in Washington and was not yet in a position to use Riverbank's facilities, Van Deman was prepared to send an officer there once his organization became a reality. He urged the Army Service Schools to cooperate with Riverbank.[11] On April 18, he forwarded Mauborgne's report to Leland Harrison at the State Department's Bureau of Secret Intelligence. Van Deman asked Harrison to forward the report and a letter to the Department of Justice and urged that the Department of Justice should take advantage of Fabyan's offer as "neither the State Department nor the War Department has any real experts on cipher work."[12]

Writing to Fabyan that day, Van Deman expressed his surprise and delight in finding "such an extensive and efficient plant for cipher work" at Riverbank. Van Deman informed Fabyan that there was not yet an official organization for intelligence matters, but he hoped such an office would soon be authorized. Once that happened, he might be able to detail an officer to oversee Riverbank and send other officers for training. In the meantime, Van Deman desired to cooperate with Riverbank on cipher solutions and planned to send Fabyan material, although he shared with him that there had been little cipher work to do apart from simple transposition ciphers in communications from Mexico. Van Deman also discussed the potential for establishing a radio link between Washington and Riverbank to exchange data, possibly under the auspices of the Signal Corps.[13]

By June, Fabyan had proposed to Van Deman the possibility of having someone at Riverbank Laboratories "sworn in and commissioned" as a "custodian" of the work the organization was doing for the MID.[14] Whether Fabyan believed that having a person with a foot in both camps might bring him some advantage or might mitigate any risk to the laboratories if something went wrong, he most likely had a candidate or two in mind for the job.

Manly and Powell

Two men associated with Riverbank quickly fell into the orbit of Van Deman and his nascent military intelligence organization. In 1916, Fabyan consulted with Professor John Matthews Manly (see sidebar), chairman of the English Department at the University of Chicago, to resolve a question of typefaces in early editions of the works of Shakespeare. Manly had an interest in ciphers in conjunction with his study of early English manuscripts and maintained a loose relationship with Fabyan. In this instance, Manly believed that Fabyan needed to consult a typographer; as a result, Fabyan hired John Arthur Powell to work in Riverbank's Cipher Department.[15] Powell and Manly were the co-authors of *A Manual for Writers*, published by the University of Chicago Press in 1913.[16]

According to Mauborgne, Manly already had been in contact with Van Deman regarding work in military intelligence and had obtained a leave of absence from the university. Mauborgne explained that Manly was "a product of the Riverbank laboratory so far as his knowledge of ciphers is concerned."[17] In October 1917, Manly was commissioned as a captain in the reserves and journeyed to Washington where he became the deputy chief of the MID's Code and Cipher Section, MI-8, working for Herbert O. Yardley (see chapter 5).[18]

Powell, a "very charming old-school type gentleman, with the highest ideas of integrity and

John Matthews Manly

John Matthews Manly was born on September 2, 1865, in Sumner County, Alabama. He studied at the Staunton Military Academy in Virginia and the Greenville Military Institute in South Carolina before receiving a master of arts degree in mathematics in 1883 from Furman University in South Carolina at the age of 18. He embarked on an academic career, teaching math at William Jewel College in Missouri for five years before attending Harvard and earning a PhD in philology in 1890. He taught English at Brown University in Rhode Island until 1898 when he joined the University of Chicago as the head of the English Department. He remained in that position until his retirement in 1933.

Center for Cryptologic History collection

In 1916, George Fabyan, the proprietor of Riverbank Laboratories, consulted with Manly on typefaces and various aspects of Shakespearean text, as part of Fabyan's quest to find a hidden cipher that would prove Francis Bacon's authorship of Shakespeare's work. Manly spent six weeks on the topic and developed a system for decipherment that did not validate the Bacon theory.

Manly volunteered his services to Major Ralph Van Deman of the Military Intelligence Division in March 1917, just before the United States entered the war, but Van Deman did not contact him until the fall. In October, Manly temporarily left his position at the university and moved to Washington, DC. He was commissioned as a captain on November 5, 1917, and assigned to active duty on November 8 in MI-8, where he served as Herbert O. Yardley's deputy. While working in MI-8, he brought in many other academics affiliated with the University of Chicago, including Dr. Edith Rickert, Dr. Charles Beeson, Mr. James R. Hulbert, Dr. Thomas A. Knott, Dr. B. Q. Morgan, Dr. David H. Stevens, and Dr. Edgar H. Sturtevant.

In 1919, Manly returned to his successful academic career; he was a world authority on the writing of Chaucer. He died April 2, 1940, and is buried in Springwood Cemetery in Greenville, South Carolina.

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honor,"[19] in his early fifties, came to Washington for a visit in August 1917 and apparently made a good impression on Van Deman. He received a reserve commission as a captain in the Signal Corps and filled the job as the MID's representative at Riverbank. While Yardley said, in his 1919 history of MI-8, that Powell had been trained by Mauborgne at Fort Leavenworth, William Friedman's annotations to the report manuscript claimed Powell had only studied from Hitt's manual.[20] In November 1917, Powell, working with the Friedmans, had charge of the instruction of the first four officers to be trained at Riverbank. In early 1918, he was entrusted with representing MI-8 on a visit to the British and French military cipher organizations as well as the American Expeditionary Forces (AEF) headquarters in Chaumont, France (see chapter 8).[21]

Work Begins

In May 1917, Riverbank Laboratories began its work as an unpaid private contractor not just for the MID but also for the Department of Justice and the State Department. One of their earliest tasks was deciphering a message sent by Department of Justice Special Agent Bryan on May 7. Fabyan forwarded a batch of papers to Van Deman on May 26; he was surprised a few days later that his package had not yet been acknowledged by Washington. The two organizations had not yet worked out a regular work routine. Fabyan advised Van Deman that if the Riverbank staff deciphered a message "of sufficient importance" he would not send it by telegraph; rather, he would put "Mr. Powell on the train with it to deliver it to you in person," for he did not believe that any of the deciphered messages should be sent "over the wire" or even delivered to army officers in Chicago for transmission to Washington.[22] By the middle of June, Fabyan began mailing Van Deman a receipt for messages received.[23] Van Deman also forwarded Riverbank samples of letters written in "sympathetic [secret] ink" for their investigation.[24]

Van Deman, in mid-May, was still hoping to have Captain Parker Hitt placed in charge of his cipher organization and had asked him to visit Riverbank on his way to Washington. Hitt was unable to do so, but in June his wife Genevieve Young Hitt came to Riverbank to demonstrate his cipher devices.[25]

By early July, Fabyan was engaged in a regular exchange with Leland Harrison. Fabyan was eager for feedback from the State Department, noting that "Government work is a serious matter with us, and the nervous tension is high. Results are the only things that count. Messages which mean life or death are checked and rechecked in every conceivable way. We take every precaution but we dread the possibility of a leak. Had this particular message proved to be important, I should have followed instructions and telephoned it, but we do not trust either the telephone or commercial wires."[26]

Although Riverbank was doing cipher work for three government organizations, Fabyan wanted more. On July 20, 1917, he sent Harrison two letters he had written, one for the Office of Naval Intelligence and one for the US Secret Service. Fabyan asked Harrison to endorse the letters and send them to the respective agencies for their consideration. In Fabyan's words, "'Practice makes perfect' and the larger range we could have, the more work we could accomplish. It does not seem dignified nor professional, for me to solicit work of this character, and I am prohibited from using names of people, or Departments, for whom we have done work, and yet I know of no more important service that I could render at this time."[27] Harrison did as Fabyan asked.[28]

Riverbank continued to do deciphering work for the MID and the State Department until late in 1917. There does not appear to be a comprehensive file documenting the text of the messages sent to Riverbank by either organization or the decipherments provided by Riverbank. From correspondence found in the National Archives it appears that Fabyan employed separate numbering schemes for each organization he served. Fabyan was a compulsive

correspondent with both Van Deman and Harrison and made regular demands for attention from each man. In August 1917, apparently in want of another scholar for Elizabethan efforts at Riverbank, he mused to Harrison that he should have Secretary of State Robert Lansing talk to President Woodrow Wilson about his need for someone from an Ivy League school; Fabyan, of course, would pay all expenses. Lansing politely responded that he would attempt to find a professor but feared it would not be easy to do so.[29]

During the early autumn of 1917, Riverbank was also doing work on the India, or "Hindu," Conspiracy Case, using enciphered material supplied by a "Mr. Marr of the British War Office," who was introduced to Fabyan by an unnamed division superintendent from the Department of Justice. Fabyan kept Van Deman updated on the work that was being done, and William Friedman testified at the October 1917 trial of the conspirators in San Francisco. Van Deman noted that the material was first in the possession of the French General Staff, who turned it over to the British General Staff, who then turned it over to the US State Department before it came to Riverbank, where William Friedman did the work.[30]

Training

As MI-8 began to take on more of the cryptanalytic tasks, leaving less for Fabyan's workforce to do, Van Deman worked with Fabyan to establish a training program in ciphers at Riverbank. Four officers had arrived at the War College in Washington for training in codes and ciphers in the early fall of 1917. These men, John A. Graham, Lee West Sellers, J. Rives Childs, and Robert Gilmore, attended lectures given by Yardley and Manly. Graham, who was "duly impressed to find myself one of the pioneers in my new field," remembered Manly as one of the more interesting people at the War College. Childs later noted that no one, "not even Yardley or (Manly), the master-minds on the subject, knew anything of German codes and ciphers, but we were put to work studying Hitt's *Manual* [*for the Solution of Military Ciphers*] and learning the a, b, c's of the science and we were informed that, with a little industry, we might be sent abroad as American experts after a few weeks of training."[31]

Meanwhile, at AEF headquarters, Major Frank Moorman, chief of the AEF General Staff Radio Intelligence Section (G2A6), needed officers. He had consulted with both British and French authorities who suggested that a "considerable force of good code and cipher men is indispensable in the solution of German messages." Moorman, whose organization consisted of himself, one other officer, and one clerk, wanted to begin operations and needed four officers and six clerks to make a start. He needed them quickly and, on October 15, 1917, recommended that the AEF ask Van Deman, who was "believed to be well acquainted with code and cipher men in the US," to provide names.[32] The request reached MI-8, and, on November 14, 1917, Graham, Sellers, Childs, and Gilmore received orders to report to Riverbank for a two-week course in code and cipher work.[33]

Graham had sharp memories of the training even 25 years after the experience (including a derogatory term considered offensive today):

> In November at the invitation of a certain Col. Fabyan at Geneva, Ill. I was sent by the War College with three other 2nd Lt. to study the methods used at what he called his cipher laboratory. The fabulous Fabyan (our nickname for him) was a millionaire cotton-broker who had on his living-room table a large book entitled *What I know about the cotton market*. When one opened the book it proved to contain 100 blank pages. He was that kind of man. Among his many enthusiasms which I wish I could stop to describe was cryptography. He maintained a corps of experts who, for his amusement and for the benefit frequently of the Secret Service and the State department, broke

> into criminal and diplomatic codes and ciphers. For instance, while I was there, as a sort of setting-up exercise each morning, we deciphered and wired to the State dept. all of the Mexican diplomatic correspondence of the preceding 24 hours. Among the tall tales told by the colonel was one to the effect that he had heard two weeks before that the Japanese Embassy had managed secretly to procure a copy of the German diplomatic code. He armed himself with a pistol and called upon the Japanese Ambassador, who was a friend of his. He was going to ask as an especial favor that he be permitted to have a look at the code and then he proposed to steal it at the point of the gun. But the Jap swore they didn't have the code.[34]

Childs observed that "nothing could have been more indicative of the elementary knowledge possessed by our armed forces of cryptography than the fact that our government had to resort to private enterprise for the instruction of its cryptographers."[35]

The quartet reported to Fabyan on Sunday afternoon, November 25, 1917; by Wednesday, Fabyan confided to Van Deman that they were doing excellent work and that he was "favorably impressed with all of them."[36] The four departed Illinois on Saturday, December 8, on the 1730 train from Chicago to New York, and two days later Fabyan sent Van Deman an account of their stay:

> I want to take the occasion to compliment Lieutenants Graham, Sellers, Gilmore, and Childs (the order in which their names are given express their markings at Riverbank) on the conscientious work they did at Riverbank. Hours, eight-thirty AM to five-thirty PM with forty-five minutes for lunch. I arranged to have them have their meals by themselves, prohibited any form of entertainment as I wished them to spend their evenings reading and outside of having their first and last meals and Thanksgiving dinner at my residence, I know of no break in the routine. I felt sorry for them but they were there for a purpose and I was more interested in that purpose than they were. I have yet to meet four young men that I think more highly of and they gained the respect and esteem of all with whom they came in contact by their application and earnestness of purpose.[37]

Elizebeth Friedman sent a humorous letter to the quartet in mid-December, as they were awaiting transport, enclosing a bibliography she had promised and an anonymous sheet of "datter" (data in the accent of "our presiding genius from Boston"). She noted that the owner of the material could be identified by his fingerprints and handwriting. Hoping that her missive reached the four "before The Silence settles down upon you," Elizebeth Friedman assured them of "our interest in your welfare, and of our willingness to aid you in whatsoever way we may. And now Good Luck, and Bon voyage."[38] Sellers later told William Friedman that Elizebeth Friedman was the "bulwark of the place."[39]

Fabyan had not lost interest in the group, but on December 3, before they had completed their class, Fabyan was already pushing Van Deman to send more officers for training. He suggested that one man from each division going to France be sent to Riverbank.[40] Van Deman began sending memos to the chiefs of staff of all active army divisions, offering training places at Riverbank for any officers that the divisions wished to have trained in cryptography, noting that the MID would take care of the details.[41] Fabyan was to pay all costs.

Divisions began responding in the middle of December, and responses trickled in well into January 1918. Officers began arriving at Riverbank in late January and continued to arrive until late February for the class that began early in the month. A very large percentage of these men had some fluency in one or more languages other than English. Most of the men remained until March, although some were called away in February, before the class ended. Seventy-eight men finished the course, some of the

latecomers completing training after the bulk of the attendees were gone.[42]

Classes took place, and officers lodged, at the Aurora Hotel, not far from Riverbank. The primary instructors were William and Elizebeth Friedman, and they used both Captain Hitt's *Manual for the Solution of Military Ciphers* and materials that they had developed to introduce the men to the unfamiliar subject of codes and ciphers.

By late February, several students established The American Cryptographic Society, a group organized to develop "a large corps of skilled operatives to be at the disposal of the government" who would freely share information and problems with each other, whether or not members were actively working in code and cipher organizations. Then Captain (soon Major) William H. Clendenin may have been the man in charge, for it was he who wrote to Colonel Van Deman about the society and the fact that the group had elected Van Deman as president. William Friedman was made secretary of the organization and dues had already been collected by Fabyan, who was going to facilitate the operations of the group.[43]

Van Deman sent a gently worded letter to Clendenin, noting it would be impossible for him to accept the position and outlining the difficulties that such a society posed given restrictions on sharing sensitive information on codes and ciphers. After sending his letter to Clendenin, he followed up with a carefully worded message to Fabyan warning about the dangers of such a group. Van Deman suggested that either the organization was planned "without your knowledge and consent" or that if Fabyan had known about it that perhaps he had been too preoccupied to give the idea "due consideration to the objectionable features."[44] Fabyan asked for Van Deman's forgiveness in the matter, regretting that he "did not have the sense to kill the movement when it was brought to my attention."[45] Fabyan notified the officers that the organization would not further the interests of the service, returned the dues, and suspended any formal organization until the occasion of a post-war reunion.[46]

But in the midst of the apologies, a short item appeared in the *Chicago Tribune*'s regularly featured humor column "A Line O' Type, Or Two." On March 8, 1918, one of the items, submitted by a reader J.R.M.,[47] noted: "Sir: The American Cryptographic society has been formed for the study of ciphers. Would you call this the absolute zero in societies?"[48]

Van Deman was fed up with the breach of secrecy and Fabyan's continual correspondence on cipher matters with other government officials that bypassed Van Deman's office. On March 23, he wrote, and abandoned, two drafts of a letter to Fabyan; Van Deman's frustration with Fabyan's actions is evident in his tone. Three days later the exasperated Van Deman finally replied to Fabyan and told him the newspaper article as well as "advertisements for cipher experts which appeared in a large number of papers" contradicted Fabyan's belief that his work had escaped public notice. It seems that the Department of Justice had been making many inquiries about the ads, and Van Deman had needed to vouch for Fabyan to avoid him being "subject to no little annoyance by agents of that Department."[49]

It was not entirely Fabyan's fault that Riverbank's work was not kept secret. There are at least three, and probably more, instances where the fact of an officer's detail to Riverbank for a class in codes and ciphers appeared in hometown papers. It was the military's practice to release orders for officers, and papers often published the list of locals who were moving to new positions.[50] Fabyan was probably largely to blame, however, for the publicity around his May 24 speech to Spanish War veterans in Chicago where he was described as an army instructor in codes and ciphers.[51]

There was some misunderstanding about the purpose of the large training class, but whether the confusion was between Fabyan and Van Deman or between Van Deman and the larger War Department bureaucracy is not clear. Fabyan took it upon

Riverbank class, March 1918, posed to form a cipher that reads "Knowledge is power" (left half of panorama). See text for details. Courtesy of the George C. Marshall Foundation, Lexington, Virginia. Item F-560 Friedman Panorama, William F. Friedman Papers, George C. Marshall Foundation Research Library

himself to inform the officers' divisions that Riverbank was ready to train groups of officers within the division; he was sending each graduate off with a supply of exercises and tools to do this.[52] Van Deman was not pleased and thought it was inadvisable to send the men out as instructors, pointing out that he had trained 80 men and "there would seem to be no need of sixteen hundred additional men … especially as cipher work is rapidly passing into discard, as I have indicated in other letters to you."[53] Van Deman was also annoyed that Fabyan might have led the men to believe that they were being trained for work as intelligence officers, which was not the case.[54] On April 29, Van Deman issued a memo to clarify that the Riverbank training was meant to prepare men who would be handling American communications for divisions, not to train the men to attack enemy codes and ciphers. He expressed concern that a great deal of confidential information may have been shared with those who had no need to know.[55]

Approximately 80 men were trained, but only eight of these men would eventually report to France for duty in the G2A6 Radio Intelligence Section; the others were assigned elsewhere. Van Deman had originally planned to select only six of the most promising officers.[56] Of the eight, only four, including Lieutenant Edwin Woellner (who became a close friend of William Friedman) remained with the G2A6 long enough to accomplish significant cryptologic work, which likely contributed to the view that Riverbank training was not needed to do the work in France.[57] MI-8 noted in mid-June that the AEF declared the eight officers were "unsuitable" because they had only slight knowledge of German but recalled that the original request for men had not stated that language requirement. No officers were available at MI-8 when the request arrived, so MI-8 chose the eight "on Mr. Fabyan's recommendation as the best out of a class of 80, both for cipher work and language qualifications."[58] For a brief period of time in May 1918, Colonel Dennis Nolan's statement to Fabyan that "graduates of Riverbank are now doing the greater part of the work in our code office" was true, if only the officers were counted.[59]

However, in early May 1918, Moorman explained the work of his section and stated that

Right half of "Knowledge is Power" photograph, 1918 Riverbank class

German codes and ciphers were very complex and that the "instruction given at Riverbank and the War College to men for this duty has been quite useless. Intelligent men with a knowledge of German can be quickly trained in our section. No other qualifications are necessary. Preliminary training is not desired."[60]

This large February class at Riverbank is captured for all time in the photo above, taken in front of the Aurora Hotel in March 1918 and known as the "Knowledge is Power" photograph. Newly trained officers and the civilian staff, 76 in all, form a cryptogram using the biliteral Bacon cipher. Each letter is represented by a pattern formed by five people facing either the camera or another direction—the two phases of the cipher. While the intended message is "Knowledge is Power," the group was four people short, and the cryptogram actually spells "Knowledge is Powe."[61]

Many sources imply that Riverbank ran three training classes, and this is true if one counts the November class of four officers as the first, the large class in February as the second, and the small group of stragglers leftover from February that were trained well into March as the third. But there was only one large class of officers—the February class.

The class results went "far beyond" Fabyan's expectations, and he was anxious to repeat the experience, telling Van Deman "I do not want to loaf." He pledged to train more officers and noted "we will try to be discreet and not permit any more societies to be formed." Fabyan also had a plan, which he hoped the War Department would support: to take the training course to the United States Military Academy at West Point.[62] Van Deman was appreciative but noncommittal in his response.[63]

Meanwhile, Fabyan took it upon himself to train a family friend, Clarence P. Bird, a "remarkable pianist and looks the part." The 35-year-old Bird was not looking for a job, but Fabyan urged Van Deman to take him on because of his skills in French, German, and Italian. Bird would eventually be commissioned as a first lieutenant and joined the G2A6 in France in mid-August.[64] William Friedman later wrote that First Lieutenant Bird was not cut out for the work and reflected badly on both Riverbank and Fabyan.[65] And even later, after the war, when Bird broached the idea of returning to the MID, Colonel Alexander B. Coxe warned Brigadier

General Churchill away from Bird, noting that he had always believed Bird to be a Fabyan "plant" in the G2A6.[66]

The miscommunications and problems associated with the training done at Riverbank mark the beginning of the end of the MID's official relationship with Riverbank.

The Navy and Riverbank

Fabyan did not overlook opportunities to court the US Navy and bring them into the Riverbank family. In December 1917, Lieutenant Commander Russell Willson, chief of the navy's Code and Cipher Section, and Lieutenant William W. Smith, a senior assistant communications officer, came to Geneva, Illinois, to see the Riverbank facilities and effort.[67] This visit was likely to demonstrate Willson's Navy Cipher Box Mark I, which Riverbank evaluated in January 1918 (almost certainly the work was done by William Friedman) (see chapter 6). Fabyan regularly sent copies of the Riverbank publications to the navy, including copies for the navy to share with their British and French counterparts.[68]

In the summer of 1918, Fabyan offered to host naval officers for the Riverbank cryptanalysis course; Willson had suggested sending Ensigns Alverson and Williams. When Commander Milo F. Draemel relieved Willson in October 1918, he began a correspondence with Fabyan. By November 2, plans were underway for the two ensigns to journey to Riverbank for a course lasting from 90 days to four months.[69] However, once the Armistice was signed, Williams and Alverson were to be released from duty, so the class never took place.[70]

Work Ends

Once it became clear that the army would not send more men to train at Riverbank, and with the large part of cryptologic work being done at MI-8 in Washington, Riverbank gradually became irrelevant to the war effort.

A slow struggle over Fabyan's desire to share and publicize the work of his organization, particularly the groundbreaking theoretical work being done by William Friedman, and the MID's desire to keep cryptologic work secret wore away at the relationship.[71] Fabyan's forwardness had begun to fray the calm temperament of Van Deman at the conclusion of the training class in March 1918. When Van Deman was assigned to Europe in June and was replaced by Churchill, it became clear that Churchill, and his deputy Coxe, did not have the patience for Fabyan's steady stream of correspondence and publicity seeking. In November 1918, just after the Armistice, Churchill decided that Fabyan had gone too far by wanting to send copies of the Riverbank publications to Japan and that it would be a good idea for MID to break off the relationship with Riverbank (see chapter 15).[72]

Another factor in the decline of work taking place at Riverbank was the commissioning of Second Lieutenant William Friedman in May 1918 and his subsequent departure for France. Friedman, who was eligible for the draft, had long struggled to go to France while Fabyan worked hard to keep him at Riverbank. Once it became clear that Friedman would be going to France, Van Deman sent a memo to the head of the AEF Intelligence Section (G2), Colonel Nolan, suggesting that Friedman's letters should be censored as he might try to relay sensitive information to Fabyan because both men "apparently do not appreciate the importance of keeping information concerning ciphers and codes strictly within the organization of cipher and code workers." Van Deman noted that Fabyan had sent William Friedman to New York to meet Powell's ship when he returned from his fact-finding trip to Europe, in an attempt to gather information for Fabyan before it reached Van Deman.[73] William Friedman's departure was a blow to the Riverbank Cipher Department and negatively affected Elizebeth Smith Friedman's relationship with Fabyan. Without William there to protect her from Fabyan's moods (and predatory advances), Elize-

beth grew increasingly uncomfortable and eventually left the organization.[74]

Conclusion

Riverbank Laboratories provided a great service to the US government in the early months of the war by supplying a concentration of cryptologic talent when the military could not. Frequent and frank communication between this private organization's proprietor, George Fabyan, and the head of the military intelligence effort in Washington, Ralph Van Deman, facilitated the effort to the mutual benefit of both organizations. Fabyan was not completely selfless in bearing the costs of turning over the cryptologic facets of his larger enterprise to the work of the government; he appears to have reveled in the attention it brought him from senior leaders of government organizations such as Van Deman and Leland Harrison at the State Department. The government did not always get its way with Fabyan, who resisted most attempts to have his people work in Washington under the direct control of military intelligence. In turn, Fabyan did not achieve his ideal of having all the cryptologic work of the government accomplished at Riverbank.

Once the US Army was able to properly staff MI-8, they reduced the flow of decipherment work that went to Riverbank. It is important to understand that Riverbank, and later MI-8, was analyzing and deciphering material that was primarily diplomatic and civilian in nature. This material tended to be in cipher rather than code. Riverbank's expertise was in cipher, albeit from a distant historical period, and the training the organization provided to the army focused on solving ciphers. Only a small number of the men trained at Riverbank would work in the AEF's cryptologic organization. When they arrived in France, they learned that the greater part of their work would be against German military codes; this contributed to a perception in the AEF that Riverbank's training was not needed. But even after Yardley was in place and MI-8 was a functioning organization, Van Deman kept control of the Riverbank relationship and did not let Yardley manage the staff there as an adjunct of MI-8.

Riverbank Laboratories was an important bridge that took US cryptologic efforts from the hobby level to a more professional operation. Fabyan's generosity is not in doubt, and his thinking about how a consolidated cryptologic bureau might work was influential in moving government efforts along. The training conducted at Riverbank produced a handful of officers (Graham, Gilmore, Sellers, Childs, and Woellner) who were useful to the effort in France, but it is possible that the success of these men had more to do with their personal characteristics than what they learned at Riverbank. Riverbank's greatest legacy is William F. Friedman, but had Friedman remained at Riverbank throughout the war and not gone to France, his cryptologic career would not have advanced in the direction that it did.

Notes

1. George Fabyan to War Department, letter, March 15, 1917, NSA Archives, Accession 49525, Box 373. Note: This should also be in National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 165, Records of the War Department General and Special Staff, Entry 65, Box 1875.
2. Fabyan to War Department, March 15, 1917.
3. Thomas M. Johnson, *Our Secret War: True American Spy Stories 1917-1919* (Indianapolis, IN: Bobbs-Merrill Company, 1929), 21.
4. Ralph Van Deman to Fabyan, letter, March 24, 1917, NSA Archives, Accession 49525, Box 373. Note: This should also be in NARA CP, RG 165, Entry 65, Box 1875.
5. Brigadier General Joseph E. Kuhn, Assistant to the Chief of Staff and Chief of the War College Division, to the Commandant of the Army Service Schools at Fort Leavenworth, letter, March 24, 1917, NSA Archives, Accession 49525, Box 373. Note: This should also be in NARA CP, RG 165, Entry 65, Box 1875.
6. Later Major General McAndrew; he would serve as the AEF's Chief of Staff.
7. J. W. McAndrew to Fabyan, letter, April 2, 1917, NSA Archives, Accession 49525, Box 373. Note: This should also be in NARA CP, RG 165, Entry 65, Box 1875, File Number 4131-27.
8. Fabyan to Army War College, telegram, April 6, 1917 at 2323, NSA Archives, Accession 49525, Box 373. Note: This should also be in NARA CP, RG 165, Entry 65, Box 1875, File Number 4131-27.
9. Captain J. O. Mauborgne to Chief of the War College Division ("Cipher work of experts employed by Col. Geo. Fabyan, Riverbank Laboratories"), memo, April 11, 1917, NARA CP, RG 59, Records of the Department of State, Entry 349, Office of the Counselor/Undersecretary and the Chief Special Agent, Box 1, Classified Case Files 1915-24.
10. Mauborgne to Chief of the War College Division.
11. Van Deman to Acting Commandant, Army Service Schools, Fort Leavenworth, letter, April 17, 1917, NSA Archives, Accession 49525, Box 373. Note: This should also be in NARA CP, RG 165, Entry 65, Box 1875.
12. Van Deman to Leland Harrison, letter, April 18, 1917, NARA CP, RG 59, Entry 349, Box 1. Mauborgne to Chief of the War College Division.
13. Van Deman to Fabyan, letter, April 18, 1917, NSA Archives, Accession 49525, Box 373. Also likely in NARA CP, RG 165, Entry 65, Box 1875. Mauborgne to Chief of the War College Division.
14. Fabyan to Van Deman, letter, June 4, 1917, NARA CP, RG 165, Entry 65, Box 2241.
15. David A. Hatch, *The Dawn of American Cryptology, 1900-1917* (Ft. Meade, MD: Center for Cryptologic History, 2019), 25. Hatch cites letters exchanged by Fabyan, John M. Manly, and J. A. Powell located in the University of Chicago Library, Special Collections Research Center, John M. Manly Papers, Box II, Folder 7.
16. *The University of Chicago Magazine* 6, no. 1 (November 1913): 22. The two later collaborated on *Better Business Letters: A Practical Desk Manual Arranged for Ready Reference, With Illustrative Examples of Sales Letters, Follow-up, Complaint, and Collection Letters* (Chicago, IL: Frederick J. Drake & Co., 1921). Powell is listed in that book as associated with the Holtzer-Cabot Electric Company in Chicago.
17. Mauborgne to the Chief War College Division.
18. Van Deman to Manly, letters, September 15, 1917, and September 24, 1917, NARA CP, RG 165, Entry 65, Box 2241.
19. Fabyan to Van Deman, letter, July 31, 1917, NARA CP, RG 165, Entry 65, Box 2241.
20. Herbert O. Yardley, "A History of the Code and Cipher Section during the First World War Prepared in 1919 by Major Herbert O. Yardley." The report was reprinted and annotated by Friedman's Signal Intelligence Service and later received the designation Special Research History 030, NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 14. Page 73 says that Fabyan sent Powell and William Friedman to the Army Service Schools in Fort Leavenworth to take a course of instruction from Lieutenant Mauborgne; "consequently they

were thereafter much better equipped to solve such problems as were submitted to them." Friedman notes that this is an error and that he was not sent to Leavenworth but studied a copy of Parker Hitt's *Manual for the Solution of Military Ciphers* that Powell brought from the school. John M. Manly, "American Codes and Ciphers in France," in John F. Dooley, *Codes, Ciphers and Spies: Tales of Military Intelligence in World War I* (New York: Springer, 2016), 80, also says that Powell attended the Signal School.

21. How this man, described as a professional printer with no known background in cryptology, made such a good impression on the military cryptologic organizations of three countries is not known and would be an excellent subject for research.
22. Fabyan to Van Deman, letter, May 31, 1917, NARA CP, RG 165, Entry 65, Box 2241.
23. Fabyan to Van Deman, letter, June 13, 1917, NARA CP, RG 165, Entry 65, Box 2241.
24. Van Deman to Fabyan, letter, May 19, 1917, NARA CP, RG 165, Entry 65, Box 2241.
25. Van Deman to Fabyan, May 19, 1917. For more on Genevieve Young Hitt's visit, see Betsy Rohaly Smoot, "An Accidental Cryptologist: The Brief Career of Genevieve Young Hitt," *Cryptologia* 35, no. 2 (2011): 164-175.
26. Fabyan to Harrison, letter, July 19, 1917, NARA CP, RG 59, Entry 349, Box 1.
27. Fabyan to Harrison, letter, July 20, 1917, NARA CP, RG 59, Entry 349, Box 1.
28. Fabyan to Harrison, letter, July 30, 1917, NARA CP, RG 59, Entry 349, Box 1.
29. Fabyan to Harrison, letter, August 20, 1917; Harrison to Fabyan, letter, August 28, 1917. Both in NARA CP, RG 59, Entry 349, Box 1.
30. Van Deman to Major Nicholas Biddle, letter, November 1, 1917; Fabyan to Van Deman, letter, November 9, 1917. Both in NARA CP, RG 165, Entry 65, Box 2241. The Hindu Conspiracy is discussed at length in Patrick Beesly, *Room 40: British Naval Intelligence 1914-1918* (London: Hamilton, 1982) and in Hatch, *The Dawn of American Cryptology, 1900-1917*.
31. [J. Rives Childs], *Before the Curtain Falls* (Indianapolis, IN: Bobbs-Merrill Company, 1932), 102. Yardley is given his true name in the book, but Manly is called Barkley.
32. Frank Moorman to Chief of Staff, memo, October 15, 1917, NARA CP, RG 120, Records of the American Expeditionary Forces, Entry 105, Box 5767.
33. War Department Special Orders 266, paragraph 160, November 14, 1917, as reported in *Air Service Journal* 1 (December 6, 1917): 704. "The following named officers will proceed to Geneva, IL, and report to Capt. John A. Powell, Aviation Section, Signal Reserve Corps, for a course of instruction for a period of two weeks in code and cipher work, and upon completion thereof will proceed to comply with their previous orders: Second Lts J Rives Childs, Inf Officer RC Robert W. Gilmore, statistical division, Adj General's Dept National Army; John A. Graham, Inf RC and Lee West Sellers, IF Off RC."
34. John A. Graham, "The Mildly Military Memories of a Refugee, Intelligence Officer and Civil Affairs Administrator in World War I," 1942, 10-11, James G. Leyburn Library Special Collections and Archives, Washington and Lee University (WLU), John A. Graham Collection, WLU 0307, Box 7.
35. Childs, "My Recollections of G.2 A.6," *Cryptologia* 2, no. 3 (1978): 203.
36. Van Deman to Fabyan, letter, November 23, 1917; Fabyan to Van Deman, letter, November 28, 1917. Both in NARA CP, RG 165, Entry 65, Box 2241.
37. Fabyan to Van Deman (about the four officers), letter, December 10, 1917, NARA CP, RG 165, Entry 65, Box 2241.
38. The "presiding genius" is a reference to George Fabyan, who was from Boston. Elizebeth Smith Friedman to the four lieutenants, letter, December 14, 1917, WLU, John A. Graham Collection, Box 7, Folder 6. The bibliography referenced is probably the one found in Randolph-Macon College, Flavia Reed Owen Special Collections and Archives (RMC), J. Rives Childs Collection (JRC), dated November 1917.
39. William Friedman to Elizebeth Friedman, letter, Thursday evening, October 10, 1918, George

C. Marshall Foundation Research Library (ML), Elizebeth Smith Friedman (ESF) Collection, Correspondence Series (CS), Box 2, File 17.

40. Fabyan to Van Deman, letter, December 3, 1917, NARA CP, RG 165, Entry 65, Box 2241.
41. Van Deman sent multiple letters to the chiefs of staff of army divisions on December 7, 1917, NARA CP, RG 165, Entry 65, Box 2242.
42. Lists of men and material found in NARA CP, RG 165, Entry 65, Box 2243.
43. William Clendenin to Van Deman, letter, February 28, 1918, NARA CP, RG 165, Entry 65, Box 2242.
44. Van Deman to Clendenin and Fabyan, letter, March 7, 1918, NARA CP, RG 165, Entry 65, Box 2242.
45. Fabyan to Van Deman, letter, March 11, 1918, NARA CP, RG 165, Entry 65, Box 2242.
46. Fabyan to students, letter, March 15, 1918, NARA CP, RG 165, Entry 65, Box 2242.
47. Almost certainly Riverbank student Lieutenant John R. Marchant, the only student with those initials on the class list found in NARA CP, RG 165, Entry 65, Box 2243.
48. "A Line O' Type or Two," *Chicago Daily Tribune,* March 8, 1918, 6, accessed July 12, 2018, https://www.newspapers.com/image/355227637.
49. Van Deman to Fabyan, letter, March 26, 1918, NARA CP, RG 165, Entry 65, Box 2242.
50. Typical examples include the January 31, 1918, item in the *Buffalo Morning Express and Illustrated Buffalo Express* (accessed July 12, 2018, https://www.newspapers.com/image/352799065) about Lieutenant Augustus H. Peterson's detail (6); the February 2, 1918, story about Lieutenant Donald C. Grant on page 12 of the *Indianapolis News* (accessed July 12, 2018, https://www.newspapers.com/image/37343821); and the February 9, 1918, *Lawrence Daily Journal-World*'s (accessed July 12, 2018, https://www.newspapers.com/image/60160320) page 3 item on Lieutenant Harry Wilson, who was a former editor of that paper.
51. Associated Press story, "Spanish War Vets Hold Big Patriotic Session in Chicago," in many papers including the *Moline Illinois Dispatch*, May 24, 1918, 1, accessed July 12, 2018, https://www.newspapers.com/image/339588964.
52. Fabyan to Van Deman, letters, March 11, 1918, and March 22, 1918, NARA CP, RG 165, Entry 65, Box 2243.
53. Van Deman to Fabyan, letter, March 23, 1918, NARA CP, RG 165, Entry 65, Box 2243.
54. Van Deman to Fabyan, letter, March 26, 1918, NARA CP, RG 165, Entry 65, Box 2243. Van Deman writes, "I note that you say that the 'eyes and the ears of the new National Army are now assembled at one central point.' I hope you haven't given the men you have had under instruction in code and cipher work to understand that they are getting instruction in Intelligence work. That, while most important, is only a very small part of the instruction of an Intelligence Officer. Moreover the officers sent to you are not the Intelligence Officers of their Divisions. Those officers are now in France undergoing an intensive course of three months in the Staff schools there. It would be giving the officers you have had a very false idea if they were allowed to think that a course in code and cipher work alone would fit them for Intelligence work."
55. Van Deman, "Instruction in Cryptography," April 29, 1918, NARA CP, RG 165, Entry 65, Box 2243.
56. Van Deman wired Fabyan on March 24, 1918, for the names of the six most promising officers. Per Van Deman to Clendenin, letter, March 25, 1918, NARA CP, RG 165, Entry 65, Box 2243.
57. The men assigned to the G2A6 (and their class rankings) were all lieutenants: Edward F. Roosevelt (4), Joseph F. Gunster (5), Nazard M. Coursalle (8), Vance L. Sailor (9), Donald D. Millikin (14), Roger R. Townsend (19), Kent Bromley (20), and Edwin D. Woellner (22). The remaining high-ranking students were primarily majors and captains who probably were not sent to the G2A6 due to their rank. Roosevelt, Coursalle, Townsend, and Bromley were not with the G2A6 very long before transferring to other organizations, but the other four remained with cryptologic work until the Armistice was signed. The G2A6 also had the services of the four offi-

cers trained in November and gained the course instructor, William Friedman, in July.

58. MI-8 weekly report, undated (but likely mid-June 9-15, 1918), NARA CP, RG 165, Entry 65, Box 3522.
59. Dennis Nolan to Fabyan, letter, May 14, 1918, NARA CP, RG 120, Entry 104, Box 5757.
60. Moorman to Nolan, letter, May 3, 1918, NARA CP, RG 120, Entry 105, Box 5761. William Friedman had no knowledge of German; however, this never seemed to be an issue for Moorman, perhaps because he had such extensive cryptographic knowledge.
61. William H. Sherman, "How to Make Anything Signify Anything," *Cabinet*, no. 40 (Winter 2010-2011), accessed July 12, 2018, http://www.cabinetmagazine.org/issues/40/sherman.php.
62. Fabyan to Van Deman, letters, March 18, 1918, and March 25, 1918, NARA CP, RG 165, Entry 65, Box 2243.
63. Van Deman to Fabyan, letter, March 22, 1918, NARA CP, RG 165, Entry 65, Box 2243.
64. Fabyan to Van Deman, letter, March 22, 1918, NARA CP, RG 165, Entry 65, Box 2243. Bird went on to the Third Army G2A6 with Berthold after the Armistice, despite telling Moorman of his "distaste for code work" in a note on November 23, 1918 (NARA CP, RG 120, Entry 105, Box 5767).
65. William Friedman to Elizebeth Friedman, letter, August 30, 1918, ML, ESF, Box 2, File 15. William quotes a letter he received from Powell that says "it is true that Riverbank does not rank very high in the reports, and I am afraid that Bird will not tend to raise its reputation. He did not make much of an impression here, and I only hope his ability will offset the poor figure he cuts." Friedman continues, "And it is true. He will never be an A1 or B2 man in this work. He isn't cut out for it. And why the Col should send him on to add to the mistakes which already have detracted from R's reputation only goes to show his poor judgment of human nature and natural ability. Bird would be good in a translator's office and I hope he is changed soon. The sending of Millikin was quite a mistake, and a good deal better might have been done. And if they had specified that a good knowledge of German was required, certain lieutenants over here now wouldn't be at GHQ. All of which worked again (*sic*) R's reputation is together with what our 'friends' at W didn't neglect to demolish."
66. Coxe, note on a routing slip, March 5, 1921, NARA CP, RG 165, Entry 65, Box 2243.
67. Correspondence between Vice Admiral William Ward Smith and David Kahn, 1963, National Cryptologic Museum Library, David Kahn Collection, DK 58-67; David Kahn, *The Codebreakers* (New York: Scribner, 1996), 386-387. Fabyan to Lieutenant Commander T. S. King, letter, December 4, 1918. From a file of correspondence between the Navy Code and Signal Section (NCSS correspondence) and Fabyan that covers October 30, 1918, to February 1932; taken from records of the Naval Security Group on deposit at Crane, Indiana, that were loaned to NSA in 1961-1962. Envelope – Riverbank Laboratories, B-1(1) [officer in charge's personal file]. In Center for Cryptologic History series II.D.1, copy held by author.
68. Fabyan to Commander Milo F. Draemel, letter, November 2, 1918, NCSS correspondence.
69. Fabyan to Draemel, November 2, 1918.
70. Fabyan to King, December 4, 1918.
71. General Marlborough Churchill to Fabyan, letter, June 22, 1918, NARA CP, RG 165, Entry 65, Box 2243.
72. Churchill to the Army Chief of Staff, letter, November 13, 1918, NARA CP, RG 165, Entry 65, Box 2243.
73. Van Deman to Nolan, letter, May 31, 1918, NARA CP, RG 165, Entry 65, Box 2880.
74. Jason Fagone, *The Woman Who Smashed Codes: A True Story of Love, Spies, and the Unlikely Heroine Who Outwitted America's Enemies* (New York: Dey Street Books, 2017), 106-107.

Chapter 5

The Military Intelligence Division

What small efforts at military intelligence existed in the War Department had been located in the US Army War College Division of the General Staff since 1908 and were inadequate to face the challenges of a war in Europe. British and French government missions were sent to the United States after the April 6, 1917, declaration of war. The [foreign] intelligence officers were referred to the War College Division, "since there was no organization in existence to handle such matters," where they engaged in conversations with Major Ralph Van Deman and others. Van Deman, who had been advocating for a military intelligence organization since 1915, had recently been rebuffed by the army chief of staff, who suggested that the United States should just ask the British and French for their [intelligence] information.[1]

Van Deman persisted. On April 30, he was called into the office of the secretary of war to give an account of British and French military intelligence systems and explain what system existed in the US military. After the conversation, the secretary announced to Van Deman that within 48 hours the War College Division would be ordered to form a military intelligence organization. On May 3, 1917, orders were issued for the formation of an intelligence branch of the Army War College.[2] Van Deman's successor, Brigadier General Marlborough Churchill, would later say that it was Van Deman's long fight that laid the foundation for the success of military intelligence.[3]

The new organization was set up along the same lines as the British intelligence system. At first there were eight sections; four more would follow. The eighth section, MI-8, was originally designated Cable and Telegraph but would later be known as Code and Cipher. MI-10, officially established on July 29, 1918, but operating in some matters earlier, was the Censorship Section and would eventually include a subsidiary Radio Section, MI-10E, which conducted radio intelligence operations on the Mexican border.[4]

MI-8

The Beginning

Van Deman had long been aware of the need for codebreaking and cipher breaking. In the month following the declaration of war but before the formation of what would first be the Military Intelligence Branch and later the Military Intelligence Division (MID),[5] he had been relying upon army cipher experts Captain Parker Hitt and Lieutenants Frank Moorman and Joseph O. Mauborgne as well

as Riverbank Laboratories personnel to break messages connected to a neutrality trial.[6]

In fact, Hitt was Van Deman's first choice to run a code and cipher office; in late April, Van Deman notified Hitt that he hoped it would be possible to have Hitt ordered to Washington "for work of this character," but stressed that it was "only a hope, so please say nothing about it and do not count on it." By May 19, 1917, Van Deman mentioned to George Fabyan that Hitt had been ordered to Washington and would visit Riverbank on the way east. "When [Hitt] reaches Washington, he will be placed in charge of the cipher and sympathetic ink section and given all the latitude and help that we can give him."[7]

Hitt was the logical choice: the right rank, experienced in the work, and the author of the sole American book on military ciphers. In mid-May 1917, Van Deman advised Hitt that he would soon be detailed to the Office of the Chief of Staff and assigned to the MID for cipher work.[8] Hitt was ordered to Washington on May 17.[9]

Unfortunately for Van Deman, Colonel Edgar Russel, Hitt's mentor from the Army Signal School, was selected to be the chief signal officer (CSO) for the American Expeditionary Forces (AEF), and Russel wanted Hitt as his executive officer. Russel hurried to get an order issued for Hitt before Van Deman could. After a confrontation with a "furious" Van Deman on May 22, Hitt and Russel quickly went to see General John J. Pershing who replied "G-d the General Staff" and then ordered Hitt to France.[10] Van Deman told Fabyan of his "vigorous protest" against Hitt being "commandeered" by AEF and noted, "I do not know at this time whether or not Captain Hitt will remain here or go to France. Certainly, his greatest usefulness will be here, and should he eventually be directed to remain here, I shall have him sent out to Chicago to spend a few days with you at your plant."[11] If Van Deman had gotten his way, it would have been Parker Hitt, not Herbert O. Yardley, in charge of MI-8, the Code and Cipher Section of the MID.

Not only was Hitt unavailable, but Mauborgne and Moorman had also been snapped up for other jobs. The MID's code and cipher work began flowing to Riverbank Laboratories in early May. Herbert O. Yardley (see sidebar) later wrote about how he maneuvered to get the job as head of MI-8 and how he would "spring my plan for a Cipher Bureau upon the unsuspecting War Department," perhaps not realizing that the War Department, in the form of Van Deman, had already planned for such an organization. Yardley finally approached Van Deman in late May or early June, and, by June 29, 1917, Yardley had been commissioned and his move from the State Department to the MID was in the works.[12] He began on July 11, 1917.[13] At the time, MI-8 consisted of just Yardley and two civilians.[14] Early on Van Deman had thought to divide the work into two parts—one for code and one for cipher—but it became clear that one organization should handle "secret communications of all sorts."[15]

Life in the MID

MI-8's humble beginnings were on a "narrow balcony" perched above the library stacks at the top of the War College Building at Washington Barracks (now Fort McNair). Yardley and his two clerks, James E. McKenna, who joined MI-8 from the State Department in September 1917 (see sidebar), and John C. Meeth, had just enough room for their desks.[16] When the MID was resubordinated from the War College to the Executive Division of the General Staff on February 7, 1918, new offices were needed. Brigadier General Churchill recalled that the organization fought a "daily struggle against prejudice, inadequate and badly situated office space, and half-hostile tradition."[17] Meeth would leave MI-8 to work in the G2A6, arriving in France in January 1918.[18]

On March 15, the 280 employees of MID took over a seven-story apartment house called Monroe Courts at 1156 15th Street, NW, on the southwest corner of 15th and M Streets. MI-8 was on the seventh floor, along with MI-2, the large Collection,

Herbert Osborn Yardley

Herbert Yardley was a prominent and controversial figure in American cryptology during World War I and the decades that followed. Born April 13, 1889, in Worthington, Indiana, he was the son of a railroad station agent/telegrapher and learned to operate the telegraph during his teens. In 1907, after graduating from a high school in Eaton Rapids, Michigan (he had been suspended from school in Worthington for a senior prank), Yardley worked as a railroad telegrapher.

In 1912, he took a civil service examination for a telegrapher job, came to Washington, DC, and embarked on a career in the State Department code room on December 23 that year. Yardley was fascinated by codes and ciphers and concerned about the insecurity of the department's cryptography. He studied the small amount of subject material available in English. Shortly after the United States entered World War I, he focused on being assigned to the newly revived military intelligence effort in the War Department. He began active duty on July 5, 1917, and was soon put in charge of MI-8.

National Archives and Records Administration (NARA), Record Group (RG) 111, Photographs of American Military Activities, 86716109

Just over a year later, as MI-8 was beginning to make its mark, Yardley was close to having what he called a breakdown. He was sent to Europe to assist the G2A6 by learning more about how the British and French cryptologic efforts selected personnel. After the Armistice was signed on November 11, 1918, he found a place for himself providing cryptologic support to the 1919 Paris Peace Conference.

When Yardley returned to Washington in April 1919, MI-8 efforts were winding down, but a decision was made to establish a new organization, based on the 1917 discussion about creating a central cipher bureau for the government. The so-called "Black Chamber" was born in July 1919 in New York City with Yardley in charge.

The rest of Yardley's story is well known and well documented. His book, *The American Black Chamber*, published in 1931 (and excerpted that same year in the widely read *Saturday Evening Post*), caused great consternation in the small American cryptologic community. William Friedman spent many years gathering material to refute the inaccuracies in Yardley's work. After providing cryptologic services in China and Canada (very briefly) and doing some work for the US Army cryptologic system during World War II, Yardley ran a variety of businesses. He died on August 7, 1958, and is buried in Arlington National Cemetery.

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James Edward McKenna (MI-8) and John Aloysius McKenna (G2A6)

James Edward McKenna was born in Boston on November 20, 1887, and educated in Boston public schools, graduating from the English High School. He attended Boston College and Georgetown University Law school, but left law school during his third year after passing a civil service examination. McKenna also worked at the Boston Public Library and in a law office before becoming a clerk and stenographer in the State Department's Index Bureau on October 8, 1910.

From December 17, 1913, to May 4, 1914, McKenna was sent on a special detail to the US embassy in Mexico City. A short item in the *Boston Globe* calling him "Uncle Sam's cipher man" implies that he worked in codes and ciphers at some point, but no details of his work have been located. After returning to Washington, he was made chief clerk and disbursing officer for a special mission to Russia from May to July 1917. Almost immediately after his return, he received a commission in the US Army and was assigned to MI-8, where he served as a clerk to Herbert O. Yardley. The two may have known each other from their time in the State Department.

McKenna eventually became a Foreign Service officer. He married an Englishwoman while stationed in Zagreb, Croatia, in 1936. McKenna died on December 15, 1970, and is buried in Gettysburg National Cemetery.

James's younger brother, John Aloysius McKenna, was born January 13, 1890. Nothing is known about his education, but in 1917 he was working as a bookkeeper for the New England Telephone and Telegraph Company.

John attended the June 1916 officer training camp at Plattsburgh, New York, and married his longtime sweetheart Anna L. Lynch just before he traveled to France in 1917. He arrived in Chaumont in late January 1918, worked in the G2A6, and served on the Radio Intelligence Section staff for both the First and Second Armies. After the Armistice, he supported the American Commission to Negotiate Peace (the American delegation to the 1919 Paris Peace Conference), possibly in Yardley's office, and returned to the United States in April 1919.

On his return, John worked as a bookkeeper and then an accountant for the New England Telephone and Telegraph Company. He died on January 29, 1973. His burial location is unknown.

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"Start Tonight for Plattsburgh Camp. Rookies Will Get a Taste of Soldier Life." *The Boston Globe*, June 4, 1916, 8.

Collation and Dissemination of Foreign Intelligence Section, which was responsible for intelligence analysis. MI-2 quickly needed more space and was moved to the second floor in rooms that had been a restaurant. The restaurant was moved to the basement.[19]

Monroe Courts was not big enough, and in July MI-8 moved to 1330 F Street, NW (the site of

the present National Press Club). At some point in 1919, the organization moved to a building on the corner of 7th and B Streets, NW.[20] MI-8 employee David H. Stevens described the conditions for the 200 people who worked there as "rooted at overheated desks under glass skylights on F Street day and night"; after five o'clock "their collared coats and puttees might be removed." Smoking was permitted.[21]

MID employees were periodically advised as to proper protocols and procedures, and for those commissioned from civilian life, guides about the proper behavior of officers. While junior officers were advised to "rise with a snap" when a superior officer came into their room, this was not needed for "officers with whom you are in hourly contact." The first consideration was "getting the work done," and rank within the office was of secondary importance. MID officers were permitted to approach other officers without formality on any subject and instructed to "ask all the questions you desire. It is better to risk seeming stupid than to miss a point." However, officers were cautioned to be "very careful about saluting and returning salutes in the prescribed manner" when outside the building.[22]

Many security procedures were not dissimilar to those a century later. The staff was reminded not to talk about their work and, if asked by friends, say they were on duty in the Office of the Chief of Staff. Guidance was provided on handling classified material (Secret, Confidential, and For Official Use Only), and staff were reminded that if something was marked Secret, even if it contained material marked at other classifications, it was to be considered Secret. They were cautioned that reports from the Department of Justice were "highly confidential" and that the source of any information from those reports must be disguised when discussing the material with anyone other than intelligence officers. All contact with the Department of Justice was handled by a liaison officer in MI-4, the Counter-Espionage Section. At the end of each day, all files were locked in a steel cupboard or filing case, desks were locked, windows closed, lights turned out, and desks left neat, with no confidential papers on them. Confidential paper was torn before putting it in the wastebasket. Visitors were not allowed unless they were on official business. All visitors filled out a form with their name, purpose of their visit, and whom they wanted to see. They were escorted to a reception room, where they would be met by the employee, who could have a discussion in the reception room or in their office. All departing visitors were escorted out of the building and their passes turned over to the duty sergeant.[23]

The employees of the MID were not subject to the discomforts of those in France, but wartime Washington was not an easy life. Major Rupert Hughes,[24] a colorful character who was the chief of MI-10, later recalled the "genuine sacrifices" of MID personnel, "living huddled in small rooms and spending life savings to do their bit." When the influenza epidemic reached the city, he remembered, "we were all turned out into the icy streets for an hour every morning while the offices were aired out. People with colds were compelled to wear gauze masks."[25] Navy cryptologists working in Washington likely had the same experience.

Staffing

MI-8 was slow to get organized and slow to be staffed. One of its largest responsibilities was encoding and decoding all official communications for the MID, and this work grew quickly. McKenna, newly commissioned as a first lieutenant, soon was put in charge of this work, which had "practically consumed" the staff and prevented Yardley from focusing on code and cipher attack.[26]

Van Deman was still disconsolate about the loss of Hitt's expertise to Pershing when he approached Professor John M. Manly in September 1917 about becoming the "cipher expert" for the MID. Without Hitt, he confessed to Manly, MI-8 lacked a cipher expert, "in which condition we have been ever since."[27] It is apparent that Van Deman viewed

Yardley as a code expert rather than someone with experience in cipher.

Van Deman offered Manly, who had initially volunteered his services in March, a commission as a captain in the reserves. Manly was shortly in place at MI-8. While Van Deman had originally planned to put Manly in charge of cipher and Yardley in charge of code, by mutual agreement the men decided to merge analysis of codes and ciphers in one section and make Manly the deputy of MI-8. When Yardley left MI-8 in July 1918 on what was supposed to be a short trip to Europe (see chapter 8), Manly was put in charge of the section.[28] David Stevens's later memories reveal that Manly was "preeminent in teaching," and that teaching was a constant duty for both Manly and Edith Rickert (see sidebar), but that Manly "inspired all to effort by his own skill in solution" and his "impersonal attitude toward any problem; it was simply something to be dealt with quietly and unceasingly until solved." Manly focused on "ideas and concepts" and never "criticized others adversely by direct means."[29]

No complete list of MI-8 staff seems to exist; even the authors of the World War I volume of *Historical Background of the Signal Security Agency*, writing in 1945, could not locate a complete roster in the files available to them. When those writers consulted Aloysius McGrail, who had worked in MI-8's Secret Ink subsection, he recalled that the number was fewer than 200.[30] Stevens agrees with that number, recalling "some two hundred at peak load in 1918."[31] A 1919 memo states that in November 1918 there were 18 officers, 24 civilian cryptologists, and 119 typists and stenographers in the organization; whether this total includes the Shorthand subsection staff based in New York is unknown.[32] People came and went in the organization, and it is not known if the men who were trained to go to France and then departed the organization are included in these totals. But I was able to construct a partial list from documents, routing slips, and other material; and 96 names (including officers who passed through for cipher training en route to the AEF) recovered in this manner can be found in appendix A.[33]

The MI-8 office might have seemed like a cross between an officer training school and a university campus as it added personnel in 1918. In March 1918, Colonel C. French of the British War Department's MI1(b) advised Van Deman about how to select the "right kind of brain" for the job. French recommended the following:

> For research of this kind requires an active, well trained and scholarly mind; not mathematical but classical. As an illustration of the right kind of man, one of my experts has suggested to me the name of a well known American scholar, Louis Herbert Gray of 25 Brimmer Street, Boston, MA. It is of course undeniable that there may be a few men who, without having had university training or without having acquired a great reputation of paleographical work, nevertheless are well suited for this work. But there is no method of discovering such people. Therefore the only test applicable is that of scholarship. When once you have got together two or three men of the right class they will soon map out the work of themselves. It is for this reason among others that detailed instructions of how to deal with the solution of codes would really be of little use, for whole volumes on this subject would be useless to the wrong kind of man, and the right man must and will prefer to work out his own line: and in so working would become an expert.[34]

Van Deman replied on April 18, noting that "while we do not think that men of University education possess any monopoly of logical thinking and power of analysis, we have not discriminated against them in organizing our cipher section." At that time there were five PhDs on staff, and three other members had been through college.[35] By late May 1918, there were at least 39 people across all the subsections. A June 1918 cross-government

Edith Rickert

University of Chicago Photographic Archive (apf1-07147), Special Collections Research Center, used with permission

Martha Edith Rickert was born in Canal Dover, Ohio, on July 11, 1871. At an early age, Edith (she never used her first name) moved with her family to La Grange, Illinois, and attended North Division High School in Chicago. Rickert entered Vassar College in 1887 at age 16 and received her degree in 1891. She returned to Chicago to care for her three younger sisters, and taught in Cook County and Chicago. In 1895, she began graduate studies at the University of Chicago. She returned to Vassar for three years (1897-1900) as an English instructor. She received her PhD (magna cum laude) in English letters and philology from the University of Chicago in 1899.

From 1900 until 1909, Rickert studied, traveled, and wrote while living in Europe. She published five novels and more than 80 short stories, edited several medieval texts, and prepared translations of medieval literature. When she returned to the United States in 1909, she settled in Boston and became an editor with publisher D. C. Heath as well as for the *Ladies' Home Journal*. Beginning in 1914, she taught during the summer at the University of Chicago as an assistant in the English Department. It is not certain when she joined MI-8, but it probably was shortly after her mentor at the University of Chicago, John Matthews Manly, joined the organization in October 1917.

In 1924, Rickert joined the faculty of the University of Chicago as associate professor of English; she was appointed professor of English in 1930 and remained on the faculty until her retirement in 1935. She collaborated with Manly on several projects, including compiling a definitive critical edition of *The Canterbury Tales*. The two of them spent part of each year together in England doing research. Neither of them ever married. Rickert died in 1938 and is buried in Oak Woods Cemetery in Chicago.

A memoir written by a former student in 1944 said of Rickert, "Miss Rickert's beauty and intelligence would have been less compelling if it had not been for incredible vitality and energy. For years, her energies seemed inexhaustible. I have never known anyone who was capable of such sustained and high-power exertion. Her normal working day was twice the length of that of most of her colleagues. She was the embodiment of a passion for constant intellectual activity."

Edith's youngest sister Margaret, a distinguished art historian who also received a PhD and taught at the University of Chicago, worked as a codebreaker for the US Army Signal Corps at Arlington Hall Station in Virginia during World War II.

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(and later cross-ally) agreement to increase efforts to solve coded messages intercepted from the German transmitter at Nauen sent the organization scrambling to hire staff who were familiar with German (see chapter 2).[36]

John Manly appears to have attracted a good number of the University of Chicago faculty to Washington, including Rickert, Thomas A. Knott (later chief editor of the second edition of the *Webster's New International Dictionary*),[37] David H. Stevens, and James Root Hulburt.[38] Edgar H. Sturtevant held a PhD from Chicago; Charles H. Beeson was a Latin professor there, and his research in medieval Latin literature "made him apt in similar work with cipher in modern languages."[39] Carl Kinsley, a professor of physics at the same institution, was the head of MI-10E.[40]

From Yale there was Frederick Bliss Luquiens, who taught Spanish and "thought as readily in Spanish as in his native English."[41] The poet Stephen Vincent Benét, then a student at Yale, worked in the Code and Cipher Solution subsection for no more than a few weeks, and perhaps as little as seven days in November, before leaving due to health problems.

Elias Avery Loew later taught paleography at Oxford; Aloysius J. McGrail had graduated Harvard and had a PhD from Catholic University. Charles Jastrow Mendelsohn[42] had a PhD in classics from the University of Pennsylvania and taught at City College of New York. Bayard Quincy Morgan taught German at the University of Wisconsin and later was a department chairman at Stanford University.[43] Victor Weiskopf, an agent for the Department of Justice, had worked for that agency in Texas for years; he came to MI-8 as an integree and then moved to New York to work for MI-8 until it closed in 1929.

Another man in this group, Thomas M. Childs, joined the MID in November 1917.[44] This Childs, who appears to have spent some time in business and was familiar with commercial codes, could possibly be the man whose reputation as an expert was mistakenly applied to J. Rives Childs when he arrived in France (see chapter 8).[45]

One of Yardley's first clerks, John Meeth, was the first to depart for the AEF's G2A6 in France in late 1917; it is not clear whether he was drafted or volunteered. Frank J. Kennedy, who had been hired as a cryptographer late in 1917, was sent to the G2A6 as a field clerk in July when he found that his draft status was 1-A.[46]

Eight men qualifying for commission were trained by the office starting on July 1, 1918. This group included Lieutenants Hugo Campagnoli

(who did not arrive at MI-8 until later in July but trained with this class), Robert Keener, Frederick Livesey, John Norris, Herbert Skinner, and Austin W. Works, all of whom arrived in Chaumont in late September 1918. The names of the other two men are unknown. The class also included the six civilian men and six civilian women hired for positions in the Code and Cipher Section; the class was described as "of high grade and full of promise."[47]

One of the staff, according to Stevens's account, was an imposter—a German prisoner of war from a southern concentration camp who claimed a knowledge of cryptography. He apparently was brought to Washington, lodged in a police station, and received rides to and from MI-8 where he sat at a solitary desk in a locked room. Stevens claimed that "his ignorance was soon proved," and the man was sent back to prison. While Stevens is a credible narrator, no other documentation can be found to back up this story.[48]

Ongoing recruitment efforts, assisted by Franklin W. Allen in the Shorthand subsection (one of the five MI-8 subsections), continued at least until October 1918 and perhaps into November. Countless letters, written by Manly for the signature of Brigadier General Churchill, the head of the MID, went to professors at Harvard, Simmons, Smith, and Vassar, requesting young women with knowledge of Spanish or German to work as cryptographers for $1,400 per year for the duration of the war or until discharged. Training time was paid and expected to take two months.[49]

In addition to Rickert, 14 women can be identified as having worked in MI-8, with nine of these 15 definitively assigned as cryptographers rather than clerical personnel. Among them was Ruth Willson (no relation to Russell Willson), who is well-known for having worked with Yardley in New York in the 1920s but who got her start in Washington during the war.

None of the women, or the men who did not take a commission, appear in a photograph of the MI-8 code- and cipher-breaking staff, taken in the late summer or early autumn of 1918 (see photo).

Mission

Organization

It was not until late spring of 1918 that the MID required any formal reporting from its Code and Cipher Section. It is possible that Van Deman instituted a formal reporting system to ease the leadership transition, for he was departing for France and was replaced by Brigadier General Churchill. By early June, a weekly report started appearing; MI-8 gave full reports to begin with, then, by mid-July, its weekly contributions were absent or negligible. Whether this was because Yardley and his staff were too busy to write them or because they had begun to be more careful about disseminating information about codes and ciphers is unknown. Other sections seem to have continued reporting until at least early October.[50]

The first of these reports outlines the duties of the section. Some duties are strictly cryptographic and related to communications security: preparing ciphers and codebooks, handling encoding and decoding for American military communications, and examining cipher and code systems proposed (by outsiders) for army use. The other broad categories involve breaking codes and ciphers, including "secret writing" (secret inks) and analyzing messages from all branches of the MID (including MI-10E, the Radio Intelligence Section), the Signal Corps, military censors, postal censors, intercepted radio from the Office of Naval Communications, material from the Department of Justice and Department of State, and assistance with "occasional messages which cannot be deciphered by the Canadian office of military intelligence."[51]

More specifically, there were five subsections in MI-8, although sometimes the training function was separated out from the code and cipher attack. Additionally, there was an Administrative subsection with one officer, two filing clerks, and two messengers.[52]

Some of the staff of MI-8. Emmet Carver worked in secret ink, the others in the code and cipher section. Photo was taken after Herbert O. Yardley had left on his European trip and excludes the women of the office. Front row, left to right: David H. Stevens, John M. Manly, Thomas A. Knott, Charles H. Beeson, Charles J. Mendelsohn. Back row, left to right: Robert H. Marvin, Paul B. Woodfin, Frederick B. Luquiens, William M. Barlow, George W. Bicknell, Emmet K. Carver, J. A. Hathaway; last two individuals unknown. Courtesy of the George C. Marshall Foundation, Lexington, Virginia. Item 604.4, William F. Friedman Papers, George C. Marshall Foundation Research Library

Communications Subsection

The Communications subsection was the first function established. This responsibility—handling communications for the MID, including encoding and decoding messages—should have been, by rights, carried out by the War Department Adjutant General, but it was thought it could be handled more securely by the MID.[53] The subsection, headed by Captain Thomas Childs,[54] maintained cable and telegraphic communications with 40 attachés and intelligence officers stationed abroad and with hundreds of intelligence officers in military camps and cities in the United States. The office was open 24 hours a day, seven days a week. A special cable connection with Paris meant the end-to-end transmission time was only 30 minutes. Nearly half of these communications were coded and had to be decoded. Seven telegraph operators (with four more authorized) and four code clerks were split across day and night shifts.[55] By the end of the war, the transmission time from Paris to Washington, to include sending and decoding, was 20 minutes; communication with

Vladivostok and Archangel (Arkhangelsk) in Russia was down to less than 24 hours.[56]

Code Compilation Subsection

MI-8's Code Compilation subsection (not to be confused with the AEF Code Compilation Section in France) was organized in 1917 while the office was still housed at the War College. Although, strictly speaking, this function belonged in the Signal Corps,[57] the MID had an interest in making sure its communications were secure. The impetus for this concern may have been a message from an assistant secretary of state to Van Deman in July 1917 alerting Van Deman that the British considered the War Department's coding methods "unsafe and a menace to secrecy."[58] Captain Altus E. Prince, commissioned from the State Department code room by Yardley, was put in charge of the subsection and soon had 10 clerks working for him. This pleased Yardley, for it meant he did not have to spend more than an hour a day thinking about code compilation.[59] See chapter 12 for details about the codes produced by this subsection.

Everyone connected with cryptology in 1917 knew that the existing War Department Telegraph Code of 1915 was not secure; it was a one-part code that was designed to save money, not protect information, although it was designed with an encipherment table. The Code Compilation subsection's first task was to produce new substitution tables (10-AA and 10-BB) for the code, and they did this every two weeks to mitigate the security problems of the underlying codebook.[60] On January 15, 1918, these tables replaced other difficult-to-use tables (2-A and 2-B), which were issued in August 1917. These tables were used by all military attachés (except for those in Jassy, Romania), the intelligence officers in the Canal Zone and Philippines, and the War College Division.[61]

A one-part code named Military Intelligence Code 5 was completed on July 1, 1918. Unfortunately, it was almost immediately misused by unnamed army organizations, and its security was considered destroyed. Despite this, it was used until 1934 when it was downgraded to Confidential and reissued in September of that year as War Department Confidential Code No. 1 SIGCOT.[62]

The replacement code, Military Intelligence Code 9, was ready for use on December 2, 1918. This was a two-part code, and all copies were recalled in 1923. It was reissued in 1933 as War Department Staff Code No. 2, SIGSYS/SIGPIK.[63]

A French Geographical Code was requested in July 1918 by General Tasker H. Bliss and was finished on October 1, 1918. It contained 9,750 place names. But by the time it was ready, it was thought it should also include Belgium and parts of Holland and Germany, so on October 15 the staff started working on a new code (French Geographical Code 2). This code was completed on November 15.[64]

Work on the MID Casualty Code started on September 16, 1918, and was almost finished at the time of the Armistice. This was not intended to be a secret code but one to provide greater efficiency in transmitting casualty reports. It was independent of the casualty codes developed by the AEF Code Compilation Section. Because the code was not complete when the war ended, work on it stopped so that emphasis could be given to completing Military Intelligence Code 9.[65]

On December 2, the organization was asked to make a "pocket code" for attachés on duty away from their posts. This was produced under the guise of the "Ideal Correspondence Code" to distance it from the MID organization, and it was printed in a format and on a paper different from standard government publications. Fifty copies were sent to attachés in Europe within two weeks.[66]

Shorthand Subsection

In October 1917, the Post Office's Censorship Board began to send MI-8 letters they believed to be in cipher, which turned out to be in a variety of shorthand systems. It was probably Van Deman who located and consulted with Franklin W. Allen,

of the firm Hulse and Allen, for at the time Van Deman handled all liaison with other organizations. Allen provided assistance by employing and paying a number of experts for their services. However, this effort was not formally a subsection of MI-8 until May 1918 when Allen was asked to organize the subsection and was appointed chief (as a civilian volunteer); the subsection was quartered at his office in New York.[67] The subsection was closed on July 11, 1919; no full-time expert had been dedicated to MI-8 since February 8, 1919, and Allen's office had been handling special problems for the organization on an hourly basis.[68]

At first the Shorthand subsection was in Allen's office at 165 Broadway, but in May 1918 it was moved to the second floor of the building at 244 Madison Avenue. Six people were employed full time. Armand B. Coigne, "so young that the prospect of his induction into the army created considerable concern," was an examiner and classifier who acted as Allen's administrative assistant and functioned to some degree as an investigator for Major Nicholas Biddle, the chief of the New York City Military Intelligence unit (May 24, 1918-February 8, 1919).[69]

Other staff included Maria Norman, a German citizen who handled Stolze-Schrey shorthand transcription from May 24, 1918, until January 11, 1919. Franz B. May and Egon Eisenhauer handled Gabelsberger shorthand (Eisenhauer replaced May). Vincente N. Noriega and José R. Alvarez handled Spanish shorthand. Employees of the subsection were paid by Major Biddle; other expenses were paid by Allen, who was later reimbursed by Biddle. Allen did not take a salary.[70]

The subsection handled 46 problems for MI-8 as well as performed work for the Post Office's Censorship Board, the Bureau of Investigation, and Major Biddle.[71] They handled 300 shorthand systems in seven languages.[72]

Early in June, Yardley had asked Allen to help him recruit personnel.[73] And in July, feeling pressured by the AEF's call for officers who knew German for the G2A6, Yardley asked Allen to find, investigate, and recommend six cryptographers and 12 candidates for commissions. Several of the officers recommended additional candidates, including women.[74]

Yardley's first request was for three experts who "could think in German," were willing to work for $1,400 a year, and were "above draft age"; a week later he asked for three people familiar with Spanish. Allen had the help of Professor Laurence A. Wilkins, the head of the Department of Modern Languages in the New York City public schools, who was also the president of the American Association of Teachers of Spanish. Approximately 50 people were interviewed, and six women chosen—three for German and three for Spanish. Of these six, the names of only four are documented: Anita Thomas, Dorothea B. Jachens, Ruth Willson, and Anne F. Carter.[75] The women joined a training class that started on July 1, 1918.[76]

Allen's inquiries resulted in 12 candidates for commissioning.[77] Luquiens, Robert H. Marvin, and Herbert S. Spencer came to Washington as captains. Eight lieutenants—Hugo G. Campagnoli, Frederick Livesey, Eugene Jackson, Robert Keener, Charles G. Montross, John S. Norris, Herbert C. Skinner, and Austin W. Works—were trained and sent to France late in 1918. The name of the twelfth candidate is unknown.

On August 15, a call was made for army field clerks "with an intimate knowledge of the Russian people and language" to go with the G2 (intelligence section) of the AEF to Siberia; on three days' notice, Allen provided two qualified candidates.[78] One of them was Henry H. Werblow; the name of the other candidate is not known.[79]

Three important results were credited to Allen's team. They compiled a bibliography of works on rare and foreign shorthand systems and built a library; 54 systems were studied and analyzed; and their experts were soon able to "determine the system used in practically every document submitted and transcribe the stenographic notes into the language used."[80]

Allen's recruiting work included identifying 15 expert stenographers who could take down verbatim reports of German prisoner of war interrogations. He organized the search and recommended qualified stenographic personnel for the AEF.[81] And, as a result of locating those 15 experts, the subsection conducted a census of shorthand writers using foreign language systems. Each was investigated and documented.[82] Names of nearly 400 stenographers using German systems were compiled.[83]

Secret Ink Subsection

Early in its history, the MID was advised by the British that German agents would attempt to evade postal censorship by using secret ink.[84] Van Deman asked the National Research Council for assistance; the council assigned Professor Theodore W. Richards of Harvard to study the subject. Dr. Emmet K. Carver joined Richards's study in the summer of 1917.[85] When, in November 1917, the MID set up a secret ink laboratory in the Post Office's Censorship Board office at 641 Washington Street in New York, Carver was put in charge. He later was commissioned a captain in April 1918.

Captain John A. Powell, formerly of Riverbank Laboratories, consulted with a British expert, Stanley W. Collins, the chief chemist of the British censorship department, during his visit to Europe in early 1918.[86] Collins spent two months in the United States consulting with Carver, and Carver also traveled to the United Kingdom and France to study the subject. In late spring 1918, a second lab was set up in the MID facility at 1330 F Street, NW, in Washington; Dr. Aloysius J. McGrail, newly commissioned as a first lieutenant, was put in charge.[87] In September 1918, this laboratory absorbed the equipment and supplies (but not the personnel) of a similar laboratory run by the Office of Naval Intelligence.[88]

The New York laboratory investigated letters obtained through the censorship office in New York; the Washington lab handled suspicious material sent in from the censorship offices at Key West, New Orleans, San Antonio, San Francisco, and Seattle, as well as suspect letters found by the MID and other agencies.[89] The Washington laboratory also supplied chemists to the AEF's Base Censor's office in Paris: First Lieutenants G. C. Chandlee and D. F. J. Lynch. Both men trained in Washington and for a week in the British laboratory; they arrived in Paris on November 4, 1918. Two others, Second Lieutenants P. S. Danner and Edward F. Snyder, reported on November 13.[90]

On average, more than 2,000 letters per week were examined from July 1, 1918, to February 1, 1919.[91] Examinations of 50 letters resulted in arrests.[92] The most famous case was that of the German agent Maria de Victorica,[93] born in Posen in 1878 as Marie Else von Kretschmann. Her third husband was Manuel Gustave Victorica, an Argentine who deserted her just months after their marriage in 1913.[94] Madame Victorica, as she was known, was in the employ of the German secret service and trained in secret inks when she arrived in New York in January 1917. She claimed her mission was to encourage pacifism and Irish unrest, but after her arrest in April 1918 and the analysis of her correspondence by MI-8 in July 1918, it became clear that she was working to import explosive material to be used on ships and gathering information on submarines, bases, and the Panama Canal.[95] It is important to stress that her correspondence was not discovered and read before her arrest but afterward; the material uncovered by the Secret Ink subsection was used in her prosecution.

Postal censorship was discontinued after the Armistice, and in February 1919 the two MI-8 labs were merged into one unit in New York, which was closed in June 1919.[96]

Code and Cipher Solution Subsection

The Cipher Solution subsection was the part of the MI-8 organization that handled cryptanalysis, conducting attacks on both codes and ciphers; it was sometimes referred to as the subsection for "criticism

and attack," since part of their job was to assess and evaluate code and cipher systems offered by outside parties for government use. This subsection additionally contained the "Code Instruction bureau" where military attachés, assistants, and clerks were trained, as were officers and army field clerks who were destined for the AEF's G2A6 Radio Intelligence Section in France. The Code and Cipher Solution subsection was the largest subsection, and the work it did breaking codes and ciphers supported not just the War Department but also the navy, State Department, Department of Justice, and the cable and postal censorship organizations.[97] Staffing and organizing the subsection took time. Not until the fall of 1917 did MI-8 begin to take over work that the State Department and the MID had been sending to Riverbank Laboratories.[98]

In October 1917, Manly and Captain Charles J. Mendelsohn were placed in charge of the work on German codes and also conducted much of the training.[99] The first trainees who would go to France—John A. Graham, Lee West Sellers, J. Rives Childs, and Robert Gilmore—spent a few weeks at MI-8 in the fall of 1917 and then went to Riverbank for more training. Childs remembered how this came about:

> Yardley came out; so he was about to give a lecture, and he asked for volunteers. And I was very anxious to get back to France. And I was serving as ADC (aide-de-camp) to General Farnsworth, Brigadier General Farnsworth in whom I didn't have great confidence. I didn't think he would ever get to France. I never regretted the fact that I went to the Army War College, and there Yardley came out and asked for volunteers and I volunteered. And then we were sent to Geneva, Illinois.[100]

In the early spring, a handful of graduates of the large Riverbank course would visit MI-8 for additional instruction before proceeding to France. In theory, MI-8 was teaching six-week courses, but in reality many men spent much less than six weeks in training.[101] Gilmore, Graham, Childs, and Sellers appear to have spent two months at MI-8 before going to Riverbank.[102] MI-8 was charged with locating and supplying officers to the G2A6 but could not keep up with the demand, and the G2A6 found that their preparation had been insufficient, particularly their lack of knowledge of German.[103]

During the first year, the organization's growth was slow, partly because the office was so busy that they did not have time to find new staff. Plans for research into new techniques and attacks on larger problems were regularly postponed because of the daily workload.[104] Much more time was spent training officers and gathering materials than doing actual cryptanalytic work. By June 1918, 14 people were on staff in this subsection: three officers, Victor Weiskopf from the Department of Justice, eight civilian cryptographers, and two stenographer/clerks.[105] The group was finally making progress on German material, including the Wilhelm cipher found in messages from Nauen and a transposition cipher used by the German minister in Mexico, Heinrich Von Eckardt.[106] By the beginning of August, there were sufficient staff to begin work on the accumulated material in the files.[107]

These issues are likely why there was such a delay in processing the cipher message found in the February 1918 capture of German agent Lothar Witzke, alias Pablo Waberski. Breaking this message was one of the organization's great successes, but the message arrived in February and was not looked at until May as it apparently arrived without any indication of its source or importance and was put into a pile (see chapter 11).

It was not until August of 1918 that the staff was of sufficient size to handle the workload.[108] It may be purely coincidental that the improved staffing and workflow occurred when Yardley was leaving for Europe, but Manly's management style might have helped improve efficiency.

Sources of Cipher Material. Because of the nature of MI-8 as a centralized bureau for multi-

ple government departments, the great majority of its coded and ciphered material came from sources other than radio intercept. Letters in secret ink, other suspicious messages and packages, clandestine notes—this was the bread and butter of the organization. Nearly all of the organization's cryptanalytic success came from solving materials related to spies and saboteurs. Radio intercept came from MI-10E, the Signal Corps, the navy (from City College, New York; Otter Cliffs, Maine; and incidental copy from ships),[109] the British (via the State Department), and sometimes the AEF.

No system of prioritization is apparent in the organization's records. Each staff member seems to have had an area of expertise, based on the languages they handled, and presumably material was distributed as it came into the office. There was no control over the flow of material; MI-8 took what it was sent. After the Armistice, with the opening of the intercept station at Houlton, Maine, MI-8 did ask that specific radio links be copied and sent to Washington.

Beginning in September 1918, the G2A6 provided the MID copies of intercepted high-power press and diplomatic radio station transmissions copied by French, British, and Italian intercept services. This was part of the agreement made at the Interallied Radio Commission meetings[110] (see chapter 2).

Examination of Proposed Cipher Systems. MI-8 worked on a variety of other problems when not breaking collected messages. There was a constant supply of proposed codes, ciphers, and machines designed by American individuals who wished to contribute to the war effort. Many of these were evaluated by MI-8 personnel; none was adopted by the government.[111] Yardley and his team tested the early versions of Joseph O. Mauborgne's cylinder device (which would become the M-94) and found it wanting—Yardley was sure it was "not safe" and could be broken.[112] The group also tested the British Pletts machine (see chapter 12).

Yardley and perhaps others at MI-8 had some peripheral involvement in testing some aspects of a printing telegraph cipher under development by Gilbert Vernam at AT&T.[113] But the bulk of this work was done by Mauborgne in the Signal Corps Research and Engineering Division and by William Friedman at Riverbank just before he departed for France.[114]

After the Armistice

The Waberski message was probably the most significant solution accomplished during the war. There were two German messages intercepted by the navy station at Otter Cliffs, Maine, that were also deemed significant in January and February 1918 (see chapter 11), but nothing conclusive came from those solutions.[115]

In April 1919, the Code and Cipher Solution subsection was able to decipher "a very long and elaborate quadruple transposition cipher" that was sent by radio from Dr. Arthur Von Magnus, the German chargé d'affaires in Mexico City, to German consular officials in Mexico, that directed destruction of materials related to the German military and secret service. This was excellent information and was considered to be one of the organization's most significant achievements, but it was not actionable intelligence.[116]

Between the summer of 1917 and May 1919, MI-8 solved an astonishing 579 governmental code and cipher systems. The vast majority of these (541) were Mexican diplomatic and consular systems. Only 12 were German diplomatic and intelligence ciphers or codes. The remaining systems were Spanish (17), Costa Rican (3), Chilean (2), Brazilian (2), Cuban (1), and Argentinian (1).[117] The focus on systems from Latin and South America is not surprising; while MI-8 received information from the AEF, most of its material came from the Western Hemisphere.

The MID was reduced in size after the war. While Brigadier General Churchill would later publicly write that a code and cipher section was "not practicable" to continue in peacetime,[118] he was secretly making arrangements for a version of MI-8, funded primarily by the State Department,

to operate in New York under the direction of Yardley.[119] This story is well-known. It was the success of Yardley's organization in handling a large volume of messages in code, cipher, secret ink, and shorthand systems during World War I that made the Black Chamber possible.

MI-10E

Creation

The Army Signal Corps was conducting radio intercept from forts along the US-Mexico border as early as 1915. This was not a coordinated or focused signals collection effort; the work was done by communicators who were also checking for other radio communications when they did not have their own traffic to send. The Signal Corps introduced mobile radio collection tractors in 1914, but it is not known when these tractors began conducting intercept. Although these stations were doing radio intelligence work, they were not part of a formal radio intelligence service.

Encoded and enciphered material collected by the Signal Corps along the border before the spring of 1917 was generally sent to the Southern Department's Intelligence Office at Fort Sam Houston in San Antonio, Texas. There it would either be sent to interested parties in the Signal Corps in Washington or routed directly to one of the few people in the army known to be able to break codes and ciphers, such as Parker Hitt, Genevieve Hitt, Joseph Mauborgne, or Frank Moorman. Beginning in the spring of 1917, some of this material would go to Ralph Van Deman, who sent it on to experts, including the cipher experts at George Fabyan's Riverbank Laboratories.

In early 1917, the Signal Corps had recognized the possibility that cross-border communication by radio would evade other forms of communication censorship, and Colonel Nugent H. Slaughter instigated a communications study in the fall of 1917 (see chapter 2). The results of this study influenced the development of the Radio Intelligence Section in the MID and a transfer of all radio intelligence work from the Signal Corps to the MID.[120] Dr. Carl Kinsley, who had supervised the Signal Corps's 1917 work, was transferred to the MID on February 16, 1918. He was put in charge of the MID's new Radio Intelligence Section on March 10, 1918.[121] The section was first put under MI-1 Administration, but by the end of July was resubordinated to Captain (later Major) Rupert Hughes's MI-10 (Censorship Section) and designated MI-10E despite the fact that it did not conduct censorship of radio.

Early on a decision was made, probably jointly by Kinsley and Van Deman, that MI-10E would consist of 14 mobile radio tractor units, independent of the fixed Signal Corps radio stations; by moving from time to time, these units would be able to cover a much larger territory than could be handled by fixed stations. The section was to have the most up-to-date radio equipment.[122] The MID's preference was that the stations be referred to as "Radio Tractor Units (RTUs)" rather than "Listening-in Stations."[123]

Staffing

When the organization was established, it was thought necessary "to have a very special radio equipment and personnel much more highly trained than that required for any other army service."[124]

Stations were outfitted with equipment for performing direction finding, reducing static and interference from nearby stations, automatic recording of messages, and transmitting and receiving simultaneously. The intent was to make these stations "more fully equipped than any other radio organization in the Army."[125]

The Signal Corps was unable to provide personnel for the MID's radio intelligence work, so Kinsley worked to "obtain highly trained radio operators … by means of enlistment or induction into the military service."[126] In February 1918, a campaign was drawn up to send letters to all colleges and universities that had an enrollment greater than 1,000 students, place stories in the popular radio publication

The Wireless Age, and conduct outreach with radio companies such as Marconi that ran schools.[127]

On March 11, after receiving special authorization from the secretary of war,[128] the army started sending letters to civilian radio schools (which were coeducational), asking to be placed in contact with "radio operators of thorough practical experience." The letters noted that personnel would be on detached service "of a highly confidential nature" and hinted at "strictly secret" methods and equipment to entice the technologically proficient for this "most unusual opportunity to start on important work of great interest." At least three female operators were recommended by the War Service Exchange (an army body that determined the qualifications of civilians to serve in various capacities), but the MID was only interested in hiring men (see chapter 17 for more on the role of women in cryptology).[129] The need for technological expertise was considered so great that the recruits did not have to attend a military training camp upon enlistment or commissioning.[130]

Kinsley was looking for men with specific skills and asked for men with two years' experience in operation of a radio station and the ability to copy 30 words per minute under average conditions. "No more attractive opportunity could be found," he wrote.[131] He dangled rapid promotion and a monthly salary of $81 for "Master Signal Electricians."[132] The qualifications were set at a high level so that only the very best amateur radio operators could qualify.[133] Because the operators were coming from civilian life and were often well-educated in addition to having radio expertise, it was thought that there would be no trouble finding those with "the quality of leadership and the character which would make them most admirable officers."[134]

Lieutenant Frank E. Lankford was assigned to MID radio intelligence on April 15, 1918, and put in charge of operations at Fort Sam Houston. He would eventually be transferred to RTU 47 (Tucson, Arizona) and then in August 1918 to the Department of Military Aeronautics. In early May, two of the first officers who had completed training in Washington were sent to work with Lankford: Lieutenants James E. Ives and Fred H. Parish. By early June, there were 15 officers and 44 operators on duty in MI-10E. Six operators were being trained in the Signal Corps laboratory at the Bureau of Standards, two men were in the hospital, and 18 men were in the process of being brought into the military.[135] By the time of the Armistice, on November 11, 1918, only 100 men, of the 140 authorized, were in place. (See table 1.)

Table 1. Authorized and actual personnel for the MI-10E Radio Intelligence Section, March–November, 1918[136]

Personnel	Authorized	On duty November 11, 1918
Majors	1	1
Captains	5	1
First lieutenants	16	6
Second lieutenants	4	8
Master signal electricians	17	1
Sergeants first class	6	1
Sergeants	8	7
Corporals	17	14
Chauffeurs first class	15	0
Chauffeurs	1	0
Privates first class	38	35
Privates	12	26
Total	**140**	**100**

Mission and Organization

The Radio Intelligence Section was charged with copying messages sent by Mexican stations, whether in Spanish or in code. There was an expectation that these messages were going to European stations, submarines, or other Mexican stations. The section was also to locate any unknown and unauthorized radio stations in the United States that were transmitting to Mexico, and they were to provide any and all information on radios to any army "mobile operating force."[137]

Code and cipher material collected by MI-10E was handled in Washington at MI-8, but the border collection was also looked at by Southern Department Headquarters in San Antonio, and some of the material was analyzed there. Plaintext information collected by MI-10E was shared with MI-2 and MI-4, and through liaison officers to the navy; the Departments of State, Justice, and the Treasury; and the War Trade Board. Signal Corps radio stations on the border also continued to intercept communications from Mexico and forwarded their findings to the Southern Department intelligence officer at Fort Sam Houston. Nogales, Arizona, appears to have had equipment dedicated to intercept before February 1918, and other stations may have had the same.[138] It is not known if Signal Corps radio stations at border locations were specifically directed to establish intercept efforts at some time between 1916 and 1918, or whether these were local initiatives. While their operation was not governed by the MID, the information they collected was fed into the cryptologic system via the Southern Department intelligence officer. On June 12, 1918, Sergeant James A. Combs, in charge of a wireless listening station reporting to the Intelligence Office at Nogales, furnished a study of Mexican stations, their callsigns, normal communication patterns, and message structure—a short traffic analytic study.[139]

A key component of MI-10's mission was work being done at the Wireless Research Bureau of the army and navy station on the grounds of the Bureau of Standards (now the National Institute of Standards and Technology [NIST]), a sprawling campus just west of Connecticut Avenue in northwest DC.[140] A new Radio Building was constructed as an annex to the Electrical Building to accommodate the MID's training program.[141] Many of the officers selected to lead the RTUs were trained at the Bureau of Standards laboratory with the expectation that they would pass on their training to their men. One unexpected factor was that many of the men commissioned for the service came from civilian life and had no knowledge of what military training entailed. They were not sent to officer training camps; an officer provided the training they needed on site, and they were soon well drilled and prepared for duty.[142]

Equipment

Fourteen radio tractors were taken out of the Southern Department's inventory. RTUs contained a transmitter powerful enough to keep in touch with neighboring RTUs and with fixed Signal Corps stations. In theory, each RTU carried a generator to run the transmitter and to power the batteries used with the receiver equipment, but several of the units often resorted to charging batteries elsewhere.[143]

RTUs also had receivers, originally to monitor the 1,000-meter to 2,500-meter wavelengths, which were judged the most likely to be used by Mexican stations, and were given "emergency equipment" to collect from 350 meters to 17,500 meters. A radio direction-finding loop, wave meters, supplies to construct a ground antenna, and an 80-foot umbrella antenna with 12 guy wires were standard equipment. The test laboratory at the Bureau of Standards had an automatic tape recorder, but this item does not appear to have been deployed to the field. The RTU at Las Cruces, New Mexico, is known to have used a dictograph cylinder to record intercept, and Sutherland Springs, Texas, requested a Dictaphone because they had many inexperienced operators.[144]

The equipment for the RTUs was estimated to

Table 2. Radio tractor units and other MI-10E collection sites. Some RTUs began in temporary locations in the summer of 1918, but I show here their permanent assignment.[147]

MI-10E stations	Location	Start date	End date
Mexico City	US Embassy Mexico City	September 1917	Early 1919
RTU 31	Fort McIntosh, Laredo, TX	June 1918	August 1919
RTU 32	McAllen, TX	July 1918	September 1918
RTU 33	McAllen, TX	August 1918	probably summer 1920
RTU 34	McAllen, TX	December 1918	August 1919
RTU 37	Del Rio, TX	September 1918	probably summer 1920
RTU 38	San Antonio, TX	July 1918 September 1918	August 1918 August 1919
RTU 39	Sutherland Springs, TX	June 1918	August 1919
RTU 42	Fort Sam Houston, San Antonio, TX	July 1918	August 1919
RTU 43	Pecos, TX May have briefly operated at Fort Bliss, El Paso, TX before moving to Pecos	September 1918	Early 1920
RTU 44	Yuma, AZ	September 1918	1921
RTU 45	Las Cruces, NM	July 1918	August 1919
RTU 46	Las Cruces, NM	July 1918	August 1919
RTU 47	Tucson, AZ	possibly late spring 1918	probably summer 1920
Substation N-47	Nogales, AZ	November 1918	probably summer 1920
RTU 48 (formed from RTU 47)	Tucson, AZ Lordsburg, NM	August 1918 August 1918	August 1918 August 1919
RTU 49	Houlton, ME	November 1918	probably summer 1920

be worth about $300,000 in 1919.[145] This would be approximately $4,630,994 in 2021 dollars.[146]

Operations and Sites

Table 2 lists RTUs and MI-10E sites. Kinsley, with Albert Sobey and John Matter, staffed the MI-10E office at MID headquarters. Lee Sutherlin (see sidebar) and Private Vance M. Thompson ran the operation at the Bureau of Standards office.[148] Operations started slowly because it was taking time to staff the RTUs and to get the equipment needed. Many stations were not fully operable until September 1918. In early June, just seven RTUs were operating (some in temporary locations not detailed in

Lee Sutherlin

Sutherlin, 1918 National Bureau of Standards personnel negative set 39, https://cdm16009.contentdm.oclc.org/digital/collection/p16009col122/id/38/rec/1

Lee Sutherlin was born on July 11, 1889, in Morton, Indiana. He graduated from Indiana University in 1912 and completed a master's degree in physics from the University of Chicago by attending during the summers of 1915-1917. From September 1912 until November 1916, he taught at Muncie High School, where his principal called him the "strongest teacher of physics in the state." From November 1916 until December 1917, he taught math at Culver Military Academy, where the acting superintendent said he was a "man of good initiative, not afraid to work."

On December 12, 1917, 28-year-old Sutherlin enlisted in the army as a private and was detailed for radio intelligence work, first attached to the 814th Aero Squadron in Washington, DC.

When the Military Intelligence Division (MID) was looking for radio operators to staff the Radio Tractor Units (RTUs), Colonel Ralph Van Deman asked that Sutherlin be commissioned since he was an expert who had been testing radio equipment for months. His commission became effective April 20, 1918, and he was detailed to the MID for temporary duty. He spent several months at the Bureau of Standards testing apparatus to be used by the RTUs and then was supposed to be sent to Fort Sam Houston.

Instead, Sutherlin spent six months at the Bureau of Standards conducting tests and helping to train RTU operators. In October 1918, he was detailed to locate a place in Maine for MI-10E to establish a collection site; this turned out to be Houlton, Maine. Sutherlin executed a lease and supervised the establishment of the station, staying at the site until early December before returning to Washington. Sutherlin was discharged from the army on September 9, 1919, worked at Western Electric for a year, and then became an engineer at Westinghouse in October 1920. He worked on vacuum tubes and received a patent for a directly heated cathode a-c tube.

Sutherlin was recalled to duty as a major in January 1941 and was assigned to the Fort Monmouth, New Jersey, Signal Laboratory. He was discharged on March 29, 1946, and resumed his career at Westinghouse. Sutherlin died on June 10, 1987, and is buried in Hebron Cemetery in Russellville, Indiana.

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table 2), but they did not have all their equipment. Three intercepted code messages were sent to MI-8 for decoding, and 10 intercepted messages in Spanish were collected the first week of the month.[149]

For the week of June 22-29, 1918, only seven code messages and 28 messages in Spanish were intercepted. The following week, 100 messages were submitted from the station at Mexico City alone, but the activity of the other stations had "been restricted by unfavorable conditions." Mid-July was no better, with only 25 messages in Spanish, six code messages, and one message in English received between July 13 and 20; however, two previously unknown radio stations (presumably Mexican) had been discovered. For the week beginning July 27, there were 97 intercepted messages in Spanish, 48 messages in code, and five messages in English sent from RTUs to the MID. For the week ending August 10, the numbers were 38 messages in English, 196 messages in Spanish, and 135 messages in code. The new MID Radio Intelligence Section was on its way.[150]

While the initial plan had been to locate six of the stations directly on army posts (one each at Fort Brown, Fort McIntosh, Fort Bliss, and Fort Huachuca, and two at Fort Sam Houston),[151] it was determined that interference from the Signal Corps stations at those posts was detrimental to the work of the stations,[152] and all were moved off post (apart from Fort Sam Houston). The RTUs varied in their level of organization and the lifestyle they offered the unit. Most were close enough to a town that provided entertainment and meals, but some had more amenities. Each station chief determined the station's routine—from when reveille would be called and when meals were taken, to the watch schedule for operators and any equipment training or military education that would be offered.[153] There was no fixed schedule imposed on the stations, so they were free to operate in a way that suited their commanding officer. The officers in charge of each station had special authority from the quartermaster general to purchase oil, gasoline, and machine repairs since it was expected that they may be as far as 100 miles from a quartermaster depot.[154] The plan was for each station to have one officer and six enlisted men, one White tractor equipped with radio instruments, and one Ford tractor as a tender.[155]

None of these sites, except for San Antonio and perhaps Mexico City, were easy places to work. The weather was harsh—there were high winds, hurricanes, thunderstorms, and snow storms. Life could be austere and boring; if the site was close to town, there might be merriment and romance.

Good accounts of life and operations for many, but not all, stations exist. The locations of some sites are well described, but for others there is nothing more specific than a town. The accounts of sites from San Antonio south and then west, as well as the special stations at Mexico City and Houlton, Maine, provide some flavor for the challenges and experiences at some of the stations. While I found copious memoranda and intercept records of the stations in San Antonio and Yuma, Arizona, I could not locate summary accounts of life at those stations.

San Antonio, Texas (Supply Center RTU 38, RTU 42)

Fort Sam Houston in San Antonio, home of the headquarters of the Southern Division, was the main supply center for the RTUs as well as an administrative hub for the operation. Second Lieutenant Fred Parish commanded both efforts. These RTUs were frequently used for equipment testing[156] (see photo of direction-finding testing).

Sutherland Springs, Texas (RTU 39)

RTU 39 was under the command of First Lieutenant Colby D. Campbell and had set up camp in Nature's Park, owned by Mr. T. J. Williams, on Cibolo Creek. At 0800 on June 7, 1918, the equipment was turned on, and intercept operations began. After the first month, the men started eating at the Busby House in town until January 1, 1919, when they formed their own mess. They lived in tents at the site. Typically reveille was at 0615.

Direction-finding testing, Medina Dam Road, outside San Antonio, Texas, 1918. NARA CP, RG 165, Entry 65, Box 96

This unit found that only some of their operators could successfully copy Mexican stations, so they adjusted their watch schedule to solve this problem. The men were divided into two squads of three operators each, with two experienced operators on each team with a man who needed to get up to speed. The two expert men worked when it was expected there would be the most intercept, the third man worked when traffic was light. The squads alternated days. In October 1918, they experimented with a new schedule, where one man worked 0800 to 1200 every day and three men rotated through three night shifts (2000 to 2400, 2400-0400, and 0400-0600).[157]

A homemade loop antenna with a fixed compass (a compass where the dial was fixed and only the needle moved), situated in a building about a half mile from camp, was found to be more accurate than the portable loop antenna supplied by the Signal Corps. From its start in June 1918 through the end of July 1919, the station intercepted more than 20,000 messages.[158]

Several problems plagued the unit. They discovered that the tractor could not generate sufficient current to charge their batteries, and there were no garages or other charging stations available. They found that there was a small Delco lighting system at the Hotel Sutherland, which was owned by their landlord, and they used this to charge their batteries until a garage opened in town. Transportation also was a problem as the Ford truck they brought with them could not be properly maintained.[159]

The men were bored in Sutherland Springs. The only diversion in town was a swimming pool, also

The "loop men" of McAllen, Texas, Radio Tractor Unit 34. The only identified individuals in the photograph are Lieutenant Alfred John Main (first on left), Ernest H. Rose (fourth from left), and Joseph Lazaerus Turre (fifth from left). Collection of the Center for Cryptologic History, gift from Charles A. Werker

owned by Mr. Williams, and he let them use it free of charge. The unit attempted to sponsor dances every few weeks; the lack of local musicians required bands to be brought in from San Antonio, 34 miles away.[160]

McAllen, Texas (RTUs 32, 33, 34)

These units were located on a deserted farm about a mile from the town of approximately 1,200 people. The men of these units appear to have worked hard and had a pleasant experience with only minimal hardship. While the men lived in tents, they took their meals at a boarding house.[161] They attended dances (with RTU operator Joseph Richey playing the violin) and socialized with the locals[162] (see loop men photograph).

Six four-hour shifts were standard, shared by eight operators. The unit did have a typewriter, but only some of the men could type; the others hand-copied the intercept. The equipment ran 24 hours a day and was only shut down if something went wrong.[163]

An account from operator Richard Egolf documents what might have been one of the first (but not the last) pranks played on a signal collector by his

peers. Egolf often worked the late shift, from 2300 to 0700, and one night sat down in his comfortable chair, ready to copy intercept. He put his feet down and later remembered that:

> I felt something down there. And we, by the way, we always kept a revolver up on the table. And I put my foot on it and I felt this soft thing. I said, "Geez, that feels like a snake." So we had a flashlight and sure I took the flashlight and I pulled the gun off the table and sure, it was a great big rattlesnake. Well one of these smart Alek's [*sic*] that had been on before me or somebody they'd cooked up this idea "Let's give Egolf a session for himself," so I started to blaze away at the snake with a 38 and then they all come running out hearing the shots, and they were having a whooping good time.[164]

The great Florida Keys hurricane of 1919 made landfall just north of McAllen on September 15 and completely wrecked the sleeping quarters, loop tent, and umbrella antenna, and partially destroyed the intercept station and supply tent. The MID did not have the money for repairs and asked the Southern Department quartermaster to allocate $100 to make repairs.[165] Lieutenant Main was still in charge of this station for the MID in February 1920. A new station, quarters, garage, and office were built entirely by the crew of the station on leased land, and they worked closely with the Border Patrol of the US Army Air Service.[166]

Laredo, Texas (RTU 31)

The commander of this unit, Second Lieutenant Arthur R. Boeder, although assigned to bachelor's quarters at Fort McIntosh, decided in June 1918 to take quarters for himself out of his own pocket, so he could install intercept equipment in a place where he could maintain secrecy. He had found that in his rented rooms he could copy stations not heard by the tractor, and often reported to the MID on these communications; so, in September, he asked the MID to pay the cost of his rental. His chain of command approved this arrangement and suggested that the quartermaster pay the rent. The request was denied in October 1918; as Boeder prepared to move back on base and to give up his extracurricular intercept work, he was assigned to go to Houlton.[167]

Del Rio, Texas (RTU 37)

This station was still operated by the MID as a Radio Intelligence station in February 1920, although manning was understrength. It was located on government-owned land but away from the post of Camp Michie (formerly Camp Del Rio). It had excellent cooperation with the Border Patrol of the US Army Air Service.[168]

Pecos, Texas (RTU 43)

A site for the station was found about one mile from town; it had an artesian well, was near a good gravel road, and electricity was installed (see RTU 43 photo). Six shifts of four hours were the norm; when not on watch, men practiced visual signaling and did calisthenics. The direction-finding loop was in a large shed, fixed on an axis to revolve 360 degrees, and a compass was laid out on the floor in white paint. The direction-finding antenna could be turned from inside the intercept shed using ropes fastened to a wheel near a window in the intercept station, which also provided a direct view of the loop mechanism. The station also had leads from the direction-finding antenna run in waterproof casing so that an intercept operator could quickly detach the collection antenna from his receiver, hook up the direction-finding equipment, and take his direction-finding measurement, all without stepping outside or needing a second man operating the direction-finding antenna.[169]

Life at this station was pleasant, with frequent duck-hunting trips and visits to the mountains 50 miles away. Every summer afternoon the entire unit would go to a swimming hole, except for the unlucky man on watch.[170]

Radio Tractor Unit 43, Pecos, Texas, October 1918. *A* is the commanding officer's tent; *B*, enlisted personnel tent; *C*, supply and storage tent; *D*, gasoline, lubricating, and kerosene tent; *E*, electric power; *F*, Ford truck; *G*, tractor; *H*, 93-foot sectional antenna mast; *I*, operating house for cold weather; and *X*, the artesian well behind the tent. NARA CP, RG 165, Entry 65, Box 96

Las Cruces, New Mexico (RTUs 45, 46)

The staff of RTU 46 (see photo) assembled at El Paso in late June 1918. They were led by 35-year-old Lieutenant Robert Bowen, who had emigrated from Bootle, England, at age 18 (see sidebar). Bowen, who had a great deal of commercial radio experience before running a storage battery and automobile business in New Rochelle, New York, applied for a commission in the Signal Corps in April 1918. He was commissioned in early May and trained at the Bureau of Standards to "fit him for special duty in charge of one of the radio stations along the Mexican border."[171]

Bowen and his men departed Fort Bliss on July 2 at 2000 in two trucks (one Ford, one White), traveling at night to avoid the heat and to conceal the nature of the mission. They had hardly left El Paso when a hot bearing on the right rear wheel set fire to the oil in the rear housing. After two hours, repairs made, they set out again, but 10 miles down the road they had a problem with the same wheel. A closer investigation revealed there was no bearing in the wheel. The truck was unloaded and sent back to Fort Bliss for a replacement, which arrived at 0100 on July 3.[172]

The men traveled until 0330 and, realizing that the road was bad ahead, pulled over, posted a guard, set up cots, and slept until the sun came up. There had been rain in the area at the end of June, and the road was muddy; the Ford would not pull its load. The crew improvised, taking the ropes that would be used for erecting their mast antenna and tying the Ford to the White truck.[173] But this was not the end of their woes.

The road narrowed and fell away steeply to the remains of an old irrigation ditch, and the White

Men and collection tent, Radio Tractor Unit 46, Las Cruces, NM. The names of the men are not known. New Mexico State University Library, Archives and Special Collections, Hobson-Huntsinger University Archives: 07090003

truck sank into mud over its rear axle. It took four hours of labor on the hot July day, digging trenches, jacking up the truck, and using railroad ties to support the load, but the spirit of the men was excellent, according to Bowen. At 1400 this muddy group pulled into Las Cruces, had something to eat, and looked for a camping spot.[174]

The mayor's offer of the fairgrounds was declined as they did not want to be close to town. Bowen visited the president of the small New Mexico College of Agriculture and Mechanical Arts (now New Mexico State University), Austin D. Crile, at the campus, about three miles out of town. There was a large tract of government-owned land behind the college, and Crile had had a pipeline laid for a water supply. By 1800 the men had their trucks parked, a tent set up, and "all turned in and slept like dead men" (see photo of men and collection tent, RTU 46).[175]

On the morning of the Fourth of July, they quickly set up the tractor, anxious to start radio collection. Nothing worked. After some time, they managed to get the National Electric Supply Company (NESCO) radio set operational and collected their first message at 2300.[176] Bowen later recommended that all equipment, including transporta-

Robert Bowen

Robert Bowen was born on January 25, 1883, in Bootle, England (near Liverpool). He came to the United States in 1901 and became an American citizen in 1910. Bowen was skilled in both American and Continental Morse code. His prior military experience included two years as a private in the British Army during the Boer War, where he served as a motorcycle dispatch carrier. He also served one year as a chief electrician in the United States Revenue Cutter Service.

Bowen had a wide range of experience as a radio engineer and radio operator, serving with the United Wireless Company for three years and with the Marconi Company for seven years. From 1914 to 1916, he served as chief of telegraphic and radio communications for the Dominican government and built two government radio stations there.

In April 1918, he was the proprietor of a storage battery and automobile business in New Rochelle, New York, when he applied for a commission as a first lieutenant in the Signal Corps, with the expectation of being detailed to the Radio Intelligence Section. He was commissioned on May 9, 1918, and reported to Washington, DC. On June 17, he completed a course of instruction at the Bureau of Standards designed to "fit him for special duty in charge of one of the radio stations along the Mexican border." After training he was put in command of RTU 46 and supervised the move of the unit from Fort Bliss, in El Paso, to Las Cruces. Bowen spoke and wrote Spanish. He married Catherine Pino in El Paso on January 22, 1919.

After the war, Bowen went back to work at his battery business in New York. He later worked as a radio salesman in Riverside, California, and then as a refrigerator serviceman. He died on November 26, 1955, and is buried at Fort Rosecrans National Cemetery in San Diego.

Sources

Ancestry.com. Vital records. Accessed July 27, 2018.
Material pertaining to Bowen. National Archives and Records Administration College Park, Record Group 165, Records of the War Department General and Special Staff, Entry 65, Boxes 69 and 70.

tion, be tested before deploying RTUs and felt that he lost six days arranging equipment and repairing trucks.[177]

The men of the unit enhanced their camp by boarding up and screening tents, erecting a shower, and making other improvements while they worked on the equipment. They first heard the radio signal from the Mexican station at Chapultepec on July 23. Their original loop antenna was too small to get a precise direction on the signal, but once they constructed an eight-foot loop they had success. The loop was set up 1,000 feet from the tractor, and they ran a buzzer line between the two so the intercept operator could alert the direction-finding operator when he needed a bearing.[178]

Each of the tractor units had a slightly different situation, but they almost certainly followed a pattern similar to what Bowen described. Intercept was done 24 hours a day, with the best operators assigned to the shifts where the most activity was expected. Routine duty assignments shifted each day and included two men doing clerical work, two

making repairs to the truck, one repairing and caring for the radio equipment, two cleaning the tents and the camp, and another cleaning and serving as property clerk. One hour of drills took place each day and might involve signaling practice (wigwag, semaphore, blinker, search light), squad formations, target practice, exercise, or reading of military books and manuals. Drills were often cancelled when extra men were needed overnight to oversee the direction-finding loop. There was also opportunity for the men to learn how to use the direction finder, plot curves, and correct the maps.[179]

Crile allowed Bowen's men to use the college's laboratories, machine shop, and a room that had been set up with equipment to train Signal Corps units. They used the auto repair shop frequently and "saved several hundred dollars for the government by being able to do our own repairing and trial vulcanizing, and the Ford trucks were continually breaking down." The men were always invited to local dances and entertainments and had "excellent meals" at a local hotel for a dollar per day for each man.

While the camp was isolated, they had a camp library with books, a phonograph, and records, as well as "a quantity of traps for trapping wild animals."[180]

Another unit of seven men arrived in August and set up about half a mile from RTU 46; this group would eventually become RTU 44. Bowen commanded both groups, and they quartered, drilled, and studied together. On September 15, Lieutenant George C. McClintock arrived for training and, on September 25, McClintock and Bowen's "best men" took the train for Yuma, Arizona. The officers agreed to a bet that RTU 46 could beat RTU 44 in monthly reception of messages. Bowen offered his men a free trip to El Paso every time they won, and "although the race was close at times, we beat them every time. The competition was very keen."[181]

Las Cruces endeavored to copy all Mexican stations, although the nearest station of importance was about 900 miles away, and there was considerable static. They also suffered from interference from US Army Signal Corps radio stations at army forts along the US-Mexican border. RTU 46 thus became an inadvertent communications security monitor, listening to orders and personal conversations, much of which Bowen felt should have been sent via land line. Lieutenant Bowen reported these problems to the district signal officer with no result and felt that his unit had been unable to properly collect several hundred Mexican messages "due to the poor management of Army radio stations."[182]

Lordsburg, New Mexico (RTU 48)

Lieutenant Frank Lankford had a difficult time finding a spot for this RTU. He searched for a location between Douglas, Arizona, and Rodeo, New Mexico, along the line of the El Paso and South West Railroad, but there was no suitable place for the men to board within their allowance. So, the unit ended up in Lordsburg as preferable to Hachita, which Lankford believed the MID thought was an unsuitable location. When Captain Albert Sobey, the deputy of MI-10E, visited in August 1918, he reported back that Lordsburg "has earned the bad reputation it has borne the past few years and conditions though better than they were are none too good now." The nine saloons in town attracted a rough clientele, but the townspeople took an interest in the unit and tried to get them safely located. Sobey concluded that when New Mexico went dry on October 1, things would probably improve.[183]

Their camp was a flat space just southeast of town, and plans were made to pipe in water. There was food at a nearby boarding house for $1.25 per day per person, and the prospect of some competition in the near future.[184]

The unit was off to a slow start, hearing mostly American stations and a few Mexican ones. The umbrella antenna was missing a part, which could not be obtained from Fort Huachuca. Fortunately, a jerry-rigged repair was made, and the antenna was connected during Sobey's visit.[185]

Not surprisingly, Sobey found the men of this

unit had less enthusiasm for the work than did other RTUs, which he attributed to the fact they were not fully operational.[186]

Tucson (RTU 47) and Nogales, Arizona (substation N-47)

This unit, under the command of First Lieutenant Lankford and Second Lieutenant George H. McClintock, was first set up as a camp on the Tucson Fair Grounds, five miles outside the city. In late August 1918, the original group of men was sent to Lordsburg to staff RTU 48, and a new team of six men, led by Lieutenant Gaston A. Costas, took over. In September, Captain James Ives took over and moved the station inside the Tucson Golf and Country Club, two miles east of the city, so that the station could be closer to town. The chef at the country club provided meals to the unit.[187]

Ives set up six watches of four hours each, beginning at 0800. He felt strongly that the men "shall get all the sleep that is possible in order that they may be fresh and vigorous on the night watches." There was a tendency in this type of work, according to Ives, for "even the best men to go to sleep while keeping a watch," because there was often nothing to do apart from keeping their headsets on their head. Consequently, reveille was set for 0700 and breakfast a half hour later. Other duties were assigned for those not on watch, including cleaning lanterns and stoves, sweeping out the tents, serving as secretary to the commander, and various other tasks, so that each man put in about eight hours a day. The watches were changed every week. Ives recognized that no two soldiers could do the same thing equally well, so he endeavored to assign men to the duties they were "especially capable of filling."[188]

The men of RTU 47 appear to have had quite a bit of difficulty with abscesses in their ears, and Ives wondered if it was due to perspiration while wearing their headsets (at the time called telephones). "The condition of an operator's ears should be given very careful attention," Ives cautioned, and recommended that a doctor should be consulted on the first appearance of trouble.[189]

A loop antenna, suspended from a horizontal beam of a specially constructed loop house that sat 750 yards from the umbrella antenna used for collection, enabled direction finding. The antenna was fastened to a dowel pin that passed through a circle, marked in degrees, which was attached to a wooden table and calibrated by compass. The circle was nailed to the table; the table was nailed to the floor so it could not shift.[190]

Most of the intercept came from Mexican stations in Guaymas, Santa Rosalia, and Mexicali; Chapultepec and other stations were sometimes heard. Nighttime static often interfered with the main press broadcast from Chapultepec.[191]

This station remained open as an MID radio intelligence station as late as February 1920. The unit relocated in late 1919 to the State Armory, where it used six rooms for operating space and quarters.[192]

A Nogales substation of this RTU was commanded by Lankford from the Tucson base. The station was first established in November 1918 and went into full operation in late December.[193]

Yuma, Arizona (RTU 44)

A radio tractor was sent to Yuma in September 1918. MID maintained a site in this area until sometime in 1921.

Mexico City

A radio station used for intercept in the US embassy in Mexico City was installed in the fall of 1917 by the MID. This equipment supplemented radio equipment already at the embassy that had been copying messages going to the Mexican station at Chapultepec. This was a secret station, under cover, and though it had equipment and an operator, it did not really succeed at the job until receiving additional equipment and personnel in 1918.[194]

In late September 1917, Corporal Charles R. Sullivan reported to Mexico City to operate the

"wireless 'listening-in'" station at the embassy. He was ordered to wear civilian clothes and to consider his destination and duty as confidential. Sullivan joined the Signal Corps in March 1914 and served for more than three years in the Philippines before reporting to Mexico City. Although commissioned a second lieutenant in the Signal Corps Reserve in December 1917, he had not been promoted because for some reason he was not considered to be on active service. At the same time, the military attaché in Mexico City felt that the work should be trusted only to commissioned officers. In July 1918, Sullivan asked to return to the United States so he could be called to active service, but both the MID and the attaché felt he was needed in Mexico City. The MID was not able to rectify this situation until August 1918 when Sullivan was officially ordered to duty as assistant to the military attaché in Mexico and formally took up his commission as a second lieutenant. Meanwhile, the ambassador asked the MID for a second officer to work at the station.[195]

First Lieutenant Roy D. Carrier reported to duty at the Mexico City collection site on May 19, 1918. He found that the radio station's antenna was the 800-foot wire used for a private telephone line between the embassy and the Hotel Genève. The station had a Type D Signal Corps shortwave tuner, a long wave set, and a single stage amplifier. This equipment could intercept Chapultepec, which was only one mile away, and could hear US Army stations at Laredo. Other Mexican stations at Vera Cruz and Túxpam were not heard well enough to copy.[196]

Carrier constructed a loop antenna attached to a US Army Signal Corps SCR-72 low frequency amplifier, but could only hear Chapultepec with this set. He constructed another antenna, which he installed around the stone balustrade on three sides of the embassy roof and connected to a NESCO tuner and the SCR-72. Using this equipment, he could copy Chapultepec and hear, but not copy, Vera Cruz and Tampico.[197]

He then tried a third antenna, which rambled up the wall of the embassy and across the roof, that he tied into a lighting circuit that controlled the embassy garden's lights. The antenna would not work if the lights were on. This antenna made it possible to successfully intercept and copy Chapultepec, Vera Cruz, Túxpam, and sometimes Tampico. Carrier was not satisfied with his results and concluded that the biggest problem at the embassy was to construct an efficient antenna while concealing its purpose.[198]

In October 1918, Kinsley sent a note to John Manly in MI-8 that included intercept from Mexico City collected between September 6 and 19. The intercept came from a station transmitting on 5,200 meters. Kinsley believed that the messages might contain a concealed number code. Messages repeated on the same days of the month as in preceding months; that is, messages sent on September 6 were identical to those sent August 6. The site had been collecting these messages since July 19.[199]

Second Lieutenant P. B. Rawley joined Carrier in November, carrying a message to Kinsley. He discussed the nightly cipher sent by Chapultepec, which had not yet been deciphered, and how the site used direction finding to determine where other stations sending this cipher were located.[200]

In January 1919, probably responding to a request from Kinsley that all officers give him some idea of their plans for the future, Carrier wrote to Kinsley about his experiences in Mexico. He mentioned that there was some scuttlebutt that the ambassador would like to discontinue the radio work, and that he hoped to return to the United States and search for a job in private industry. Commending Rawley as "one of the best men that could have been picked for this work," Carrier asked that, if the station continued, Rawley be allowed to stay. Second Lieutenant Charles Sullivan, also at the station, was anxious for a discharge and had a job waiting at an oil company in Tampico.[201]

That same month, Lieutenant Colonel R. M. Campbell, the military attaché, told the MID that the ambassador wanted to keep the intercept equipment for the embassy, so it would be there in case of emergency. Both Campbell and the ambassador

agreed that the need for the intercept station no longer existed.[202]

Establishing an intercept station in Mexico City was a logical response to the concern generated by the expansion of the Chapultepec station in early 1917 and the US government's desire to know what type of communications Germany was sending to Mexico. This station seems to have taken advantage of the fact that some sort of radio station already existed in the embassy. Little documentation remains to properly judge the worth of this effort, although, by September 1918, the station was supplying material of interest to MI-8. In retrospect, the station at Houlton, Maine, turned out to be a better solution for collection of communications between Germany and Mexico.

Houlton, Maine (RTU 49)

By October 19, 1918, the MID had decided that it needed its own intercept station devoted to collection of communications from the high-power radio station at Nauen, Germany.[203] This was entirely driven by the success the MID had experienced the week before, when it presented intelligence to President Woodrow Wilson based on communications intercepted by the US Navy from Nauen (see chapter 7). A quick survey was made, and Major Carl Kinsley noted that a station could be established to intercept traffic from Nauen "with no more delay than necessary to have radio operators ordered to the place where it was decided to establish such a station."[204] Houlton, Maine, was the location of the new station. While the station was not mobile or in a radio tractor, it received the administrative designator RTU 49, though it was never referred to as an RTU in memos.[205]

Orders were issued on October 28, 1918, and Lieutenant Lee Sutherlin, based on his experience managing the RTUs, was asked to travel from Washington to Houlton to make preliminary arrangements. It was Sutherlin who located and executed a lease on the Gillen Farm on the southwest corner of White Settlement Road and Military Road (now US 2). (See photo of intercept house, Gillen Farm.) The house and property, including all repairs, telephone service, electric light and battery service, stoves, fuel, and water, were leased by the army for $45 a month for a term of six months. The station was a mile and a half from Houlton's main square. There was no housing on the site; the men would board in town and walk approximately 25 minutes to the station. A tractor unit at Laredo was shut down to staff Houlton. Some of its equipment was stored; some was shipped to Maine. Additional apparatus was shipped from Washington.[206]

Second Lieutenant Arthur R. Boeder of New York was in command. Just shy of his twenty-fifth birthday when he arrived at Houlton in early November 1918, Boeder had enlisted in September 1917 and had an outstanding résumé, ideally suited for assignment at what was a new type of collection site.[207]

Boeder and two privates arrived in Houlton on November 8. Personnel were still arriving on November 11, and it was not until that day that the holes were dug for the poles and the lumber ordered. Ten poles were set up, running southwest from the house, on November 12, and 1,000 feet of antenna wire was strung from the poles on November 13. Instruments were connected that same day, and Lieutenant Boeder reported that "reception started on a regular schedule." Houlton was in operation.[208]

But in the fall of 1918, the army's Houlton site was seen as being in competition for, and a duplication of, the new navy radio transmission and interception station at Otter Cliffs, Maine. At a cabinet meeting, Secretary of the Navy Josephus Daniels protested the operation of an army station so close to the navy station, and Secretary of War Newton Baker had little option but to order the MID to shut down collection operations. The navy likely considered long-distance transatlantic radio strictly its responsibility, particularly as it was a stretch to claim that Houlton was intended to support army operations (see chapter 7). MID placed Houlton on experimental status on November 23.[209]

The intercept house, Gillen Farm, Houlton, Maine. NARA CP, RG 457, Entry 11, Box 210

Likely in violation of whatever promise had been made by the army to the navy, the site was instructed to intercept the code messages transmitted by the German radio transmitter at Chapultepec, Mexico, each night, take audibility readings, and watch for any related transmissions.[210] This was due to a cryptologic breakthrough in Washington. On November 13, the same day Houlton had begun collection, MI-8 had broken encoded messages sent out by Chapultepec for the first time since August 14, and a message intercepted by an RTU on November 9 showed a relationship between the German station at Nauen and the station at Chapultepec. It was hoped that Houlton would be able to intercept traffic that could not be collected by other stations.[211]

On December 12, likely while listening for Chapultepec, Houlton intercepted 14 cipher messages sent by Berlin to Madrid. These messages were forwarded to MI-8 where, by December 19, John Manly, in charge of MI-8 while Yardley was in Europe (see chapter 8), had deciphered seven of them, a total of 720 words. Notably, the navy's site at Bar Harbor, Maine, had not copied these messages; they were unique to Houlton. Manly consulted with the Office of Naval Intelligence and the navy's Radio Communications department and

reported that the navy had not intercepted any German cipher messages in two months and that few had been collected by any other site (see chapter 11). Manly claimed that "the Navy were no longer paying any attention to the German cipher messages and that Captain David W. Todd, Chief of Radio Communications, had expressed himself as in favor of the immediate resumption of operations by the Houlton Station."[212]

Relying on Manly's conviction that this was important, Colonel John Dunn, who was serving as acting director of the MID while Churchill was temporarily away, ordered Houlton to resume regular interception activities on December 19. Dunn was hopeful that this was a permanent move; he wrote to the men at Houlton that there had been some favorable developments and that "definite instructions" would be provided shortly. His hope was extremely short-lived. The next day, December 20, Houlton was again ordered to discontinue intercept operations.[213]

Peace negotiations began in January 1919 without the benefit of intelligence from Houlton intercept. The site was kept running by doing radio experiments (see photo of L-shaped loop antenna). These were still the early days of understanding the physics of long-distance radio communication, and it was thought this was a productive way to keep personnel at Houlton and support the army's desire to better understand radio.

While Houlton was on experimental status, Dunn had been working very hard to reinstate the collection mission. After months of discussion, Houlton resumed intercept on April 20, 1919.[214] This pleased MI-8 as cipher messages now were coming in regularly. About half of the collected messages were easily read and the other half were, per MI-8, being "vigorously worked on."[215] On May 1, Houlton was directed to focus on cipher messages rather than plaintext press. Ninety-eight enciphered messages were collected in the first two weeks of operations. Houlton's collection of the German transmitter at Eilvese was determined to be unique intercept of both diplomatic traffic and propaganda. It seemed that Otter Cliffs was collecting only the plaintext press from the Nauen transmitter, not the enciphered traffic from Eilvese. The possibility of sharing information with the navy was broached in late May 1919; it was thought that the MID could receive the Nauen collection from the navy, but whether this ever happened is unknown.[216]

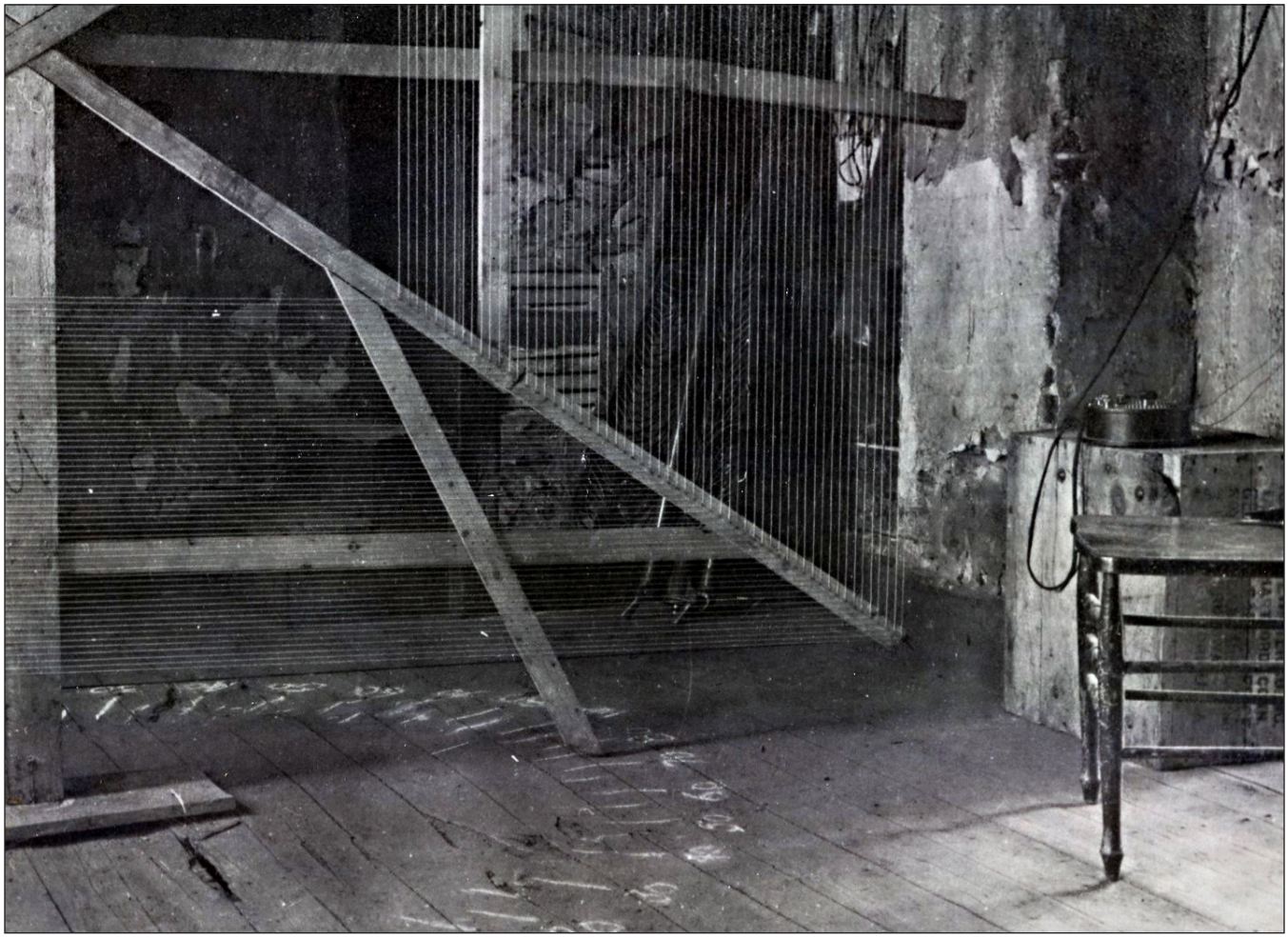
The rivalry with the navy continued. The sharing of information idea was introduced by May 26, 1919. "Navy still copies Nauen at Bar Harbor and reports to Washington by mail," said the MI-10E front office, noting that Houlton might be able to obtain a carbon copy of this intercept.[217]

Houlton remained operational until sometime in mid-1920 and routinely sent material to MI-8 in Washington and later to Yardley's operation in New York. In retrospect, the MID was not really prepared to operate a fixed site. While the tasking procedures and collection process seem to have been relatively straightforward, materiel and logistics were always problems and never really solved. The operators were expected to modify or build some of their own equipment and antennas, shovel the snow, and clean the intercept house, all while maintaining a 24-hour watch for important communications intelligence.

Houlton did receive some of the best radio equipment available to the army and was able to intercept signals from at least 35 US and foreign stations. The site collected unique traffic from the German high-power radio stations, collection that enabled MI-8 to break German codes. Information gleaned from Houlton intercept seems to have provided timely intelligence in support of the Paris Peace Conference of 1919, judging from the reaction the MID relayed to the site. By virtue of its location, the site provided collection that the smaller radio tractor units could not.

After the Armistice

MI-10E was judged a success in the eight months it had been in operation. Not only had it collected Mexican radio traffic (more than 60,000



L-shaped loop antenna used for direction finding at Houlton, Maine. Note the compass markings chalked on the floor. NARA CP, Records of the Military Intelligence Division

messages), but it was also able to intercept traffic between Mexico and Germany, and between Germany and Spain, thanks to the newly established Houlton station. There was also the unexpected success of intercept from the Japanese high-power station at Funabashi. No intelligence value was seen in the content of the Japanese intercept, but the MID believed it was important to develop the capacity to collect against Japan.[218]

Technologically, the organization had succeeded by developing four types of receivers and a radio goniometer as well as an automatic receiver that could copy 100 words per minute. Scientific experiments conducted at Houlton, McAllen, and Tucson examined the variations found in radio signals, and their findings were shared with the Signal Corps, the navy, and the scientific community.[219]

A small office staff of two translators, three clerks, two stenographers, and three officers (Kinsley, Sobey, and Sutherlin) stayed on after the war to support the RTUs, most of which remained operational through much of 1919. Several stations stayed in business longer.[220]

On August 15, 1919, the strength of the Signal Corps was increased by 54 men so that the organization could support, under the administrative control

of the MID, "certain radio stations within the continental limits of the United States to intercept radio communications originating with foreign governments." The MID began planning for a permanent radio intelligence service. Initially, it was anticipated that there would be four units of nine men and one officer, with two units (one on the Pacific Coast and one in the Philippines) added later. The officers were to come from the existing corps.[221] Houlton was to cover transatlantic traffic; McAllen, Sutherland Springs, and Tucson were to handle Mexican intercept, with training units at Sutherland Springs and Tucson. Tucson was selected as the logical station for work on Japanese code. Once a unit had been properly trained in Japanese codes, a station would be set up in Oregon and that unit transferred; once a second unit was trained, both units would function in Oregon until the MID was ready to deploy a unit to the Philippines.[222]

The MID was still recruiting for radio operators in February 1920.[223] But by June 1920, Chief Signal Officer George Squier believed that the administration of the personnel and the installation, operation, and maintenance of the stations should be returned to the control of the Signal Corps. The stations would provide their collection to the MID in a manner similar to how the AEF was structured during the war.[224] The secretary of war settled the matter by giving the Signal Corps supervision of personnel as well as installation, operation, and maintenance of radio intercept stations, while giving the MID "supervisory control" over the service, with all intercept forwarded to the MID. The commanders of regional departments of the army that had stations in their area (the Northeastern and Southern Departments) received letters about the agreement and were asked to transfer administrative control of the stations from the assistant chief of staff for Military Intelligence to the department signal officer.[225] At the time of the agreement, there were only four stations: Houlton, McAllen, Del Rio, and Tucson.[226]

There were still some anomalies in the system. Before February 1920, some of the RTU personnel were moved to open new stations at Calexico, California, and Nogales. Calexico was not at that time under the MID system and was under the direction of the intelligence officer for the Southern California Border District. Calexico was particularly adept at intercepting Japanese radio stations, and an inspection recommended that it be brought into the MID system.[227] But in January 1921, due to intercept problems and a shortage of personnel at Yuma, it was suggested that the personnel from Calexico be moved to Yuma.[228]

Sometime in 1920, the Signal Corps radio station in the Presidio of Monterey had established a Radio Intercept Unit. In December 1920, they requested that the 9th Corps Military Intelligence office furnish a clerk to assist the organization. Monterey reported receiving 6,000 words of traffic a day, copied by operators by hand, in pencil, which then needed to be typed in—"a very tedious process." At that time, they had one radio set monitoring long wavelengths from late afternoon to early morning; the commander of the unit, First Lieutenant Calvin H. Burkhead, wanted to have a second set looking at shortwave stations on boats and along the west coast of Mexico. The 9th Corps suggested that they hire a female civilian stenographer and referred the matter to Washington. MID Washington advised that they could not provide a stenographer and expressed a willingness to receive the material as copied by the operators.[229] It is not clear who in the MID headquarters was working with this traffic.

Conclusion

The MI-8 Code and Cipher Section exhibited enough high-profile success from the fall of 1917 through early 1919 that its survival, in some form, was assured. After the war ended, the State Department, cut off from the flow of diplomatic intelligence supplied by the British Admiralty's Room 40, particularly wanted to retain a codebreaking capability, a cipher bureau that could serve its needs. A scaled-down version of MI-8, freed from code compilation, communications, shorthand, secret ink, and

training, could focus purely on code and cipher solution, working primarily with telegraphic traffic and the occasional radio intercept. Yardley, and a select group of those who had worked in MI-8 and the AEF G2A6, went to New York, where they were able to refine methodologies developed during the war.

Working together, the two sections of the Military Intelligence Division faced the challenges of the home front. While MI-10E supplied only a fraction of the material analyzed by MI-8, the organization was able to provide valuable insight into both German communications with the Western Hemisphere and Mexican internal communications. The Signal Corps had not been able to provide the MID with what it needed, so the MID, a very young organization, put significant resources into a system to meet its needs.

Although the MID system of intercept had been effective during the war, the arrangement with the Signal Corps in 1920 freed the MID from the burden of recruiting and training operators and supplying the stations, tasks which the Signal Corps could more efficiently accomplish. The AEF system of a Signal Corps collection system supervised by the intelligence personnel of the General Staff had worked extremely well (see part 3); there was no reason to believe that this arrangement would function differently. But there was a difference: the code and cipher work had moved to New York and, largely funded by the State Department, concentrated on diplomatic traffic obtained from the telegraph companies. In 1920, the Signal Corps hired William Friedman, first as a contractor and then as a government employee. While Friedman's work began with codemaking and cipher making (as well as evaluation of systems and machines), he was poised to handle intercepted traffic as needed.

Notes

1. Ralph Van Deman, "Memorandum," April 8, 1949, 33, in "FOIA: Van Deman, Ralph H. HQ 2," Internet Archive, accessed February 22, 2018, https://archive.org/details/foia_Van_Deman_Ralph_H.-HQ-2, 57. Bruce W. Bidwell, *History of the Military Intelligence Division, Department of the Army General Staff: 1775-1941* (Frederick, MD: University Publications of America, 1986), 96.
2. Ralph Van Deman, "Memorandum," April 8, 1949, 35, in "FOIA: Van Deman, Ralph H. HQ 2," Internet Archive, accessed February 22, 2018, https://archive.org/details/foia_Van_Deman_Ralph_H.-HQ-2, 59.
3. Brigadier General Marlborough Churchill, "The Military Intelligence Division General Staff," *Journal of the United States Artillery* 52, no. 4 (April 1920): 296.
4. Bidwell, *History of the Military Intelligence Division*, 121-125.
5. For clarity, MID is used throughout.
6. Many letters between Van Deman, A. B. Bielaski, Parker Hitt, Joseph O. Mauborgne, John M. Manly, and George Fabyan, April-June 1917, National Archives and Records Administration, College Park, MD (NARA CP), Record Group (RG) 165, Records of the War Department General and Special Staff, Entry 65, Box 2241.
7. Letters between Van Deman, Hitt, and Fabyan, April 21, April 26, April 30, May 7, May 15, and May 19, 1917. All from NARA CP, RG 165, Entry 65, Box 2241.
8. Parker Hitt to George Cooper Hitt, May 16, 1917, Moreman-Mustain Collection of Parker Hitt Material (MMC). I have been unable to locate the May 1917 letter from Van Deman, but it likely was sent on May 15 or 16, given the fact of the order on May 17 and the note sent by Van Deman to Fabyan on May 19. See Bidwell, *History of the Military Intelligence Division*, 165, for the December date.
9. Special Orders No 114 War Department, MMC. Paragraph 30 orders Hitt to Washington, DC, to report to the Chief of Staff for duty.
10. Parker Hitt to Genevieve Young Hitt, May 22, 1917, MMC.

11. Van Deman to Fabyan, May 23, 1917, NARA CP, RG 165, Entry 65, Box 2241.
12. Some sources say he was commissioned on June 10, 1917, but the June 29 date seems most credible. Herbert O. Yardley, "The Achievements of the Cipher Bureau," *Cryptologia* 8, no. 1 (1984), 62-74. For Yardley's account of how he came to run the organization see Herbert O. Yardley, *The American Black Chamber* (New York: Ballantine Books, 1931), 10-13; see also David Kahn, *The Reader of Gentlemen's Mail* (New Haven, CT: Yale University Press, 2004), 19-21, and Bidwell, *History of the Military Intelligence Division*, 164-165.
13. Kahn, *The Reader of Gentlemen's Mail*, 21.
14. William F. Friedman, "A Brief History of US Cryptologic Operations 1917-1929," *Cryptologic Spectrum* 6, no. 2 (Spring 1976): 9-14.
15. *History of the MID*, July 21, 1919, NARA CP, RG 319, Records of the Army Staff, Entry UD1071, Box 21, 474.
16. Kahn, *The Reader of Gentlemen's Mail*, 21. Kahn implies that McKenna and Meeth were already assigned when Yardley started, but McKenna, who had been at the State Department as a clerk since October 1910, did not leave that organization until September 1917. McKenna and Yardley may possibly have worked in an office together at State, or it is possible that the men knew each other from their time there and that Yardley brought him to the MID.
17. Churchill, "The Military Intelligence Division General Staff," 293-315.
18. List of personnel contained in Final Report of the Radio Intelligence Section, General Staff, General Headquarters American Expeditionary Forces 1918–1919. Special Research History 014. NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 9.
19. Van Deman, "Memorandum," April 8, 1949, 57, in "FOIA: Van Deman, Ralph H. HQ_2," Internet Archive, accessed February 22, 2018, https://archive.org/details/foia_Van_Deman_Ralph_H.-HQ-2, 81. The Quartermaster Corps occupied a few rooms in the basement. The building would later be known as the Colonial Hotel. Memo on building move, May 3, 1918, NARA CP, RG 319, Entry P128, Box 1.
20. *Historical Background of the Signal Security Agency*, vol. 2, *World War I* (Washington, DC: Army Security Agency, 1945), 15, Special Research History 001, copy held by National Cryptologic Museum Library.
21. David Stevens, untitled manuscript, 8-9, David H. Stevens Papers, University of Chicago. Stevens also mentions th at the office, or at least some of the personnel, worked in temporary offices on the Mall (presumably the Munitions Building); there is no record of MI-8 being housed there. Stevens was writing in the 1930s after the publication of Yardley's book, so may have been familiar with the work of the Signal Intelligence Service, which was housed in the Munitions Building.
22. "General Suggestions," *MID Hand Book* [*sic*] *of Office Practice,* July 1918, 2, NARA CP, RG 165, Entry 159, Box 1.
23. "Miscellaneous," *MID Hand Book*, 10.
24. Hughes (1872-1956) enlisted in the New York National Guard in 1897 and was called up during the Punitive Expedition. He was the uncle of billionaire Howard R. Hughes, Jr., and was a well-known author, historian, and playwright who wrote a three-volume scholarly biography of George Washington after the war. In October 1918, Hughes may have stirred up some conflict between the army and the navy (see chapter 7).
25. Rupert Hughes, "Memories of MID," *The American Legion Monthly* 18, no. 3 (March 1935): 20-23, 64-66.
26. Yardley, "The Achievements of the Cipher Bureau."
27. Van Deman to Manly, September 15, 1917, NARA CP, RG 165, Entry 65, Box 2241.
28. Yardley, "The Achievements of the Cipher Bureau."
29. Stevens, untitled manuscript, 8-9.
30. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 21.
31. Stevens, untitled manuscript, 8.
32. Churchill to Chief of Staff, "Permanent Organization for Code and Cipher Investigation and

Attack," May 16, 1919, NARA CP, RG 457, Records of the National Security Agency, Entry 9032, Box 777.

33. "Biographical Record of Officers Connected with Military Intelligence Division," NARA CP, RG 319, Entry UD1071, Box 21. This was extremely helpful in reconstructing the list of personnel.
34. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 17-18 does not source this except as in "IR 4153."
35. Van Deman to Major C. H. French, April 18, 1918, referenced in *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 17-18.
36. Weekly report of MI-8, June 9-15, 1918, NARA CP, RG 165, Entry 65, Box 3522.
37. Stevens, untitled manuscript, 9. Stevens claims that Knott was the one who "completely convinced Colonel Fabyan that Shakespeare doubtless wrote his own plays."
38. "The University of Chicago War Service," accessed August 2018, https://brocku.ca/MeadProject/UniversityRecord/UniversityRecord_1918.html.
39. Stevens, untitled manuscript, 9.
40. Carl Kinsley to Chief Military Censor, "Military Censorship along the Mexican border," September 4, 1918, NARA CP, RG 165, Entry 159, Box 1.
41. Manly to F. W. Allen, September 4, 1918, NARA CP, RG 165, Entry 65, Box 2880; Stevens, untitled manuscript, 9.
42. Charles Jastrow Mendelsohn (1889-1939) had a PhD from the University of Pennsylvania and was a professor of ancient languages at the College of the City of New York. He began his government work with the Post Office's Censorship Board in New York in 1917 and was recruited by Yardley to come to Washington. He was commissioned a captain and joined MI-8 in July 1918 and was discharged in August 1919. Although he returned to his teaching work in New York, he continued to work part-time for Yardley. In 1939, he spent six months working in Washington for the Signal Intelligence Service but died of meningitis before renewing his contract. He is buried in Oakdale Cemetery in his hometown of Wilmington, North Carolina.
43. Bayard Quincy Morgan was, as a boy, called the "walking dictionary" by his friends. "N. F." (author initials), "B. Q. Morgan at Eighty," *Monatshefte* 55, no. 3 (March 1963): 102-106.
44. Churchill to Chief of Staff, memo, July 24, 1919, NARA CP, RG 165, Entry 65, Box 2800.
45. See J. Rives Childs, interview by Wilson, Coates, Schorreck, Goodman, Valaki, NSA-OH-1976-11 (September 10, 1976) for Childs's reception in France. The conclusion that Thomas M. Childs was the real expert is my own.
46. Weekly report of MI-8, June 9-15, 1918.
47. Weekly report of MI-8 [June 30-July 6, 1918?]; Weekly report of MI-18 [July 7-13, 1918?]. Both in NARA CP, RG 165, Entry 65, Box 3522.
48. Stevens, untitled manuscript, 9. Could this be the man that Yardley referred to as a spy in *The American Black Chamber,* 69-83? Thomas M. Johnson in his article "Battles in Code for World War Secrets" (*Modern Mechanix*, July 1933) says this man was Rudolph Metz. Metz does not appear on any MI-8 list of personnel, but as explained, these lists are incomplete.
49. Manly to Professor J. D. M. Ford at Harvard, September 19, 1918, NARA CP, RG 165, Entry 65, Box 2880.
50. Weekly reports of MI-8 through October 1918, NARA CP, RG 165, Entry 65, Box 3522.
51. Weekly reports of MI-8 through October 1918.
52. Weekly report of MI-8, late June 1918, NARA CP, RG 165, Entry 65, Box 3522.
53. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 59-60.
54. Churchill to Chief of Staff, memo, July 24, 1919.
55. *History of the MID*, 480-481.
56. Churchill, "The Military Intelligence Division General Staff," 293-315.
57. Friedman, "A Brief History of US Cryptologic Operations 1917-1929."
58. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 27. This source takes this story from a memo dated April 2, 1918 (no other reference given). In "Remarks of H. O. Yard-

ley Formerly in Charge of MI-8, Given before Officers of MID on January 5, 1920," Center for Cryptologic History file series II.H.20, copy held by author, Yardley says that the War Department code was used to encode sailing dates and destinations of transports leaving the United States for Europe. This would not have been happening before July 1917, but he claims that "A few months later the British Government officially informed this Government that the American War Department code was unsafe for secret communications." Is Yardley misremembering dates and circumstances and referring to the British memo of April 1917, or were the British still trying to warn the United States about this code months later?

59. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 29; Yardley, *The American Black Chamber*, 40-41.
60. James L. Gilbert, "US Army COMSEC in World War I," in *US Army Military Intelligence History: A Sourcebook*, ed. James P. Finley (Fort Huachuca: US Army Intelligence Center, 1995), 135-136.
61. Van Deman to Military Attaché, Paris, December 7, 1917, NARA CP, RG 165, Entry 65, File 7619-34. Also found in Center for Cryptologic History file series II.F2.29, copy held by author. The attaché at Jassy had a special figure code because of difficulties in transmitting coded letters by wire. Copies of the tables also went to the AEF intelligence offices.
62. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 36-37.
63. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 38.
64. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 41.
65. *History of the MID*, 480.
66. Yardley, "The Achievements of the Cipher Bureau."
67. *History of the MID*, 476.
68. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 114-115.
69. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 114-115.
70. *Historical Background of the Signal Security Agency*, vol. 2, *World War I*, 115-116.
71. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 120.
72. Churchill, "The Military Intelligence Division General Staff," 315.
73. The writer of *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 125 notes that the fact that Yardley was seeking linguists via a "law reporting firm" (possibly a firm that supplied court reporters) rather than from academia was an indication of Yardley's lack of an academic background.
74. *History of the MID*, 477.
75. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 125-126; Weekly report of MI-8 [June 22-29?], NARA CP, RG 165, Entry 65, Box 3522.
76. MI-8 weekly report [June 30-July 6?], NARA CP, RG 165. Entry 65, Box 3522.
77. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 126.
78. *History of the MID*, 477.
79. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 127.
80. *History of the MID*, 476-477.
81. *History of the MID*, 477.
82. *History of the MID*, 477.
83. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 127.
84. "Remarks of H. O. Yardley."
85. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 106.
86. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 107.
87. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*; Yardley, "The Achievements of the Cipher Bureau (MI-8) During the First World War," 74, notes that Lieutenant Colonel A. J. McGrail "was the only member of MI-8 in Washington who later also was a member of the Signal Security Agency in the Second World War. From 1941 until his death on 30 April 1945, Colonel McGrail was in charge of all work involving secret ink and photography."

88. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 108.
89. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 108.
90. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 111-112.
91. Weekly reports of MI-8, NARA CP, RG 165, Entry 65, Box 3522.
92. Churchill, "The Military Intelligence Division General Staff," 293-315.
93. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 108.
94. Manly in John F. Dooley, *Codes, Ciphers and Spies: Tales of Military Intelligence in World War I* (New York: Springer, 2016), 208-209.
95. Manly in Dooley, *Codes, Ciphers and Spies*, 214. Madame Victorica's exploits are comprehensively recounted in Manly's articles in Dooley's book, as well as in Yardley's *The American Black Chamber* and in David Kahn, *The Codebreakers* (New York: Scribner, 1996).
96. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 108-109; this account notes that when the unit was closed, its records were sent to the MID "and promptly lost."
97. Friedman, "A Brief History of US Cryptologic Operations 1917-1929."
98. Weekly report of MI-8 for June 1-8, 1918, NARA CP, RG 165, Entry 65, Box 3522.
99. "Studies in German Diplomatic Codes Employed during the World War," *Notes on History of Signal Intelligence Service,* 27, NARA CP, RG 457, Entry 9032, Box 745. Military attachés and their assistants also received training from MI-8.
100. J. Rives Childs, interview.
101. *Notes on History of Signal Intelligence Service*, 27.
102. Childs, "Introduction" to "The History and Principles of German Military Ciphers 1914-1918" (unpublished manuscript, n.d.), National Cryptologic Museum Library.
103. Cable from Frank Moorman to Army Chief of Staff, Washington, June 3, 1918, NARA CP, RG 120, Record of the American Expeditionary Forces, Entry 105, Box 5767.
104. Yardley, "The Achievements of the Cipher Bureau."
105. Weekly Report of MI-8, July 1-8, 1918.
106. Weekly report of MI-8 [June 16-23, 1918?], NARA CP, RG 165, Entry 65, Box 3522.
107. Yardley, "The Achievements of the Cipher Bureau."
108. Yardley, "The Achievements of the Cipher Bureau."
109. Messages picked up at San Cristóbal de las Casas, Mexico, sent to attention of Captain Keppel, November 6, 1918, NARA CP, RG 165, Entry 65, Box 3438.
110. Message dated November 22, 1918, citing G2 letter of September 14, 1918, NARA CP, RG 165, Entry 65, Box 3437.
111. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, and various MI-8 weekly reports found in NARA CP, RG 165, Entry 65, Box 3522.
112. Weekly Report of MI-8, July 1-8, 1918.
113. *Historical Background of the Signal Security Agency,* vol. 2, *World War I*, 47; Steven M. Bellovin, "Vernam, Mauborgne, and Friedman: The One-Time Pad and the Index of Coincidence," accessed September 3, 2018, https://mice.cs.columbia.edu/getTechreport.php?techreportID=1576. This article also appears as a chapter in Peter Y. A. Ryan, David Naccache, and Jean-Jacques Quisquater, eds., *The New Codebreakers* (New York: Springer, 2016), 40-66.
114. Louis Kruh, "Riverbank Laboratory Correspondence, 1919 (SRH-50)," *Cryptologia* 19, no. 3, (July 1995): 236-246.
115. Churchill to Chief of Staff, "Permanent Organization for Code and Cipher Investigation and Attack," May 16, 1919, NARA CP, RG 165, Entry 65, Box 3862.
116. Churchill, "Permanent Organization."
117. Churchill, "Permanent Organization."
118. Churchill, "The Military Intelligence Division, General Staff," 307-308.
119. Churchill, "Permanent Organization."
120. *History of the MID*, NARA CP, RG 319, Entry UD1071, Box 21A, 1407-1408.
121. Date found in Kinsley to Chief Military Censor, "Military Censorship along the Mexican border." Some sources, particularly "Officer for

Radio Duty" to the Chief Signal Officer, March 21, 1918, NARA CP, RG 165, Entry 65, Box 69, claim the date was March 11, 1918.

122. Van Deman to Commanding General Southern Department, "Radio Intelligence Service," May 9, 1918, NARA CP, RG 457, Entry P11, Box 85.
123. Churchill to Lieutenant Fred Parish, June 22, 1918, NARA CP, RG 165, Entry 65, Box 128.
124. Kinsley to Chief Military Censor, "Military Censorship along the Mexican border."
125. Kinsley to Chief Military Censor, "Military Censorship along the Mexican border."
126. Kinsley to Chief Military Censor, "Military Censorship along the Mexican border."
127. *History of the MID*, Box 21A, 1408.
128. *History of the MID*, Box 21A, 1409.
129. "List of Practical Radio Operators Submitted by War Service Exchange" [May 8, 1918?], NARA CP, RG 165, Entry 65, Box 77. This list includes three "women operators with splendid experience." Leonard L. Lerwill, *The Personnel Replacement System in the United States Army* (Washington, DC: The Department of the Army, 1954), 193.
130. Adjutant General, War Service Exchange, to the Eastern Radio Institute in Boston, MA, March 26, 1918, NARA CP, RG 165, Entry 65, Box 77. The concept of skipping basic training and other standard military procedures has been repeatedly floated, 100 years later, as a way to attract people with modern technological skills to the armed forces.
131. "Radio Operators," April 5, 1918, NARA CP, RG 165, Entry 65, Box 77.
132. "Radio Operators," April 5, 1918.
133. *History of the MID*, Box 21A, 1408.
134. *History of the MID*, Box 21A, 1413.
135. MI-1 Weekly Report for June 9-15, 1918, "Administrative and Executive section," NARA CP, RG 165, Entry 65, Box 3522.
136. *History of the MID*, Box 21A, 1410.
137. Kinsley to Chief Military Censor, "Military Censorship along the Mexican border."
138. Intelligence Officer at Nogales to the Southern Department Intelligence officer, message providing a translation of intercept, February 26, 1918, NARA CP, RG 165, Entry 65, Box 2394.
139. Intelligence Officer at Nogales to the Southern Department Intelligence officer, "Mexican Wireless Stations," June 12, 1918, NARA CP, RG 165, Entry 65, Box 2394.
140. The old buildings were demolished in the 1970s; the University of the District of Columbia is on the northeastern part of the property. The rest of the space was turned over to the State Department for use as an international enclave, and many embassies are located here today. "The Lost Hilltop Home of the National Bureau of Standards," July 1, 2013, accessed September 7, 2018, http://www.streetsofwashington.com/2013/07/the-lost-hilltop-home-of-national.html.
141. Annual Report of the Director of Bureau of Standards to the Secretary of Commerce for the Fiscal Year ending June 1918 (Washington, DC: Government Printing Office, 1918), 46.
142. *History of the MID*, Box 21A, 1412-1413.
143. *History of the MID*, Box 21A, 1413-1414.
144. *History of the MID*, Box 21A, 1414.
145. Van Deman, "Radio Intelligence Service," May 9, 1918.
146. "US Inflation Calculator," accessed May 12, 2021, https://www.usinflationcalculator.com/.
147. Table constructed by author from material found in NARA CP, RG 165, Entry 65, Boxes 70-113.
148. Churchill to Captain J. C. Fisher, August 28, 1918, NARA CP, RG 165, Entry 65, Box 83.
149. MI-1 weekly report for June 9-15, 1918.
150. Weekly reports of the MID, NARA CP, RG 165, Entry 159, Box 3. The men of the MID's Radio Intelligence Section often referred to their Section as a "Service," but Section has been used for consistency in the text.
151. Memorandum "Listening-in stations" [February 1918?], NARA CP, RG 165, Entry 65, Box 78.
152. James E. Ives at Fort Huachuca to MID re Interference of the Radio Intelligence Section with the SC station at Huachuca, June 15, 1918, NARA CP, RG 165, Entry 65, Box 90.
153. Military education would have included the

drills and other practices of the regular army, an organization new to the civilians who enlisted for RTU service. None of these men went through basic training.

154. Churchill to Quartermaster General, June 3, 1918, NARA CP, RG 165, Entry 65, Box 69.
155. Churchill to Quartermaster General, June 3, 1918.
156. Churchill to Fisher, August 28, 1918.
157. "History of Radio Tractor Unit No. 39," NARA CP, RG 165, Entry 65, Box 90.
158. "History of Radio Tractor Unit No. 39."
159. "History of Radio Tractor Unit No. 39."
160. "History of Radio Tractor Unit No. 39."
161. Charles A. Werker, interview by Coates, Goodman, October 20, 1976, NSA-OH-1976-14, Center for Cryptologic History, Ft. Meade, MD.
162. Joseph Richey, interview by Coates, Goodman, October 20, 1976, NSA-OH-1976-13, Center for Cryptologic History, Ft. Meade, MD.
163. Richard S. Egolf, interview by Coates, Goodman, October 20, 1976, NSA-OH-1976-16, Center for Cryptologic History, Ft. Meade, MD.
164. Richard S. Egolf, interview.
165. Churchill to Southern Department Quartermaster, September 16, 1919, NARA CP, RG 165, Entry 65, Box 88.
166. First Lieutenant F. E. Johnston, "Inspection of Radio Intelligence Stations Southern Department," February 6, 1920, NARA CP, RG 165, Entry 65, Box 78.
167. Correspondence from August 24, 1918, through October 17, 1918, on the subject of commutation of quarters, NARA CP, RG 165, Entry 65, Box 70.
168. Johnston, "Inspection of Radio Intelligence Stations Southern Department."
169. Donald Pieri to MID, August 6, 1919, NARA CP, RG 165, Entry 65, file series 65-43a-14. Center for Cryptologic History, file series II.G.2, copy held by author.
170. Pieri to MID, August 6, 1919.
171. Personnel questionnaire, July 18, 1918, NARA CP, RG 165, Entry 65, Box 70.
172. Robert Bowen after-action report, n.d., NARA CP, RG 165, Entry 65, Box 70.
173. Bowen after-action report.
174. Bowen after-action report.
175. Bowen after-action report.
176. The "NESCO set" was radio equipment built by the National Electric Signaling Company (NESCO). NESCO was founded in 1902 by Reginald A. Fessenden, Hay Walker Jr., and Thomas H. Given. Fessenden is credited with making the first voice broadcast by radio on Christmas Eve 1906 and conducting the first two-way transatlantic radio transmission in January 1907. Despite these achievements, NESCO was a mostly unsuccessful company that went bankrupt in 1912. The company exited bankruptcy during World War I under the name "International Radio Telegraph" and was purchased by Westinghouse in 1920. It is not clear if the set in question was old equipment from 1912 or new equipment that the experienced radio operator recognized as produced by NESCO.
177. Bowen after-action report.
178. Bowen after-action report.
179. Bowen after-action report.
180. Bowen after-action report.
181. Bowen after-action report.
182. Bowen after-action report.
183. New Mexico implemented a prohibition on alcohol on October 1, 1918. David J. McCullough, "Bone Dry? A Review of Prohibition, New Mexico Style 1918-1933," *New Mexico Historical Review* 63, no. 1 (1988). Accessed May 13, 2021, https://digitalrepository.unm.edu/nmhr/vol63/iss1/3. Albert Sobey to Carl Kinsley, "Report RTU No 48" [August 29, 1918?] (stamped as received December 30, 1918), NARA CP, RG 165, Entry 65, Box 112.
184. "Report RTU No. 48."
185. "Report RTU No. 48."
186. "Report RTU No. 48."
187. "Report on History and Operation of Radio Tractor Unit #47, Tucson, Arizona," August 11, 1919, NARA CP, RG 165, Entry 65, file series 65-47a, Center for Cryptologic History, file series II.G.1, copy held by author.
188. "Report on History and Operation of Radio Tractor Unit #47."

189. "Report on History and Operation of Radio Tractor Unit #47."
190. "Report on History and Operation of Radio Tractor Unit #47."
191. "Report on History and Operation of Radio Tractor Unit #47."
192. Johnston, "Inspection of Radio Intelligence Stations Southern Department."
193. Ives to MID, "Listening In Station at Nogales," January 6, 1919. NARA CP, RG 165, Entry 65, Box 111.
194. Van Deman to Military Attaché Mexico City, September 11, 1917, NARA CP, RG 165, Entry 65, Box 70; War College Division Chief of Staff to Army Chief of Staff, September 13, 1917, NARA CP, RG 165, Entry 65, Box 70; *History of the MID*, Box 21A, 1409.
195. Churchill to Chief Signal Officer Indorsement [*sic*] of August 26, 1918; Chief of Staff to Adjutant General of Army, September 14, 1917; Charlie R. Sullivan to Chief Signal Officer Washington, July 16, 1918; Chief of Staff's office to MID, August 31, 1918. All in NARA CP, RG 165, Entry 65, Box 70.
196. R. D. Carrier to the Military Attaché, June 10, 1918, NARA CP, RG 165, Entry 65, Box 116.
197. Carrier to the Military Attaché.
198. Carrier to the Military Attaché.
199. Kinsley to Manly, October 2, 1918, NARA CP, RG 165, Entry 65, Box 116.
200. Kinsley to Carrier, November 15, 1918, NARA CP, RG 165, Entry 65, Box 69.
201. Carrier to Krepinsley, January 8, 1919, NARA CP, RG 165, Entry 65, Box 116.
202. Military Attaché Mexico City to Director MID, January 8, 1919, NARA CP, RG 165, Entry 65, Box 70.
203. This section is adapted from Betsy Rohaly Smoot, "Farmhouse Field Station Houlton, Maine: The U.S. Army's First Fixed Field Site," *Cryptologic Quarterly* 33, no. 1 (2014): 40-55. Kinsley to A. G. Campbell, memo, "German Transmission from Nauen of radio messages sent out in broadcast," October 28, 1918, NARA CP, RG 165, Entry 65, Box 78.
204. Comments about the survey exist in MID files, but I have not located the survey in those records. Kinsley to Campbell, "German transmission from Nauen of radio messages sent out in broadcast."
205. In NARA CP, RG 165, Entry 65 paperwork for the MI-10E RTUs are filed under the series 65-##, with the second two-digit number representing the RTU number; Houlton is filed under 65-49.
206. Administrative paperwork and records of supplies, NARA CP, RG 165, Entry 65, Box 78. Although Kinsley's memo of October 28, 1918, specifies that it was RTU 33 at Laredo that would move to Houlton, this was probably a typo, for RTU 31 stationed at Laredo under Arthur R. Boeder's command made the move—RTU 33 was not at Laredo.
207. Boeder had worked for both the Marconi and United Wireless telegraph companies and had spent time at sea as a radio operator. He copied both American and continental Morse, had studied electricity at the Pratt Institute, and served as a radio instructor at the US Aviation School at Cornell University before joining up. And, critically, Boeder had been an enthusiastic amateur radio operator from a young age. He was even mentioned in a newsletter for radio amateurs and called "a dandy little operator, and long before he was out of short pants, he left lots of others in the dust." Irving Vermilya, "Amateur Number One," *QST* (February 1917): 8-12 and (March 1917): 10-15, accessed September 2, 2013, https://earlyradiohistory.us/1917verm.htm. Interestingly, Boeder's sister seems to have been a radio operator as well. According to Vermilya, "he has one of the finest sisters a brother ever wanted to have, and she can send too. At least she used to, for after I knew her, my electric light meter registered at least ten dollars a month more for juice consumed in talking to her."
208. Arthur R. Boeder to Director MID, "History and Recommendations for Houlton Radio Station," August 6, 1919, NARA CP, RG 165, Entry 65, Box 114. James Bamford in *The Puzzle Palace* (Boston: Houghton Mifflin, 1982), 155, implies the station was operational "a fortnight before the

close of World War I," when "Lieutenant Arthur E. [*sic*] Boeder flipped a switch and brought to life America's first transatlantic eavesdropping station." This conflates the visit of Sutherlin in late October and the arrival of Boeder just three days before the Armistice and contradicts official records.

209. Sobey for Churchill to Boeder, "Operation of the Houlton Station," November 23, 1918, NARA CP, RG 165, Entry 65, Box 115.
210. German undersea cables and several German long-distance radio stations overseas had been destroyed by the Allies in the early days of World War I. In early 1917, Germany worked with authorities in neutral Mexico to reconstruct German long-distance telecommunications; the transmitting station at Chapultepec, a suburb of Mexico City, was part of this plan. See Jonathan Reed Winkler, *Nexus: Strategic Communications and American Security in World War I* (Cambridge, MA: Harvard University Press, 2008), 166-168, for further details.
211. Sobey to Boeder, "Operation of the Houlton Station."
212. Kinsley, "The Houlton, Maine, Radio Station," memorandum [December 1918?], NARA CP, RG 165, Entry 65, Box 78.
213. Dunn to Boeder, December 23, 1918, NARA CP, RG 165, Entry 65, Box 115. Marlborough Churchill in April 1919 said the shutdown was because Houlton "on one occasion duplicated certain work being done by the Navy Department." However, it seems more likely that Churchill was describing the November shutdown. Churchill to Chief of Staff, "Special Radio Station," April 16, 1919, NARA CP, RG 165, Entry 65, Box 115.
214. Churchill to Chief of Staff, "Special Radio Station."
215. Kinsley to Boeder, "Interception of Cipher Messages," April 30, 1919, NARA CP, RG 165, Entry 65, Box 115.
216. Kinsley to Colonel Masteller, "German Propaganda by Radio," May 17, 1919, NARA CP, RG 165, Entry 65, Box 78.
217. Kinsley to Houlton, telegram, May 26, 1919, NARA CP, RG 165, Entry 65, Box 115.
218. *History of the MID*, Box 21A, 1416-1417.
219. *History of the MID*, Box 21A, 1417-1418.
220. Sobey to Kinsley, "Disposition of messages intercepted by the Radio Tractor Units," March 6, 1919, NARA CP, RG 457, Entry P11, Box 85.
221. Director of MI to First Lieutenant Arthur R. Boeder, "Permanent Organization," July 31, 1919, NARA CP, RG 165, Entry 65, Box 113.
222. "Assignment of Officers in Permanent Stations," July 31, 1919, NARA CP, RG 165, Entry 65, Box 69.
223. Numerous letters, February 1920, NARA CP, RG 165, Entry 65, Box 70.
224. George O. Squier, Memorandum for the Adjutant General of the Army, "Administration of Signal Corps Personnel," July 9, 1920, NARA CP, RG 165, Entry 65, Box 69. This memo cites the order of the President, August 15, 1919, under his authority of the National Defense Act of June 3, 1916.
225. Squier, Memorandum for the Adjutant General of the Army, "Administration of Signal Corps Personnel."
226. A. B. Coxe, Acting Director MID to Chief Signal Officer, July 17, 1920, NARA CP, RG 165, Entry 65, Box 69.
227. Johnston, "Inspection of Radio Intelligence Stations Southern Department."
228. The Yuma RTU had likely found a permanent home by this time, but details are not known.
229. Calvin H. Burkhead to Assistant Chief of Staff (ACOS) for Military Intelligence in Ninth Corps area, December 29, 1920. Subsequent indorsement [*sic*] during this period passes the matter to the MID; James L. Collins, Executive Officer MID to ACOS Ninth Corps, letter, January 19, 1921. Both in NARA CP, RG 165, Entry 65, Box 70.

Chapter 6

The Navy

At the time of the war, the US Navy was the organization with the most knowledge of radio technology, and it maintained a controlling interest in radio communications for the entire United States. The navy had been quick to adopt radio, an ideal mode of communication for ships at sea to stay in touch with the shore, and had a technical expertise in the subject rivaling that of private radio companies. A long-distance, transatlantic radio service, with multiple stations on the East Coast, would be put into service to supplement the telegraphic transatlantic submarine cables and assist communications between the American Expeditionary Forces (AEF) and Washington. The navy also provided support to the Paris Peace Conference after the war.

While the US Navy was advanced in radio, its cryptologic work focused on the making of codes and ciphers, rather than cryptanalysis or codebreaking. By mid-November 1917, the director of the Office of Naval Intelligence, Edward McCauley, had agreed to cooperate with MI-8's effort to serve as a central cipher bureau for the US government.[1] MI-8 was the Military Intelligence Division's (MID) Code and Cipher Section. Chief Yeoman Harrison E. Burt later reflected that a central bureau staffed by personnel from each government department would be "the ideal arrangement," for each cryptologist could specialize in "their particular problems" while under one general direction and benefitting from the experience of the other analysts.[2]

In December 1917 and January 1918, the Office of Naval Intelligence began to receive simple encrypted messages in Spanish from the postal censors. According to Burt, the only training material available to navy cryptologists was a "short cipher in Hans Gross' *Criminal Investigation*." Burt, who had no previous experience in cipher work, was assigned to work on messages collected from the German radio station at Nauen and spent several months trying to solve what were encoded German messages as if they were enciphered and found it "an unremunerative work." In early 1918, the office received a copy of Parker Hitt's *Manual for the Solution of Military Ciphers*, which assisted with reading cipher messages, but the navy had no luck with the German code messages. Burt later felt the efforts of the navy had been "misguided" and that "no great advance" was made until the navy began to work with MI-8. By July 1918, Burt was the navy's representative in MI-8.

Only one significant radio intercept effort was established, at Otter Cliffs near Bar Harbor, Maine. Although this site was primarily used for navy and government transatlantic radio communications, staff there prided themselves on the ability to con-

duct high-quality intercept of the German high-power radio transmitter at Nauen. The rest of the navy's widespread radio network occasionally intercepted enemy communications although I could find no record that it was formally tasked to intercept enemy communications.

Navy Radio

On April 7, 1917, the US Navy closed or assumed control of all amateur and commercial radio stations in the United States.[3] A special conference of US Navy and US Army officers met on October 4, 1917, in New London, Connecticut, to discuss how best to organize transatlantic communication supporting the AEF. At a meeting in Paris on August 22, General John J. Pershing had made an "urgent" recommendation that immediate actions be taken to guarantee radio communications between the United States and France should transatlantic submarine cables be cut.[4] A decision was made to have separate stations servicing communications between France and the United States, Italy and the United States, and the United Kingdom and the United States. The navy station at Sayville, New York, which in 1915 had been taken over from a German company, was set aside for sending to the French station at Lyon, with Tuckerton, New Jersey, given the task of receiving communications from Lyon.[5] This was the beginning of what the navy dubbed its "transatlantic service."

Radio training for new navy men began on April 12, 1917, with the establishment of a radio school at Harvard University. Training in radio and direction finding also took place at the College of the City of New York (now CCNY) under a program that had been developed by the US Army Signal Corps.

Captain David W. Todd, director of Naval Communications, traveled to Paris for a January 1918 meeting of the chiefs of radio services; he also attended the meetings of the Interallied Radio Commission. Additionally, Todd worked with the French to discuss division of costs for the new radio transmitter under construction at Bordeaux.[6] Traveling back to France with Todd was French Army Lieutenant Maurice Paternot. Paternot had previously come to the United States in the summer of 1917 with the French Scientific Mission and had helped with communications tests made in July 1917 between the Sayville and Lyon stations. He was attached to the office of the director of Naval Communications and made several visits to the navy's new facility at Otter Cliffs.[7]

The navy's radio communication capacity and coding expertise were used to support long-distance cable and radio communications for the AEF as well as to support Paris Peace Conference communications for the State Department. Coding officers and file clerks were sent to Paris from various naval bases and from the US Navy offices in London.[8] Otter Cliffs handled some of the communications traffic. The navy found that the radio service provided a delivery speed that cable transmissions could not match. In November 1918, for instance, it was reckoned that a radio message could be sent from France to Washington in 51 minutes, whereas the cable system was "a day to a day and a half behind in handling official government traffic and four days behind in commercial business."[9]

Navy Direction Finding

The US Navy's work in direction-finding, or radio compass, technology during World War I was done primarily to locate and track German submarines; it would also contribute to future radio intelligence work. One system, the Bellini-Tosi, was rejected as unsuitable for naval vessels, and the navy began using equipment developed by D. F. A. Kolster of the Bureau of Standards. First called the Kolstermeter, the name was changed to radio compass.[10]

Navy radio operators were trained in the use of radio direction finding as early as July 1917 at the College of the City of New York.[11] The first priority was to equip all warships with direction-finding equipment. Subsequently, a decision was made to establish stations on the East Coast by mid-1918, although only five stations were completed by the

Armistice. The stations had some success at locating unauthorized shore radio stations and enemy ships and aircraft.[12] There was no need to pair these direction-finding stations with naval long-distance radio intercept facilities because the nature of the high-power radio stations and their fixed call signs obviated the need to locate them with the technology. Everyone knew where these radio stations were located.

Communications Security Procedures

All secret and confidential messages were to be sent using code or cipher.[13] In addition to issuing codes and ciphers, the navy provided wartime radio instructions to its own vessels and provided radio instructions and codes to US merchant vessels. Vessels from neutral nations were required to use plain English to conduct business; when they arrived in port, their radios were sealed and their antennae grounded so that they could not operate. US commercial vessels were not allowed to use English, and such messages were to be ignored by navy radio operators (although the navy suggested that any English language message heard should "be copied and used to any advantage").[14]

All ships were required to maintain radio silence in "dangerous localities" at sea except if they were attacked or in distress. Radio traffic was to be kept to a minimum in safe areas. In conjunction with these procedures, a system of broadcasting information, warnings, orders, weather, and press went into effect at the end of May 1917.[15] The instructions specifically noted that radio should be used only when it was not practical to use other means, and that orders sent by radio could be intercepted by the enemy and the radio signals used to locate vessels through direction finding.[16] On the value of radio silence it was said:

> There is no more certain way of gaining a general knowledge of an enemy's whereabouts than by listening to his radio work. Even though it be in cipher or code, an expert officer operator will be able to come to the conclusions of value in this manner by judging the strength and change in strength of incoming signals, etc. especially since the direction finder now enables the bearing of the station to be determined at once. For this reason it is extremely valuable to our fleet, if attempting to avoid discovery, that the radio be kept absolutely silent; all enemy ships must be assumed to be equipped with direction finders.[17]

Ships were cautioned to be aware of enemy attempts to interfere with radio signals and to use radio deception.[18]

As part of communications security efforts, an unknown number of listening-in stations were set up, as part of an unspecified group of navy radio stations, to listen for, and report on, illegal traffic and rules violations. These reports were made daily.[19]

US Navy security consciousness might be attributed to their working relationship with the British Admiralty, who, in early 1917, notified the navy about the inadequacy of its systems. Because the navy was part of the Royal Navy's Grand Fleet, they received joint Allied security publications, including operating signals and codes that were based on British systems; the navy benefited from this material. The Admiralty had to share cryptographic information with the Americans because they were involved in joint operations.[20] This is an interesting contrast with the lack of transparency of the British War Office and the British Expeditionary Forces in France. Both were quite reluctant to share the methods by which they protected their own communications with the AEF, although older material was provided for study and training.

Code and Signal Section

On January 2, 1917, Lieutenant Russell Willson (see sidebar), a 1906 graduate of the US Naval Academy, was ordered to the Navy Department to establish and head the Confidential Publications Section of the Division of Operations (OP-58). It prepared, distributed, and accounted for the vari-

Russell Willson

Willson family photograph courtesy Naval Cryptologic Veterans Association

Russell Willson was born in Fredonia, New York, on December 27, 1883, and grew up in Washington, DC. Unable to get a nomination to the US Military Academy at West Point, he attended the Massachusetts Institute of Technology, where he spent a year studying engineering. He spent the summer working on a cousin's ranch in Wyoming and, while there, received an appointment from an elected official in Wyoming to the US Naval Academy where he became a member of the class of 1906. After graduation, he spent time on the battleship USS *New York* and was flag lieutenant to the commander-in-chief, US Atlantic Fleet.

On January 8, 1917, he was detached from the commander-in-chief, US Atlantic Fleet, and reported to the Chief of Naval Operations, where he was "charged with correcting serious vulnerabilities in antiquated signals, codes, and ciphers and with organizing, updating, and implementing critical functions for the recently-created Naval Communication Service." When he reported for duty at the navy Code and Signal Section, he brought with him the first model of a cipher machine he had designed, the Navy Cipher Box. Willson received the Navy Cross for his code work during the war and, in 1935, received compensation of $15,000 for his invention. He served in numerous positions after leaving the navy Code and Cipher Section, including as superintendent of the US Naval Academy and chief of staff to the commander-in-chief, US Fleet. He retired in 1945.

He married Eunice May Westcott (1884-1952). His daughter, Eunice Willson Rice (1912-2011), worked in the navy Code and Cipher Section in the years preceding and during World War II. Russell Willson died on July 6, 1948, and is buried in the US Naval Academy Cemetery with his family.

Sources

Ancestry.com. Vital records. Accessed July 28, 2018.

Schmidt, Raymond P. "From Code-Making to Policy-Making: Four Decades in the Memorable Career of Russell Willson." *Prologue* 48, no. 2 (Summer 2016).

Schmidt, Raymond P. "Russell Willson: Creative Cryptologist." In *Echoes of Our Past*. Special Publication, National Cryptologic Veterans Association, edited by Jay R. Browne, 3-10. Pace, FL: Patmos, 2008.

ous codes and ciphers used by the navy; the section also centralized the Navy Department's storage and distribution of all confidential publications prepared by any department.[21] Prior to this date, preparation of naval codes and ciphers was a function of the Bureau of Navigation, where it had developed from the bureau's signal office.[22] The code work kept Willson and his one-person staff so busy that they

never handled other navy classified publications.[23] Willson was promoted to lieutenant commander in May 1917.

On April 1, 1917, just days before the declaration of war against Germany, the staff consisted of Willson and a yeoman.[24] At that time, the navy was using only three codes prepared by the service, only one of which was used in conjunction with ciphers.[25] These were the Service Radio Code of 1914, the Navy Secret Code of 1908, and the Battle Signal Book of the United States Navy, 1913. Larrabee's cipher code was also employed by the service. After the war, Willson noted "the outbreak of hostilities found us utterly unprepared in regard to codes and ciphers."[26]

At some time before October 10, 1917, the section was renamed the Code and Signal Section, designated OP-58-B, to reflect its work more accurately. On that date, Code and Signal Memorandum Number 1 acknowledged that the subject of codes, ciphers, and signals was handled across three offices: the Office of Naval Intelligence (ONI), the Office of Naval Communications, and the recently established Code and Signal Section of the Division of Operations. While the three offices cooperated with each other, they were in three different buildings and kept separate records.[27]

Code work in ONI was limited to those needed for special activities and agents. The Office of Naval Communications handled radio regulations, radio call signs, and similar work. And the Code and Signal Section handled signal books, several codes, a few ciphers, visual and radio call books, and other recognition signals.[28]

By December 1, 1917, Willson became an assistant to the director of Naval Communications for Code and Signals. The Code and Signal Section was made a part of the Naval Communications Service, but not of the director's office, since it was not performing a staff function and was located at that time in a different building from the Naval Communications Service.[29] During the war, the section would greatly expand. It supplied all naval vessels and merchant ships in the Atlantic with codes and ciphers as well as coordinated communications procedures and codes with Allied nations, thus enabling "all United States vessels to communicate with secrecy in any part of the world."[30]

Lieutenant Commander Milo F. Draemel assumed command of the section on October 21, 1918. Willson was transferred to London to work for Admiral William S. Sims; there he had some discussions with the US Sixth Battle Squadron, followed by a brief visit to Paris in conjunction with duties related to the preparations for the upcoming Paris Peace Conference.[31]

At the time of the Armistice, the section had 61 people: 13 officers, 14 male enlisted personnel, and 34 female enlisted personnel ("yeomanettes"). During the war 18 other officers and another 58 enlisted personnel spent time in the section. Unfortunately, I could not locate complete personnel records for the section. By December 1919, the staff consisted of just five officers and 17 civilian assistants. See appendix A for known section personnel.[32]

Codes

The navy used codes and ciphers extensively during the war (a list of navy codes and ciphers can be found in appendix B). Lieutenant, later Vice Admiral, William Ward "Poco" Smith[33] had served in naval communication since 1915 and took up cryptologic work almost accidentally while decoding incoming radio messages. Following the widely publicized loss of the navy's five-letter SIGCODE, one of Smith's duties was to answer a flood of messages that swamped the office offering new codes and ciphers. While investigating the wild ideas that came in the mail, Smith searched for material that would help him understand and evaluate the proposed systems. When a complex system came to his attention, he devoted his full attention to it, passing the simpler systems to his wife, codebreaker Elizabeth Purdy, for evaluation.[34]

In 1916, during an ongoing crisis in Haiti,[35] the State Department, which believed its codes had been compromised, asked to use a navy code, with

superencipherment, to send a very secret message. Smith objected, noting that the State Department used stereotypical diplomatic language. Assuming that the navy codebook was readily available to any interested party, he believed this would make it quite easy to crack the cipher that protected the code. Overruled by senior personnel, the code was given to the diplomats and soon the full text of the secret messages appeared in the press. The system had been compromised, and Smith was tasked with preparing a new code. He was in the process of doing this when the Code and Signal Section was formed. Although Smith was not his subordinate, Willson closely monitored progress on the book, which became Naval Code A-1.[36]

Preparation of Naval Code A-1 was a "colossal" task and "tedious work." Smith discarded the existing system that had plaintext phrases arranged alphabetically next to their code groups, which were also in alphabetical order. Lacking the technology to mix and match the codewords, he typed the five-letter code groups into columns, cut them apart, and put each code group into a bucket. Then he drew one code group at a time and typed them into a column opposite the phrase or word to be encoded. One night, Smith tried to speed up the process by dictating the code groups to a stenographer but found that letters B, P, and V were too easily confused in this method. So, he continued to do the work by himself. When war was declared on April 6, 1917, Smith knew he had to finish quickly, and his place on the watch was taken by a reserve officer so he could work on the book full time.[37]

Naval Code A-1 was not sufficient for wartime and received much criticism for not including enough material related to general administration. New words and phrases were added over time to enlarge the code.[38]

Willson's first act upon the section's renaming in October 1917 was to issue Code and Signal Memorandum (CSM) Number 1, Code and Signal Publication (CSP) 103.[39] It gave the service a consistent baseline to understand the cryptographic state of the navy and imposed some order on the confusing situation. It read in part:

> Under present conditions there has been a large increase in the number of signal books, codes, ciphers, radio regulations, radio and visual calls, etc. issued to the service, and, due to lack of published instructions on the subject, some uncertainty and confusion as to the issue and use of publications of this kind has resulted. This memorandum is issued with a view to furnishing in compact form information on this subject, to increasing the efficiency of confidential communications, and to simplifying the question of handling this matter on board ship, at naval stations, and in the department. Additional memoranda will be issued from time to time in order to bring up to date the information contained herein.[40]

CSP 103 declared that the Navy Secret Codes of 1887 and 1908 were considered compromised and would not be used or issued except in special cases. The Code and Cipher Section would also no longer issue (or account for) Larrabee's cipher, the Naval Militia Tactical Signal Book, Radio Signals (1913), the Western Union Code, or "Useful Curves, Scouting, and Torpedo Danger Areas." Publications that the section had distributed (or were preparing to distribute) by mid-October were the following:

- General Signal Book, 1913
- Battle Signal Book, 1913
- Service Radio Code, 1914
- Navy Cipher Box and Associated Ciphers
- Secret Fleet Ciphers
- S.C. Ciphers (SigCode Ciphers) (being prepared to supersede "Secret Fleet Ciphers")
- D.P. Ciphers (District Patrol Ciphers)
- M.S. Ciphers (Merchant Ship Ciphers)
- U.S. Recognition Signals (in preparation)
- War instructions for United States Merchant Vessels

Visual Call Memoranda
Radio Calls (except commercial calls)
Signal Letters of U.S. and Foreign Government Vessels (four-letter visual calls)
Code and Signal Memoranda
Record Book for Signal Books, Codes, Ciphers, etc.[41]

The section also distributed publications provided by Allied governments to district communication superintendents at the Boston, New York, and Philadelphia Navy Yards and to the aide to the commandant at the Norfolk Navy Yard.[42]

CSM Number 3, issued on December 3, 1917, as CSP 130, shows the early result of naval cooperation with the British Admiralty. Focused entirely on the matter of the compromise of codes and cipher, it provides naval radio officers with a compact guide for what not to do. It specifically addresses the enemy's ability to reconstruct codes and cipher from intercepted messages as a principal cause of compromise. The list of four primary methods used by the enemy to reconstruct codes also clearly reflects the analytic capabilities used by the British in Room 40 to attack enemy codes. These methods were:

1. Direction finding
2. Historical record of previous messages and obsolete codes
3. Current intercept particularly with errors such as long messages, repeating the same message in code and plain language, [and] using two or more codes for the same message
4. Comparison of ciphered or coded messages with literal translations

The pamphlet closed with a warning about the enemy's "large, scientifically organized, and efficient office, whose only duty is the breaking of codes and ciphers, and that code and cipher systems which may appear absolutely secure to a person not expert in such work may in the hands of the enemy's cryptographers be comparatively simple."[43]

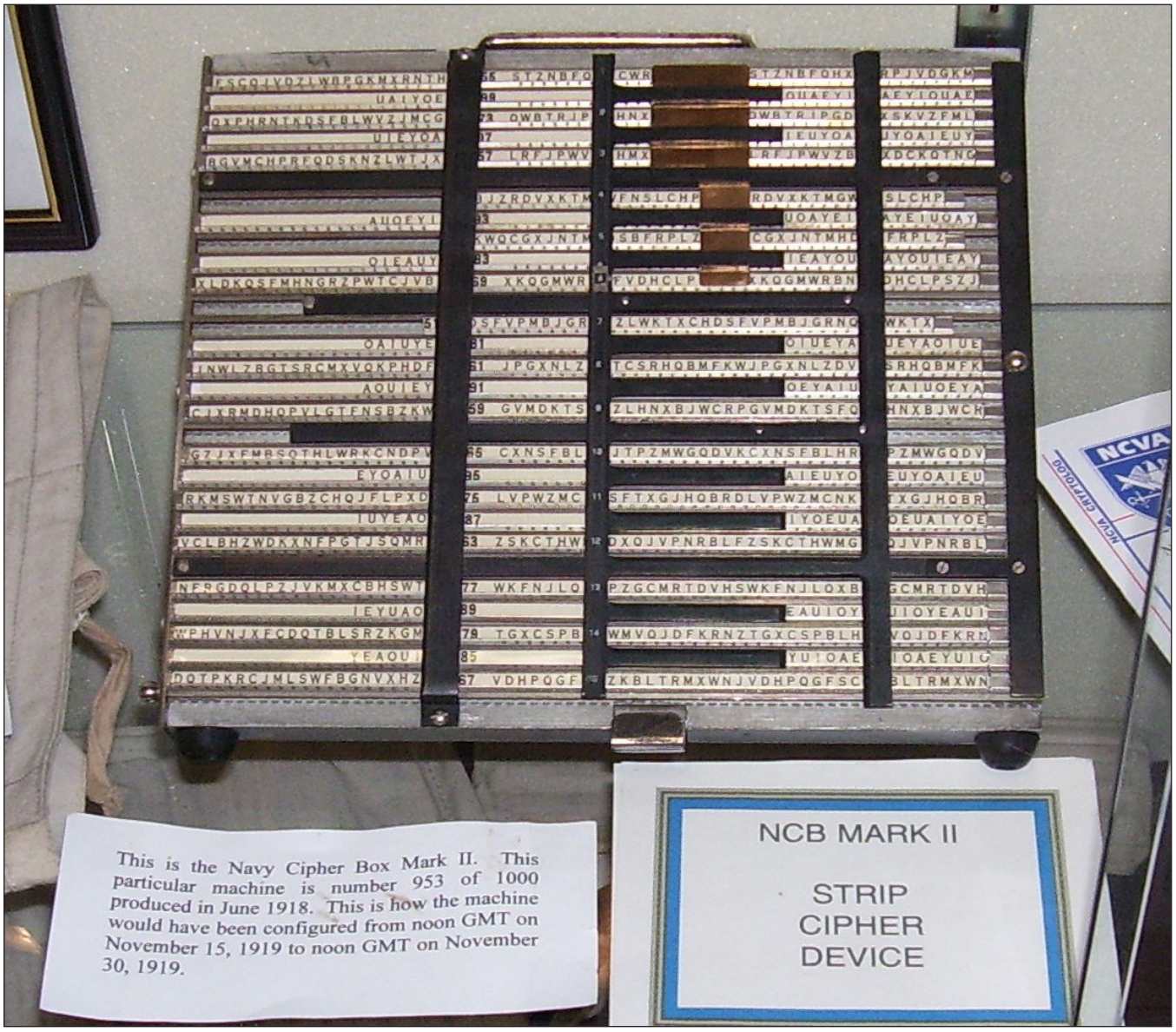
The Navy Cipher Box

Willson's grand achievement was a device called the Navy Cipher Box (NCB), the first model of which (Mark I) was issued on June 12, 1917. A polyalphabetic system used for superencipherment, the NCB was a dramatic improvement compared to old naval enciphered codes. Essentially a strip cipher, the NCB shared the principles of the Jefferson cylinder cipher (the design of which was not found in the Library of Congress until 1922 and, thus, was unknown to Willson), the work of Étienne Bazeries, and the 1912-1916 work of Parker Hitt (which led to development of the US Army's cylinder cipher M-94). The NCB was used to encipher messages coded with the new secret code, Navy Code A-1, the highest level of navy code. NCB Mark I could only work with Code A-1; Mark II, issued in August 1918, worked with other newer navy codes. Care was taken not to use the NCB for older codes that may have been compromised. The Mark II was manufactured by the American Multigraph Company; it built 1,000 devices at a cost of just over $41,000 (approximately $719,000 in 2021 dollars)[44] (see photo).

The machine had an aluminum base with steel rails and a series of slides that carried celluloid-covered paper strips on which were mixed alphabets. It fit in a case with two pockets, one of which was suited for a set of additional slides. The slides were inserted in a prescribed order given in the cipher setting for that crypto period. A movable window showed the initial position for the index; the index had to be moved after every five groups unless otherwise instructed. To encipher a codeword, letters were selected from top to bottom, following a bar on the left side of the device; the encipherment was selected from a different column at the right margin. New alphabets were issued as required; eight classes of ciphers were distributed for users based upon mission and the codebook they used.[45]

Evaluation of NCB

Historical records indicate that the NCB received evaluation and assessment from many parties in late 1917 and early 1918. It is not clear if these records are referring to the Mark I or a prototype of



Russell Willson's Navy Cipher Box on display at the Cryptologic Command Display, Pensacola, Florida. Courtesy Naval Cryptologic Veterans Association

the Mark II. Willson and Lieutenant Smith traveled to Riverbank Laboratories in December 1917 in conjunction with an assessment of the NCB Mark II (see chapter 4).[46]

Riverbank received test messages generated by the NCB Mark I on January 17, 1918, and provided a solution and a page-and-a-half of feedback to the Office of Naval Operations two days later. The message was solved by one person in not more than seven hours. One problem identified was that the message was enciphered with only one setting. William Friedman was employed at Riverbank at this

time and was likely the person who performed the analysis. Riverbank's feedback suggested the use of all 26-possible settings would increase security. No impediment was seen to using any alphabet more than once in a message. Underlying codewords needed to differ by at least two letters, and adding more alphabets to the system could provide some safeguards.[47]

MI-8 also evaluated the device in February 1918. In *The American Black Chamber*, Herbert Yardley described the NCB and noted that British cryptographers had pronounced the system "indecipherable." But Yardley disagreed. Although the system was "most elaborate," the messages given to Yardley were "readily solved" after he and several clerks compiled statistics that required 1,300 pages and 650,000 entries. Yardley claimed this was proof that the navy was "still controlled by amateur cryptographers" and insisted that their subsequent changes to the device showed that they knew very little about cryptography.[48]

Fleet Paymaster John E. A. Brown of the Royal Navy's Signal Division made a long assessment of the NCB, submitting a memorandum on February 21, 1918. While Brown noted that no systems of this type could be entirely secure, he determined the NCB would likely prevent real-time exploitation of messages. And he saw several advantages in Willson's system, including that it was simple to use and there was little risk of error. Brown made about a dozen suggestions for improvement.[49] Brown's report was forwarded to the secretary of the navy by Admiral Sims, who said it reflected the Admiralty's discussion on the subject.[50]

An undated memo for the director of Naval Communications from OP-58-B (the Code and Signal Section) extracts a letter from Lieutenant C. A. Russell, expressing the Admiralty's discontent with other US Navy cryptographic systems. Russell reported that

> the Admiralty do not think much of our Code B-1 and say it could be very easily broken and is not constructed in a way to make compromise difficult by one familiar with the breaking of codes. They refer to the four-letter groups in regular sequence and have got the people in this office thinking their way. They seem to dislike entirely the regular differential and form used in our codes. When they see the Mark II box this idea may change but of course the box does not handle the Code B. I will give all the reasons I know to uphold our reputation.[51]

On the same day as Fleet Paymaster Brown's report, Lieutenant F. W. Pennoyer, Jr., on the USS *Alabama* (BB-8), the flagship of Division One, Battleship Force One of the Atlantic Reserve Fleet, sent the secretary of the navy a method for breaking the NCB Mark I cipher. His method presumed that the enemy had both a codebook and the device with its accompanying alphabet strips.[52]

The NCB Mark II was a successful device, used by the navy for decades. It was reliable, fast, and secure. The State Department also used the machine; the NCB Mark II, along with a navy team to operate it, went with President Woodrow Wilson in 1919 to the Paris Peace Conference. Wilson was so delighted by the device that he was given his own cipher and often operated the machine.[53]

Cryptanalysis—The Navy's Relationship with the Military Intelligence Division

Available primary sources present an incomplete narrative of the navy's attempt to establish a section to break codes and ciphers sometime in 1917 or early 1918. Captain Laurance Safford, who formed the navy's Research Desk in 1924, claimed that the service "attempted no cryptanalytic work during the war."[54] Captain J. S. Holtwick, Jr., in his history of the Naval Security Group, stated that while there were cryptologic activities in the navy prior to 1924, "on the cryptanalytic side, these are difficult to trace, or to document much more than with fragmentary information," a circumstance he attributed to documents not being saved to protect

sources as "such activities against communications of other governments were considered by many to be illegal, or, if legal, at least immoral."[55] The late British author Patrick Beesly claimed that the US Navy was unsuccessful in setting up a unit and that they willingly turned it over to MI-8, "a clear indication of how hopeless they thought the task was."[56]

Early in 1918, the ONI set up a secret ink laboratory at 1710 New York Avenue, NW, in Washington, DC, but the newly commissioned ensign in charge had a civilian career in the study of fingerprints, rather than inks. In September 1918, the navy sent its equipment and supplies to the Military Intelligence Division (MID) laboratory in Washington.[57] Whether it had "peremptorily been ordered to relinquish" this work to MI-8 or did it voluntarily is unknown.[58] In *The American Black Chamber*, Yardley quotes an undated letter from the director of the ONI to the naval attaché in London that the ONI had "turned over to the Military Intelligence Branch all the work along the lines of breaking enemy cipher and code messages."[59]

The navy, well aware of the work of the British Admiralty's Room 40 thanks to the efforts of Admiral Sims, may have been trying to create a similar organization in the United States. Unfortunately, without an existing pool of cryptanalytic talent or the organizational skills of Ralph Van Deman, the navy could not build a competent workforce. The navy's official opinion on the concept of a combined cipher bureau is not known; lacking a cryptanalytic workforce, the navy became a customer of the pooled talent in MI-8.

Whatever the reason for the navy's initial reluctance to send material to MI-8, by early 1918 they were sending at least some information, and MI-8 was providing decryption and translation service to the ONI. This work at first consisted of messages intercepted at Otter Cliffs from the German radio station at Nauen.[60] Sometime during the last week of June 1918, a Lieutenant Elkins of the ONI visited MI-8; he then requested permission to send all cipher and code matter from ONI to MI-8. This request was likely the result of Van Deman's determination that MI-8 and the ONI should work together on the code and cipher messages transmitted by the station at Nauen (see chapter 2). In July 1918, as a result of Elkins's visit, Chief Yeoman H. E. Burt of the Naval Reserve, who worked in the ONI, was sent to MI-8 as a liaison officer.[61] Whether Burt actually broke codes and ciphers or acted entirely as a liaison is unknown. Yardley claimed that the "Navy Cryptographic Bureau" was abandoned at this time and all the secret ink equipment turned over to MI-8.[62]

Sometime in the fall of 1918, Burt assessed the work of MI-8 and recommended that a "nucleus staff of expert and experienced cryptographers be maintained by the Navy" so that they could understand the weaknesses of various codes and ciphers to improve naval cryptography, be the core of a decipherment effort in wartime, and make it possible for the navy to decipher enemy naval messages (instead of relying on other organizations). Burt also recommended that three naval officers be trained at Riverbank and MI-8.[63]

In 1924, when Safford was working to firmly establish the navy's Research Desk as a cryptologic organization, he went in search of Burt's wartime documentation. Looking for files, which the Code and Signal Section supposedly deposited with the ONI in 1918, Safford found only one note from Chief Yeoman Burt and recorded, "ONI knows nothing about this and can't find anything—but they have no record of ever seeing any of it. Historical files and Secret files have no record of it. Miss Meyer may know."[64]

Otter Cliffs Radio Station

Alessandro Fabbri (see sidebar), a wealthy New York radio amateur, was eager to serve his country. He first tried to join the Army Signal Corps but received no offer. Just two weeks after the declaration of war, he travelled to the headquarters of the First Naval District in Boston; they were very interested in having a boat he was building. Fab-

Alessandro Fabbri

Alessandro "Sandro" Fabbri was born in New York City on May 21, 1877, the third son of a wealthy Italian, Ernest G. Fabbri, and his American wife, Sara Randall. The family had estates in New York, Paris, Rome, and Bar Harbor, Maine. His brother, Ernesto, married a granddaughter of William H. Vanderbilt. Sandro, who never married, was interested in literature and science and worked as a research associate in physiology at the American Museum of Natural History. He also had an affiliation with the Rockefeller Institute. In 1912, while at the institute, he used high-power magnification and time-lapse photography to create motion pictures of the growth of chicken heart cells to assist the work of French Nobel laureate Alexis Carrel. On his 1910 passport application, he listed his occupation as "capitalist."

Fabbri in May 1919. Courtesy of the Photo Archives, Naval History and Heritage Command

Fabbri had both an amateur radio operator license and a station license with the call sign 1AJ. Using his technical expertise, political connections, and estate at Otter Cliffs, Maine, he became a pioneer in US Navy radio intelligence collection. Fabbri was commissioned as an ensign and subsequently promoted to lieutenant junior grade on June 22, 1918. He received the Distinguished Service Medal and the Navy Cross for his work at the US Navy radio station at Otter Cliffs.

At the age of 44, Fabbri fell ill while duck hunting off the coast of Long Island. He developed pneumonia and died three days later on February 6, 1922. He is buried in the Vanderbilt Private Section adjacent to Moravian Cemetery on Staten Island, New York, in the family plot of his sister-in-law, Edith Shepard Fabbri.

Sources

Ancestry.com. Vital records. Accessed August 4, 2018.

Brucia, Margaret A. "Alessandro Fabbri, the Rockefeller Institute & The Immortal Chicken Heart." *Gotham: A Blog for Scholars of New York City History,* September 5, 2017, https://www.gothamcenter.org/blog/alessandro-fabbri-the-rockefeller-institute-amp-the-immortal-chicken-heart.

The Acadian, January 21, 1972. National Archives and Records Administration, Boston, Record Group 181, Records of Naval Districts and Shore Establishments, Naval Security Group Activity Winter Harbor, Historical Information 1917-2002, Box 1.

bri offered the boat and himself, detailing his radio experience. He knew that he was able to intercept European high-power radio stations from his home on Mount Desert Island in Maine and thought the navy would be interested.[65] At some point, the navy asked him to be part of a chain of radio stations to be built along the coast of Maine; on May 20, 1917, Fabbri was instructed to build an "efficient radio sta-

tion" in Bar Harbor and told that he would be put in charge. After a visit to Fabbri's land on May 26, navy officials assessed the site to be "excellent" from a radio point of view. Fabbri immediately leased a nearby house and started improvements to the land and the house. He also ordered radio equipment.[66]

By June 12, Fabbri began to worry about the expense he was incurring, as the navy had not been in touch. Then he learned the station had been disapproved. But Fabbri had an old personal friend named Franklin Roosevelt, the assistant secretary of the navy. Even with Roosevelt's intervention, and a visit to see Secretary of the Navy Josephus Daniels, things moved slowly. Daniels was willing to commission Fabbri but not to put him in charge of the station he was building. After many months, Fabbri was commissioned as an ensign in the US Naval Reserves and ordered to command the radio station he had built.[67]

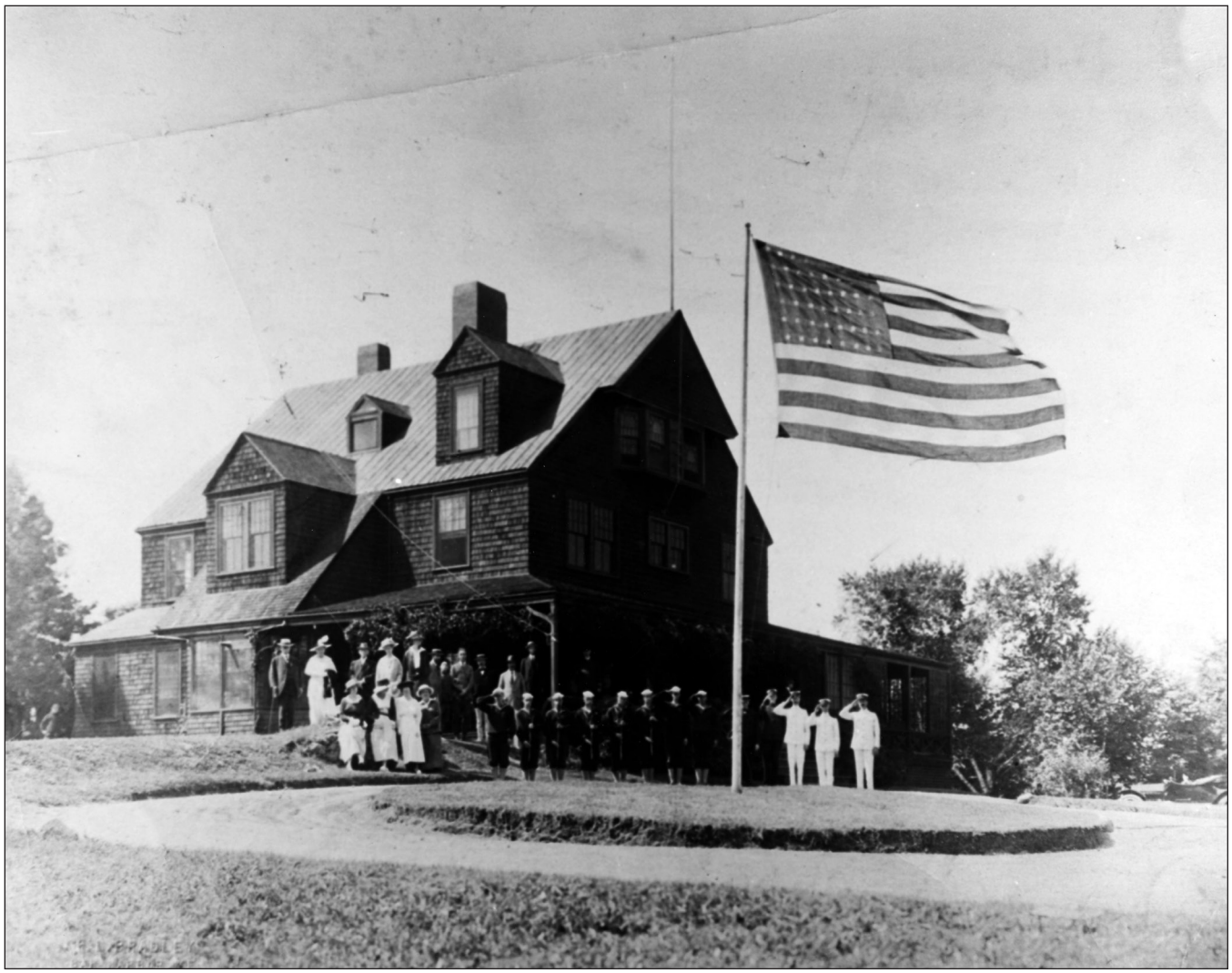
Otter Cliffs station was finally authorized on August 27, 1917 (see photo). The station began operations the next day, with a ceremony at noon kicked off by a signal from the navy radio station at Arlington, Virginia, the raising of the flag, and a bugler playing "The Star-Spangled Banner."[68] On that first day, the station—manned by four operators, a gunner's mate, a chief electrician, 10 guards, a cook, and a mess attendant—did 17,900 words of business. The station became an official part of the navy's transatlantic service in early 1918, taking responsibility for nearly all the communications with Europe that had previously been handled by the navy stations at Belmar, New Jersey, and Chatham, Massachusetts. Transatlantic radio communications took some of the burden off the submarine cables and was an important backup to those cables, which were often threatened by German submarines.[69] Indeed, on June 4, 1918, two transatlantic cables were severed just east of Sandy Hook, New Jersey.[70]

Incoming traffic was automatically relayed to Washington, where the messages were copied.[71] All messages from receiving stations at Otter Cliffs, Chatham, and Belmar came into the 10th floor of the Southern Building (an office building one block from the White House) by August 1, 1918. Messages for transmission to Europe came to Washington and then were sent out via lines to transmitting stations at Annapolis, Maryland; New Brunswick and Tuckerton, New Jersey; and Sayville, New York. Due to Otter Cliffs' efficiency, the navy was able to close the Chatham station and move the personnel to Otter Cliffs.[72]

Life in Bar Harbor was idyllic compared to that experienced by other cryptologists at home and abroad. The sailors slept in quarters in a nice building; there were cooks, so they did not have to fend for themselves or eat on the local economy; the climate was to their liking; and there were many recreational opportunities. It is no wonder that many of the men looked back on their time at the station with great fondness: "The thunder of the waves is in our ears and the tang of the sea air, plainly salty, is in our lungs. Beautiful forests cloak the huge hills that tower above us to the North and West. From Schooner Head to the Lookout, a most magnificent seashore, huge tumbled masses of granite carved in fantastic forms by the surf. What a paradise for a camera."[73]

Work with Allies

In June 1917, an Anglo-French team of experts arrived in New York to consult with the military. This visit established a network of transnational scientific liaisons, some of which continued after the war.[74] Lieutenant Maurice Paternot, a naval wireless expert, was part of that delegation, as was Corporal Leon Deloy.[75] Paternot spent much of the war on the French High Commission in Washington in the Department of Franco-American War Cooperation, and in that role he consulted with the navy and visited the station at Otter Cliffs multiple times in 1918. Paternot also maintained a correspondence with Fabbri. The British sent a Major Cheesman, also a radio expert, who stopped by Otter Cliffs for two days while en route from Washington to Newfoundland, but little is known about his visit.[76]



Commissioning ceremony for Otter Cliffs station, August 28, 1917. Chief Electrician Raymond Cole is behind flagpole. To the right of him are, left to right: Ensign W. G. Richardson, Ensign E. A. Gallatin, Ensign Ralph Kingsley, and Ensign Alessandro Fabbri. Courtesy of the Naval History and Heritage Command. NH 91201, Otter Cliffs Naval Radio Station, Bar Harbor, Maine. Photo Archives Naval History and Heritage Command

In his collection of memories about World War I service at Otter Cliffs, navy radio operator Harold W. Castner recounted an undocumented version of Paternot's capture by the Germans and subsequent escape. Paternot was later placed in charge of all French radio communication.[77] In 1917, Paternot established the high-power radio station at Lyon and was concerned with transatlantic communications. He brought his assistant Deloy with him to the United States.[78]

Fabbri, who spoke fluent French, and Paternot became close, though the French officer's uniform and mannerisms were a source of amusement to the young radio operators.[79] But the relationship between Fabbri and Paternot was not focused on the collection of intelligence. Both the French and the Americans were concerned about the potential for the Germans to jam transatlantic radio communications, and Paternot had deep discussions with the

radio pioneer Dr. Ernst F. Alexanderson about his "barrage receiver," one of which would be installed at Otter Cliffs.[80] Dr. A. Hoyt Taylor, the founder of naval radar, was put in charge of the Marconi station at Belmar during WWI. He later remembered that the French believed that the amplifier they had brought with them would solve all of the navy's transatlantic radio reception problems. According to Taylor, Paternot "finally threw up his hands and said they never realized what static was until they came to this country; they had nothing like it in Europe." Taylor noted that the static was dependent on latitude, and that Otter Cliffs had much lower instances than New Jersey and was more similar to what was expected in Europe at the time.[81]

Otter Cliffs's signals environment made it a good place to test new equipment, and a major technological advance in signals collection was made there during the war. General Electric's Charles A. Hoxie developed a high-speed photographic telegraphic recorder that was tested and used at the station. The recorder was meant for high-speed reception of radio telegraph signals; it photographically recorded, on a paper tape, at a speed of up to 400 words per minute, even through moderate static and other interference. Normally an expert operator was able to receive 35 words a minute if atmospheric conditions were good; the men at Otter Cliffs usually averaged 15 or 20 words per minute. German communications between Nauen and Madrid were automated to operate at 400 words per minute, far beyond the capabilities of even an expert operator. With Hoxie's recorder it took just three minutes between receipt of a signal and production of a printed copy of the message; the messages could then be transcribed at leisure.[82]

Radio Intelligence at Otter Cliffs

This lack of static not only made Otter Cliffs a successful naval communications site, it made the location ideal for radio intelligence. For in addition to transmitting and receiving official navy communications, Otter Cliffs monitored the German radio broadcasts from Nauen and Eilvese in Germany, 24 hours a day, with operators working at special positions on the second floor.[83] It is important to note that up until this time there was very little difference made between a station that received radio messages and an intercept station; in many circumstances, the first intercept operations were conducted by radio operators during their down time—when they were not sending or receiving official traffic. The separation of these duties would be an outgrowth of World War I. Otter Cliffs both intercepted adversarial communications and received official navy radio traffic.

The station had "phenomenal" range and could hear stations from the Great Lakes to the West Indies. When a long wave receiver was installed in December 1917, the operators took advantage of the new technology and began to "listen in" during their spare time and "found that we were copying the powerful trans-Atlantic station at Nauen, Germany."[84] Even then, the men knew that the Nauen messages (called POZ code messages because POZ was Nauen's call sign) "really don't count."[85] The Naval Communications Service was not interested in the intercept, telling the station that they did not want a copy of the daily Nauen press that the operators were duly intercepting and transcribing.[86] But the men were fascinated and persisted, particularly when there were changes in the character of the broadcast. Many decades later, Castner remembered that Nauen sent a great deal of propaganda on two wave lengths: 15,000 meters (long wave) and 12,000 meters (shortwave). He recounted:

> They sent two long, five-figure code messages. These were without address and were incorporated into the regular schedule. The first day it was copied as a regular part of the schedule, but on the following day, with an entirely new press report, these were repeated again. I recall that they were sent over and over again, day after day as many as 30 times. It became monotonous, and, in fact, I even got so that I knew every group of figures almost by heart. From time

> to time we inquired of Washington if they knew what these were all about. We were assured that they were in the proper hands and that it was probable that they had been de-coded and the information noted. We were told, however, to watch them every day and be alert, in case any group of figures was changed from the previous transmission.[87]

Castner believed that these messages were the High German code that Yardley referenced in *The American Black Chamber*, which were sent in January and February 1918 and were intended for the Mexican station at Chapultepec. The messages were not heard again.[88] See part four, chapter 11, for more discussion of these messages.[89]

Another sort of message that Castner remembered were those he termed "Aumlaut" (umlaut) code messages—composed entirely of four letters that had umlauts—encountered on a naval scouting frequency of 4,000 meters.[90] The station executive contacted the director of Naval Communications about the code; the men were apprised that Washington was "very excited" and that they should "abandon all work (on Nauen) to get that code." The messages were sent, Castner learned later, to MI-8. Years later, Admiral Stanford C. Hooper let slip to Castner that these were instructions to small submarines concerning supply rendezvous with larger submarines that led to a capture of five small submarines and two oceangoing subs "all tied together with portable gangplanks and helpless to submerge or defend themselves with destroyers all around them."[91] Unfortunately, it has been impossible so far to link this story with any documented incident connected to the US Navy.[92] A mid-June 1918 MI-8 report does mention "German four-letter accented messages" and the attribution to German submarines came from the Italian Naval Cipher Bureau via the US military attaché in Rome. The French Cipher Bureau reported that the encipherment changed every week; they, as well as the Italians, had abandoned attack on this cipher. If the messages were for submarines in European waters, MI-8 was waiting for some explanation of why the frequency was reportedly at 12,600 meters (although Castner remembered them being at 4,000 meters).[93] Both the navy and MID queried the AEF as to whether they were working on these messages; Major Frank Moorman's reply, sent above General Pershing's signature, was that though the AEF collected these German messages and sent the collection to the navy, the G2A6 did not conduct cryptanalysis on what they collected. Moorman had been told (possibly by the Italians) that the letters "represent Greek letters used by Germans for the purpose of extending their alphabet" and involved messages to submarines.[94]

Many decades later, the operators remained proud of two particular messages from Nauen. The first, sent on October 12, 1918, concerned Germany's agreement to meet Wilson's peace terms. The second, sent on November 10, 1918, covered the signing of the Armistice. The October message sparked the rivalry between the army and navy that is discussed in both chapter 7 and chapter 11. The Armistice message—for Otter Creek, a point of pride in being the first station to receive official word in the United States—actually was not a cryptologic success.[95] See chapter 11 for details on these events.

College of the City of New York

Many colleges and universities were involved in training men for some aspect of military service. Most notably, Harvard University set up a radio school that trained navy radiomen. But the only program with a documented signals intelligence connection is a radio training program at the College of the City of New York, where the college's radio station provided intercepted radio traffic to the navy and the MID in late 1917.

By June 1917, the college had a radio station, constructed by the navy and staffed by naval radio operators, for the purpose of listening-in on foreign radio broadcasts (see photo).[96] The school also began, in September 1917, a special course in radio

The College of the City of New York. Radio antennas connected with the Department of Electrical Engineering, which trained members of the Signal Corps and the navy. The radio station at the college conducted intercept for the navy in at least 1917. National Archives and Records Administration College Park, Record Group 111, Records of the Chief Signal Officer, Photographic Collection, 111-SC-56004

telegraphy "and other methods of electrical communication" on behalf of the Signal Corps. Detachments of signal men, quartered in college buildings, attended for a few months at a time. Additionally, six detachments of naval men attended the school for advanced work in radio. The City College course was a follow-on for trainees from the Harvard radio school; it also trained existing naval radio operators who were serving in the Atlantic Fleet. In total, the school trained 1,127 men from the army and 221 from the navy. Captain Charles J. Mendelsohn of the MID taught some of the classes. Training units were demobilized in December 1918.[97]

The college's shortwave radio station was in the bell tower of Main Building (now known as Shepard Hall). While the primary purpose of the station was training, operators would have used the equipment to discover any signals that might be audible. On December 13, 1917, a cipher message transmitted by the German high-power radio station at Nauen was heard, and transcribed, by the college's listening-in station. The message went to the Naval Communications Service, which sent a copy to the MID for analysis.[98] By early January, the City College station was formally tasked by the navy to intercept signals from Nauen.[99]

The actual cipher message was not retained in the MID files. No other evidence of City College intercept has been located to date by the author, and it is not known how long this effort continued.

Conclusions

The enormity, and the necessity, of the code-making task occupied the personnel with cryptologic skill. Given the general shortage of cryptologic talent and the huge demands put on the Code and Signal Section, it is not surprising that the navy relied on others to handle cryptanalytic functions.

As for the Otter Cliffs radio site, it was completely successful. The station received the Navy Cross for its work during the war. Negotiations for purchasing the land and additional acreage began in late 1918. The site continued to expand and gained a marine guard and an electrified fence. A new transmitting station was constructed nearby late in 1918 and two new 220-foot wooden antenna masts were planned.[100]

Otter Cliffs was in need of improvements in the 1930s at the time John D. Rockefeller was making improvements to the adjacent Acadia National Park. The navy, with the help of the Interior Department and Rockefeller, moved the radio station to Big Moose Island at the tip of the Schoodic Peninsula, about five miles away from the original Otter Cliffs station. The new site opened on February 28, 1935, as the US Navy Radio and Direction Finding Station Winter Harbor. The facility changed names several times, but on June 9, 1958, it became Naval Group Security Activity (NGSA) Winter Harbor. NGSA Winter Harbor closed in 2002; it was the only US signals collection facility that began in World War I that continued operation past 1920. Some traces of the original site remain within Acadia National Park, including a monument to Alessandro Fabbri.

Notes

1. Ralph Van Deman to Edward McCauley, letter, November 12, 1917, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 165, Records of the War Department General and Special Staff, Entry 65, Box 2241.
2. H. E. Burt, "A Summary of the Organization, Activities and Achievements of the Code and Cipher Section of [the] Military Intelligence Division," November 1918, NARA CP, RG 38, Records of the Office of the Chief of Naval Operations, Entry 98, File F-6-d, 11466-C. I am indebted to Mark Stout for providing this reference.
3. Captain Linwood S. Howeth, *History of Communications-Electronics in the United States Navy* (Washington, DC: Bureau of Ships and Office of Naval History, 1963), 528.
4. Van Deman postulated that perhaps the Germans did not cut the cables, despite having the ability to do so, because they were using submarines off the US East Coast to tap the cables. Van Deman, "Memorandum," April 8, 1949, 36-37, in "FOIA: Van Deman, Ralph H. HQ_2," Internet Archive, accessed February 22, 2018, https://archive.org/details/foia_Van_Deman_Ralph_H.-HQ-2, 60-61.
5. "History of US Naval Communication Service in the World War prepared April 30, 1921," NARA, RG 45, Naval Records Collection of the Office of Naval Records and Library, Subject File 2D, Communications History Navy Department Historical Section, 24-25, ARC Identifier 594070.
6. The navy began work on a high-power radio station at Croix d'Hins in Bordeaux in March 1918. Named Radio Lafayette, the station was intended to carry traffic from the AEF, thus relieving the transatlantic cables (which the United States worried could be severed by the Germans) of some of the burden. The station was not complete at the time of the Armistice and construction was halted. In 1919, an agreement was reached with the French whereby the US Navy completed the system at French expense. The station was turned over to the French in November 1920. Howeth,

History of Communications-Electronics in the United States Navy, 237-251.
7. "History of US Naval Communication Service in the World War," 26-27.
8. "History of US Naval Communication Service in the World War," 116-117.
9. Office of the Director of the Naval Communication Service in Washington to Alessandro Fabbri, letter, November 14, 1918, National Archives and Records Administration, Boston (NARA B), RG 181, Records of Naval Districts and Shore Establishments, Naval Security Group Activity Winter Harbor, ME (NSGA WH), Historical Information 1917-2002, Fabbri Papers, Volume 2.
10. "History of US Naval Communication Service in the World War," 38-39.
11. "Early Navy Interest in Radio Direction Finding," undated notes (no author given), NSA Archives, Accession F17030804; Captain J. S. Holtwick, Jr., USN Ret., *Naval Security Group History to World War II*, 4, Special Research History 355, Volume I, NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 94.
12. "Early Navy Interest in Radio Direction Finding." Stations were planned for Mantoloking, NJ; Assateague Island, VA; Cape Henry, VA; Cape May, NJ; Cape Hatteras, NC; Siasconset, MA; Shelburne, Nova Scotia, Canada; Machias, ME; Bar Harbor, ME; Boothbay, ME; City College, NY; and Bush Terminal, NY. "History of US Naval Communication Service in the World War," 123-125.
13. "History of US Naval Communication Service in the World War," 72.
14. Howeth, *History of Communications-Electronics in the United States Navy*, 11.
15. Howeth, *History of Communications-Electronics in the United States Navy*, 11. On the subject of English language messages, see "History of US Naval Communication Service in the World War," 85.
16. "History of US Naval Communication Service in the World War," 85.
17. "History of US Naval Communication Service in the World War," 84.
18. "History of US Naval Communication Service in the World War," 84.
19. Howeth, *History of Communications-Electronics in the United States Navy*, 12.
20. Howeth, *History of Communications-Electronics in the United States Navy*, 292.
21. Holtwick, *Naval Security Group History*, 10.
22. Holtwick, *Naval Security Group History*, 1.
23. Holtwick, *Naval Security Group History*, 12. It was not until 1921 that the idea was resurrected.
24. Holtwick, *Naval Security Group History*, 1.
25. "History of US Naval Communication Service in the World War," 32.
26. Holtwick, *Naval Security Group History*, 17, identifies a memo from OP-20-G dated May 9, 1925, and signed by H. McCoy Jones that quotes Russell Willson on the original Naval Code A-1.
27. Holtwick, *Naval Security Group History*, 12.
28. Holtwick, *Naval Security Group History*, 12.
29. Holtwick, *Naval Security Group History*, 20.
30. *Annual Report of the Secretary of the Navy* (Washington, DC: Government Printing Office, 1918), 22; "History of US Naval Communication Service in the World War," Appendix B ("Memorandum for the Secretary of the Navy, October 19, 1918"), 141.
31. Raymond P. Schmidt, "From Code-Making to Policy-Making: Four Decades in the Memorable Career of Russell Willson," *Prologue* 48, no. 2 (Summer 2016): 31. It is likely that Willson visited Paris to organize the use of the Navy Cipher Box for American communications during the 1919 Paris Peace Conference. Willson never returned to cryptology. In the late 1930s, when Willson was commander of the USS *Pennsylvania*, he called recently trained cryptologist Ham Wright to task for missing an inspection (because Wright had stayed up too late breaking a cipher). When Wright pointed out Willson's past work in the field as an example, Willson snapped back, "Yes, but I had the good sense to get out!" Steven E. Maffeo, *U.S. Navy Codebreakers, Linguists, and Intelligence Officers against Japan 1910-1941: A Biographical Dictionary* (Lanham, MD: Rowman & Littlefield, 2015), 192-193.

32. Holtwick, *Naval Security Group History*, 20.
33. William Ward "Poco" Smith (1888-1966) was not a career cryptologist. A 1911 graduate of the US Naval Academy, he served as Admiral Husband E. Kimmel's chief of staff, among other senior positions. He later told David Kahn that he first met Yardley during the 1916 Haiti crisis, and Yardley became interested in Smith's code work and "frequently came to my office to watch me working." According to Smith, Yardley proudly showed off a cipher MID was using with Pershing "not enciphered code, just cipher" and defied Smith to try to break it. Although Smith was busily preparing to go overseas, he took a message home and "within less than two days" had broken the cipher and returned it to Yardley, who was "not pleased." Smith vowed never to return to communication duty when he sailed for Europe later that month—and he did not. David Kahn, *The Codebreakers* (New York: Scribner, 1996), 386-387; Kahn correspondence with Smith, National Cryptologic Museum Library (NCML), David Kahn Collection (DKC), DK 58-67.
34. Kahn, *The Codebreakers*, 386-387; Kahn correspondence with Smith.
35. The United States intervened in Haiti in July 1915, landing marines after the murder of the Haitian president by insurgents. The occupation lasted until August 1934.
36. Kahn, *The Codebreakers*, 386-387; Kahn correspondence with Smith. In the 1920s, Smith wrote an essay on the solution of the Playfair cipher, which appeared in André Langie, *Cryptography*, trans. J. C. H. Macbeth (London: Constable & Co., 1922).
37. Kahn, *The Codebreakers*, 386-387; Kahn correspondence with Smith.
38. Holtwick, *Naval Security Group History*, 17.
39. NARA CP, RG 38, Entry 1029, Box 24. This box also contains a very helpful index to Code and Signal Memoranda published to October 1918.
40. Howeth, *History of Communications-Electronics in the United States Navy*, 292-294.
41. Page 292 in Howeth's *History of Communications-Electronics in the United States Navy* cites Code and Signal Memorandum (CSM) No. 1 (CSP 103), issued October 10, 1917.
42. Howeth, *History of Communications-Electronics in the United States Navy*, 292.
43. "CSP 3," December 3, 1917, NARA CP, RG 38, Entry 1029, Box 24.
44. Holtwick, *Naval Security Group History*, 17; for currency conversion, accessed May 21, 2021, https://cpiinflationcalculator.com.
45. Raymond P. Schmidt, "Operating the NCB Mark II," *Cryptolog* 36, no. 1 (Winter 2015): 8-11.
46. Kahn, *The Codebreakers*, 386-387; Kahn correspondence with Smith.
47. Papers discussing the NCB Mark I, including an evaluation by W. W. Smith and a January 19, 1918, memo from Riverbank Laboratories to the Office of Naval Operations, NARA CP, RG 38, Entry 1029, Box 76; Director of Naval Communications, extracts a letter from Lieutenant C. A. Russell, undated, NARA CP, RG 38, Entry 1029, Box 76.
48. Herbert O. Yardley, *The American Black Chamber* (New York: Ballantine Books, 1931), 128. MI-8's February 19, 1918, solution can also be found in NARA CP, RG 38, Entry 1029, Box 76 among the papers discussing the NCB Mark I.
49. John E. A. Brown, Assessment of NCB, February 21, 1918, NARA CP, RG 38, Entry 1029, Box 76.
50. Holtwick, *Naval Security Group History*, 17, cites a February 25, 1918, message from William S. Sims to the secretary of the navy concerning the Admiralty discussion of the Navy Cipher Box and references OPNAV Cable 1781 of December 24, 1917; OPNAV Cable 3024 of February 16, 1918; and Sims cable of February 16, 1918.
51. M. F. Draemel, undated, NARA CP, RG 38, Entry 1029, Box 76.
52. F. W. Pennoyer, report, February 21, 1918, NARA CP, RG 38, Entry 1029, Box 76.
53. John R. Schindler, "Securing the Airwaves at Sea: US Navy Communications Security, 1917-1945," chap. 9 in *Naval Networks: The Dominance of Communications in Maritime Operations: 2007*

King-Hall Naval History Conference Proceedings (Canberra: Sea Power Centre-Australia, 2007), 150.

54. Captain Laurance F. Safford, "A Brief History of Communications Intelligence in the United States, 1952," in *A History of Communications Intelligence in the United States with Emphasis on the United States Navy* (Denver, CO: Naval Cryptologic Veterans Association, 1982).
55. Holtwick, *Naval Security Group History*, 2.
56. Patrick Beesly, *Room 40: British Naval Intelligence 1914-1918* (London: Hamilton, 1982), 247.
57. *Historical Background of the Signal Security Agency,* vol. 2, *World War I* (Washington, DC: Army Security Agency, 1945), 108, Special Research History 001, copy held by NCM.
58. Ladislas Farago, *The Broken Seal: The Story of "Operation Magic" and the Pearl Harbor Disaster* (New York: Random House, 1967), 33, 392. Farago cites an unnamed lieutenant on this subject, and his information should be treated with some skepticism.
59. Yardley, *The American Black Chamber*, 132; Midshipman T. R. S. Ilker, "Contributions of Cryptography to the Naval Aspects of World War I," undated, copy held by author.
60. H. E. Burt, undated memo, NCML, DKC, Y1 Earliest Naval Comint.
61. Weekly Reports of MI-8, June 22-29 and July 7-13, 1918, NARA CP, RG 165, Entry 65, Box 3522.
62. Yardley, *The American Black Chamber*, 127-132. Yardley's account seems excessively harsh, but at the same time he describes himself as being close to a breakdown and too ill to take interest in what was going on with plans to send him to France.
63. Burt, undated memo.
64. See page 4 in Holtwick's *Naval Security Group History* for a letter, dated December 11, 1918, to the Office of Naval Intelligence, with a penciled note from Safford dated September 20, 1924. Miss Meyer is, of course, Agnes Meyer Driscoll, who came to work in the Code and Signal Section in 1919. A copy of Safford's note and the memo can also be found in the NCML, DKC, Y1 Earliest Naval Comint.
65. "History of US Naval Communication Service in the World War," 122.
66. "History of Winter Harbor," *The Acadian*, January 21, February 4, February 18, March 3, March 17, March 31, April 14, April 28, and May 12, 1972, NARA B, RG 181, NSGA WH, Box 1.
67. "History of Winter Harbor," *The Acadian*.
68. "History of Winter Harbor," *The Acadian*, April 28, 1972.
69. "History of US Naval Communication Service in the World War," 122.
70. Howeth, *History of Communications-Electronics in the United States Navy,* 530.
71. Howeth, *History of Communications-Electronics in the United States Navy*, 530.
72. "History of US Naval Communication Service in the World War," 26.
73. Diary of an unnamed individual, dated June 21, 1918, with a letter from the unnamed person to Harold W. Castner, May 22, possibly 1960, NARA B, RG 181, NSGA WH, Box 12.
74. Jorg Lehamann and Francesca Morselli, CENDARI Archival Research Guide: "Science and Technology in the First World War," 2016, 18-19, accessed October 23, 2018, https://www.researchgate.net/publication/311439258_CENDARI_Archival_Research_Guide_Science_and_Technology_in_the_First_World_War.
75. David Zimmerman, *Top Secret Exchange: The Tizard Mission and the Scientific War* (Montreal: McGill-Queen's Press, 1996); *United States Official Bulletin* 1, no. 25 (June 8, 1917).
76. Castner, "Lieutenant Paternot" in untitled document (unpublished manuscript, n.d.), 188-192, NARA B, RG 181, NSGA WH, Box 781; Memo, Lieutenant Cooper to Fabbri, July 25, 1918 (transcript), NARA B, RG 181, NSGA WH, Box 12, Fabbri Papers, Volume 2.
77. Castner, "Lieutenant Paternot," 188-192.
78. Some sources call him Corporal Deloy, some Sergeant Deloy.
79. Castner, "Lieutenant Paternot," 188-192. Castner wrote: "It is possible that some of you fellows have seen the uniforms of the commissioned

French Officers. Those robin-egg pants, with the wide red stripe, that colorful hat and usually the traditional French moustache. Well Paternot had all that and more. He sure was a dandy. One day he came into the office and Mr. Fabbri was absent. He had not seen us for some time as he advanced to great [*sic*] me enthusiastically, I stuck out my hand. Holy Mackerel! Before I knew it, he was sniffing around one ear and then the other. I didn't know whether to kiss him or sock him."

80. H. H. Beverage to Commander Hahn, commanding officer of NSGA Winter Harbor, letter, June 28, 1968, NARA B, RG 181, NSGA WH, Winter Harbor correspondence.
81. A. Hoyt Taylor, *Radio Reminiscences: A Half Century* (Washington, DC: U.S. Naval Research Laboratory, 1948, reprinted 1960), 50-60, accessed March 28, 2018, https://infoage.org/radio-reminiscences-a-half-century-by-a-hoyt-taylor/.
82. "The General Electric Company in the Great World War," *The General Electric Review* XXII, no. 8 (August 1919): 614.
83. H. C. Hovenden, memories, NARA B, RG 181, NSGA WH.
84. "History of Winter Harbor," *The Acadian*, April 28, 1972.
85. Fabbri to Cooper, letter, July 1, 1918, NARA B, RG 181, NSGA WH, Fabbri papers, Volume 2.
86. J. A. W. Craven, Office of the Director of Naval Communications, to Fabbri, February 1, 1918, NARA B, RG 181, NSGA WH, Fabbri Memoirs Volume 1.
87. Castner, "Human Interest Stories," 217-222, NARA B, RG 181, NSGA WH, Box P.
88. Castner, "Human Interest Stories," 220-221.
89. I believe these are almost certainly the messages broken by Charles Mendelsohn in MI-8 that are mentioned by David Kahn in his chapter, "Charles J. Mendelsohn and Why I Envy Him," although Kahn says the messages were intercepted at Houlton, more than nine months before the station opened. Kahn, *How I Discovered World War II's Greatest Spy and Other Stories of Intelligence and Code* (Boca Raton, FL: CRC Press, 2014).
90. While the German alphabet only has three letters with umlauts, the implication is that a fourth letter was used. I have not found examples of the system.
91. Castner, "Human Interest Stories," 205-212.
92. Historians I consulted on this matter know nothing of the incident and suggest that it may have been a story from World War II and not World War I. This could be an interesting area to research.
93. Weekly Report of MI-8, undated but based on the order and content, probably mid-June 1918, NARA CP, RG 165, Entry 65, Box 3522.
94. Correspondence to the G2, file number 311.5, dated June 7, 8, and July 27, 1918, Center for Cryptologic History files, copies held by author. This material is almost certainly located in NARA CP, RG 120, Records of the American Expeditionary Forces.
95. Alfred J. Ball Folder, NARA B, RG 181, NSGA WH.
96. Captain David Todd to Rear Admiral R. S. Griffin, Chief of Steam Engineering, letter, June 14, 1917, NARA CP, RG 38, CNO DNC Office files of Captain Todd, Box 2. Copy in Center for Cryptologic History files, copy held by author.
97. The College of the City of New York, *Sixty-Ninth Annual Register 1918-1919*, January 1919, 42-69.
98. Navy Department Naval Communication Service to the MID, memorandum, December 15, 1917, NARA CP, RG 165, Entry 65, Box 3435. While the memo survives, the attachment with the cipher message cannot be found in the files.
99. McCauley to Van Deman (enclosing a message "Communications between Germany and Mexico by Wireless," January 8, 1918), letter, January 10, 1918, NARA CP, RG 165, Entry 65, Box 3449.
100. Various memos dated June 26, 1918, September 25, 1918, and October 2, 1918, and a telegram dated October 25, 1918, NARA B, RG 181, NSGA WH, Box 44.

Chapter 7
Army Versus Navy in Maine

The cryptologic relationship between the US Army and US Navy was more often strained than cooperative. In the fall of 1917, one of the young officers in training at MI-8 (the army's cryptologic organization), John A. Graham, was sent to the Navy Department and decades later remembered:

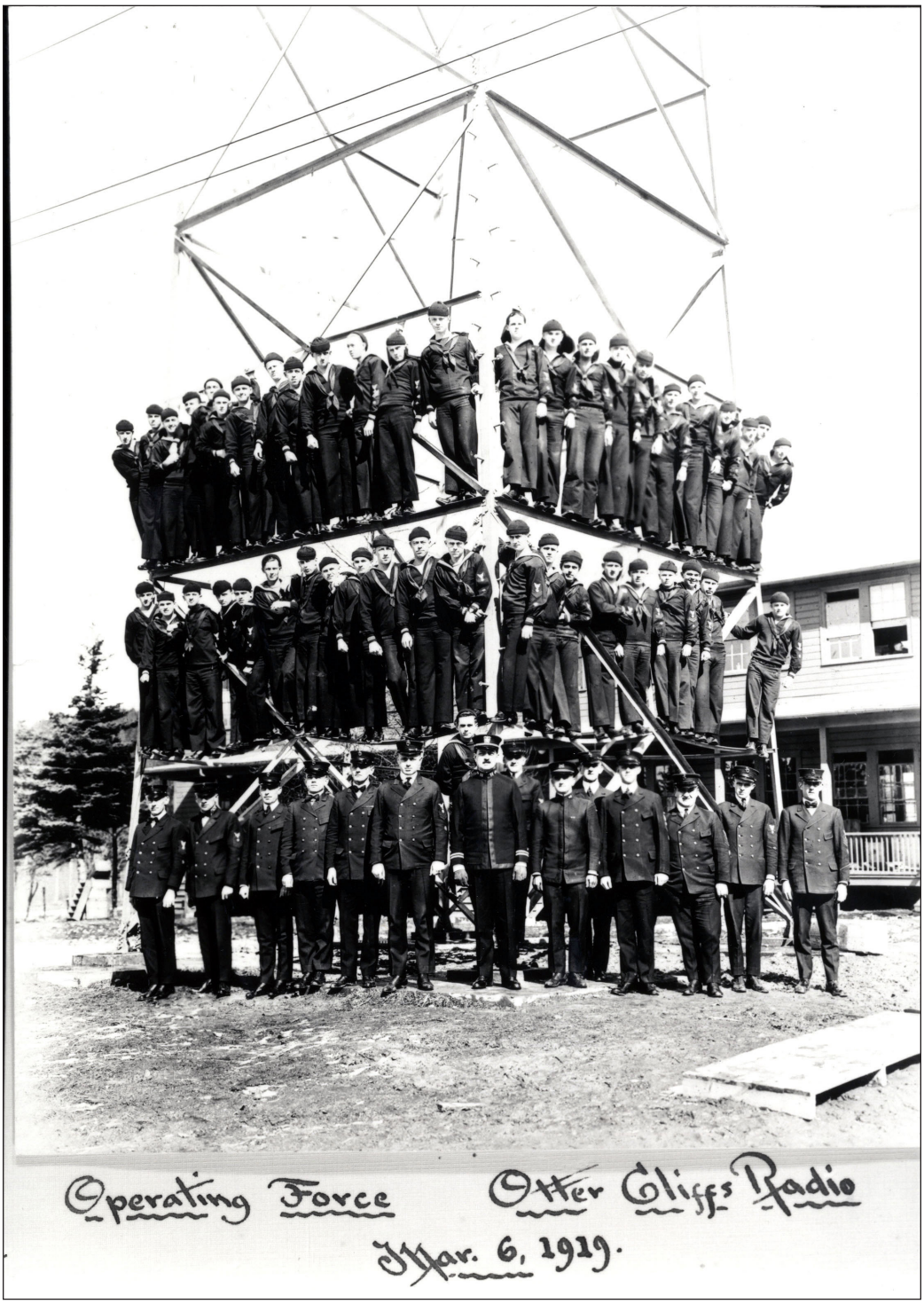
> Here in Washington I suffered one of my great disillusionments which made Pearl Harbor conditions no surprise to me. As an officer from civilian life, I naively believed that we were all in the war together. I discovered that the Army and Navy departments did not share this belief. One morning, armed with proper credentials from the head of Army Intelligence I called at the Navy Department to request on behalf of the Army certain information which we had reason to believe the Navy had. The naval officer, who received me very courteously but firmly, refused, for reasons which he said he could not divulge, to share their information on the subject with the Army. Right there on the spot was born my enthusiasm for unified military command.[1]

Still, as noted in chapter 6, by the beginning of 1918, the navy sometimes sent coded or ciphered messages intercepted by their Otter Cliffs facility in Maine, other navy radio stations, or ships at sea to MI-8 for analysis. In June 1918, the navy sent a liaison officer to work in MI-8. But there was still conflict ahead.

The Otter Cliffs station, although not originally intended as a radio intelligence collection station, did intercept messages from the German station at Nauen. Otter Cliffs was a robust effort, a transatlantic naval radio station that did significant experimental work, in which the navy had invested $80,000 by the time of the Armistice (slightly more than $1.4 million in 2021 dollars).[2] (See photo.)

An operator at Otter Cliffs, Herbert C. Hovenden, remembered that on the evening of October 6, 1918, four operators were covering Nauen when Nauen started transmitting in English. Sensing the importance of the message, they summoned Executive Officer Raymond Cole, who read over Hovenden's shoulder, tore the intercept off the machine, and ran down the stairs to telegraph the information to Washington. When he returned, he grabbed more of the intercept and quickly sent it off. On Cole's return, he told Hovenden that a direct wire to Washington was being held open for the remainder of the message.[3] The precise details of this message are not clear, but Hovenden believed it was a proposed armistice.

Then, on October 12, Otter Cliffs copied another message from Nauen that is said to have been the German reply to President Woodrow Wilson's



Operators, Otter Cliffs Naval Radio Station, March 1919. National Archives and Records Administration, Boston, Record Group 181, Records of Naval Districts and Shore Establishments, 1784-2000, Winter Harbor Papers, Box 9 (ARC ID 6210474)

offer for a "permanent peace of justice," which he had made in a speech on January 8, 1918. The message was signed by Dr. Wilhelm Soif, the German foreign minister. Otter Cliffs started sending the text through to Washington while the message was in progress, beating out a similar message that had been sent via cable.[4]

The army's Military Intelligence Division (MID) got word of the October 12 message containing the German offer. MID took the news to Wilson, scooping the navy and getting credit for obtaining information. Rupert Hughes, the head of MI-10 (the MID's Radio Intelligence Section), later dramatically recounted the story:

> A curious thing happened on a holiday, Columbus Day, October 12, 1918. President Wilson had gone to New York to speak at a public banquet. The military intelligence offices were closed. Only a few were in our office, only one at the Navy Intelligence. Pressure of work brought me down to my desk. A telephone message came from a lone officer at the Naval Intelligence. A strange radio message had come through the ether purporting to be from somebody in Germany and signed by the unfamiliar name of Soif. He was the state secretary of the German Foreign Office and he called across the world to President Wilson a willingness to accept the terms proposed long ago by Wilson.
>
> I rushed with this message to General Churchill, who was also at his desk. What to do? How to get this secretly to President Wilson? After much debate, General Churchill called Delmonico's restaurant in New York on the telephone and had Wilson's secretary, Tumulty, called. Taking all precautions against being overheard, General Churchill repeated Soif's ratio message and Tumulty conveyed it to Wilson.
>
> The next morning I went very early to the naval intelligence office myself in the hope of picking up another plum. The sheepish officers informed me that I had already raised enough hell and Secretary Daniels was roaring like a lion over having such a scoop picked out of the Navy's hands by the Army. Henceforth we were to get no more tips.[5]

While earlier in Hughes's account he attributes the collection to the army station at Houlton, Maine, the intercept actually came from Otter Cliffs. The army's motives for cutting the navy out of the process are unclear.

Shortly after this event, the MID moved quickly to establish an army intercept station in Maine. By the end of October (two weeks after the navy's intercept of the message), arrangements had been made for MI-10 to occupy a site at Houlton. Intercept began on November 11. The navy's objections to the Houlton facility came fast and furious (see chapter 5). Without knowing the Hughes story, these objections seem inexplicable and the official documents provide no rationale for the navy's behavior. The navy's indignation and the subsequent long argument over the army's effort at Houlton only make sense within the context of the MID's scooping of navy intelligence.

The army was at a disadvantage in the transatlantic radio intercept battle, for the navy had put a decade or more of strategic thought into radio work and enjoyed greater political influence. Still, both the Houlton and Otter Cliffs stations made progress in radio experiments and direction finding that would benefit future intercept operations, and both stations made important contributions to the field of radio intelligence.

Harold W. Castner, an operator at Otter Cliffs, would later write of the station at Houlton:

> I suppose it is quite natural that all branches of the Service, strive to produce results with the hope that it will bring credit to that particular Service. It might have been expected that the Army Communications, such as the Signal Corps and others, would

be attracted to the possible glory of efficient Trans-Atlantic Communication.

At all events the Army did establish some kind of a receiving station at Houlton, Maine. I have no doubt but what reception was good and that it might have been of some assistance to the government in these communications, but we always felt that their hope was to exceed the results of the Navy, and even that much concern was had over beating us.

We received several official letters and even copies of various schedules, but they indicated that they were simply making a comparison of their copy with Bar Harbor. To this day I think it was an earnest endeavor to be of service, but I do feel that the Army personnel entertained a hope of showing the Navy something. They had able direction and capable operators, but one thing is certain. They did not enjoy the direction of a commanding officer of the caliber of Mr. Fabbri, whose dynamic personality and profound executive ability was equal to any situation, which was so aptly illustrated by his accomplishments. Very little was heard of the Houlton station and they found it impossible to even offer second-rate competition to us, although it may have been possible for them to make a complete copy of POZ [Nauen call sign]. My reaction to this would be: Who couldn't—except Belmar?[6]

Some sort of accord was reached between the services, although the details are not clear and may not have been documented. Houlton resumed a radio intelligence mission on April 20, 1919. However, when the original group of enlisted men was demobilized in August of that year, the station lost much of its ability to perform its mission. The army was largely unsuccessful in recruiting suitable intercept operators to run the station. Logistics became increasingly difficult. When the lease on the farmhouse expired in the summer of 1920, the effort was abandoned.

Otter Cliffs, in contrast, continued operations until 1933 and was only decommissioned because the land was donated to the National Park Service's new Acadia National Park. Operations were moved to nearby Winter Harbor Station—later known as Naval Security Group Activity Winter Harbor. That site was decommissioned in 2002 and the land transferred to the National Park Service.

Notes

1. John A. Graham, "The Mildly Military Memories of a Refugee, Intelligence Officer and Civil Affairs Administrator in World War I," 10-11, James G. Leyburn Library Special Collections and Archives, Washington and Lee University (WLU), John A. Graham Collection, WLU 0307, Box 7, 10.
2. Alessandro Fabbri to W. J. Carvers, letter, November 12, 1918, National Archives and Records Administration, Boston (NARA B), Record Group (RG) 181, Records of Naval Districts and Shore Establishments, Naval Security Group Activity Winter Harbor, ME (NSGA WH), Fabbri Papers.
3. Herbert Hovenden to Commander Wood, letter, April 20, 1975, NARA B, RG 181, NSGA WH, Historical Information 1917-2002, Papers of Herbert C. Hovenden.
4. Hovenden to Wood; Office of the Director of the Naval Communication Service to Fabbri, letter, November 14, 1918, NARA B, RG 181, NSGA WH, Fabbri Papers, Volume 2; Recollections of Hovenden, August 30, 1979, NARA B, RG 181, NSGA WH, Papers of Herbert C. Hovenden.
5. Rupert Hughes, "Memories of MID," Part IV, *The American Legion Monthly* 18, no. 4 (April 1935): 22-23, 52-54.
6. Howard Castner, "Human Interest Stories Concerning Personalities, Events, and Experiences at the United States Naval Radio Station Bar Harbor, Maine, World War I," 188, NARA B, RG 181, NSGA WH, Box P.

Conclusion to Part Two

There was not time to fully coordinate cryptologic work on the home front. Both the War Department's Military Intelligence Division (MID) and the US Navy used civilian organizations to help them get up to speed in the new discipline of cryptology. Both the MID and the navy scrambled to acquire people known to have the correct skill set or who might have the aptitude to become codebreakers.

Locating and training the right people took far longer than expected. The MID's MI-8 section was not properly staffed for codebreaking and cipher breaking (cryptanalysis) until August or September 1918. The overwhelming burden of codemaking and cipher making (cryptographic) tasks sank the navy's attempts to conduct its own cryptanalysis; the navy eventually allowed MI-8 to become a clearinghouse for cryptanalytic work.

A desire to establish a combined cipher bureau—driven largely by the State Department and by George Fabyan, each for their own purposes—was an idea ahead of its time. While some organizations were quick to cooperate, all parties eventually acknowledged that there was mutual benefit in joining forces. However, the MID and navy had collection interests that remained at cross-purposes, which led to significant conflict in late 1918 and well into the postwar period.

The material against which the cryptologists worked differed substantially from the source material of later organizations. While there was radio intelligence collection from both MI-10E and the navy radio station at Otter Cliffs, Maine, the bulk of the material that had to be decrypted came from material collected through censorship and human means. There was little specific tasking of resources; material arrived, almost unbidden. This flow of information, without an established system of tasking or prioritization, hindered operations for MI-8, if not others.

Operations on the home front occasionally interacted with the organizations overseas. The MID sometimes tried to support American Expeditionary Forces (AEF) analytic efforts but primarily provided staffing assistance. The war ended before a regular pipeline of trained personnel could be established. Cryptologic efforts on the home front and the Western Front operated independently and were very loosely interlocked.

Big personalities drove the operations in lieu of existing policies and structures. Leland Harrison, George Fabyan, Ralph Van Deman, Herbert Yardley, John Manly, Carl Kinsley, and Russell Willson were strong-minded and determined individuals. The patriotism of these leaders and the urgency of the war won out over any personal desire for control of a

cryptologic enterprise. When Van Deman, who had kept various relationships with organization leaders alive despite differences of opinion, left the MID in the summer of 1918, cooperation suffered, particularly between MID and Riverbank Laboratories.

After the war, the work of the navy and MI-10E received less attention than the work of Riverbank and MI-8; this was largely due to the writing and postwar influence of both Yardley and William Friedman. Trading on his wartime success, Yardley, under the auspices of the MID and the State Department, was able to establish his New York cipher bureau in the 1920s. Yardley's Black Chamber, while not a true combined government cipher department (the army, navy, and Department of the Treasury had independent efforts), satisfied some of the postwar need for a central code and cipher service. Similarly, wartime efforts led to continued, if sometimes sporadic, collection of radio intelligence from US-based stations specifically designated for that purpose and set a precedent for radio collection efforts from the late 1930s onward.

Part Three

American Cryptologic Organizations and Operations in France

Introduction to Part Three

American Cryptologic Organizations and Operations in France

Montsec, early 1919. This hill, held by the Germans, overlooked American positions along the southern side of the St. Mihiel salient. Digitization courtesy of Meuse-Argonne.com. National Archives and Records Administration, College Park, Record Group 120, Records of the American Expeditionary Forces, RG 120-G. Photographs taken by the "Griffin Group" of areas occupied by American troops during World War I combat operations, 1918-1919. 120-G-1-SM-48-26

The United States entered World War I with minimal experience in radio intelligence and cryptologic work. Between mid-1917 and the Armistice in November 1918, the American Expeditionary Forces (AEF) built up a creditable radio intelligence operation—not just by hard work but through substantial contributions of hardware and experience gained from their British and French allies. By the end of the war, more than 500 men were operating a complex, cross-organizational collection, analysis, and reporting effort. They had established operational techniques

that would influence the future of American signals intelligence efforts.

In November 1918, newly promoted Captain Charles H. Matz (see chapter 8), the radio intelligence officer for the First Army, declared: "This source of information, practically unthought-of before the war, has been developed to such an extent that, at the close of hostilities, it constituted one of the main branches of intelligence."[1] He was speaking, of course, of radio intelligence. The AEF collected and processed huge volumes of radio and other communications traffic, leading to the development of an efficient system of breaking codes and ciphers and using direction-finding results. The type and quantity of reporting evolved over time.

It is impossible to stress too strongly how much of an integrated, matrix-managed operation the AEF had in France. While there were three different sections, commanded by three individuals, the Signal Corps Radio Section did the bidding of the Radio Intelligence Section (G2A6). The G2A6 chief handled issues relating to the collection facilities, particularly when other organizations were involved.[2]

Collection systems, operated by the Signal Corps, were managed by officers from the G2A6. These officers in turn were subordinate both to the G2 and to the AEF's First and Second Armies. The evolving work had many masters and was accomplished by juggling priorities across multiple boundaries of military command. There was also a small but efficient effort to develop codes for American use and to distribute them across the AEF.

Part three addresses the work of three organizations: the Radio Intelligence Section (G2A6) of the AEF General Staff (chapter 8), the Code Compilation Section of the Signal Corps (chapter 9), and the Radio Section of the Signal Corps (chapter 10).

Notes

1. Charles Matz, November 13, 1918, report of First Army G2A6, quoted in Robert Loghry memo to Radio Section Personnel, November 25, 1918, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 120, Records of the American Expeditionary Forces, Entry 105, Box 5762.
2. Frank Moorman to Arthur Conger, letter, May 18, 1918, NARA CP, RG 120, Entry 105, Box 5767. Moorman complains about divisions moving away and not informing the Radio Intelligence Section (G2A6), abandoning the stations and operators.

Quick Guide to American Areas of Operation in France Discussed in Part Three

In the official records, "sector" is used in several different ways. It describes a general geographical area under military control or a specific, defined part of the front line.

The American Expeditionary Forces (AEF) primarily occupied the Lorraine Front (see map), although they also were active in other regions. For the purposes of this book the focus is on Lorraine, as that is where the cryptologists were located. The AEF headquarters were in Chaumont; the Radio Section would eventually be located in Toul.

Listening stations were set up in the Baccarat Sector, not far from Pexonne (south and east of Nancy, along the front line in the area between Nancy and the Vosges mountains). They were also set up in what was variously known as the Toul Sector and the St. Mihiel Sector, the area along the southern side of the St. Mihiel salient. The St. Mihiel salient was an approximately 200-square-mile area southeast of Verdun that was occupied by the Germans in August 1914. The Toul Sector included other areas often given their own sector designation, such as Ansauville.

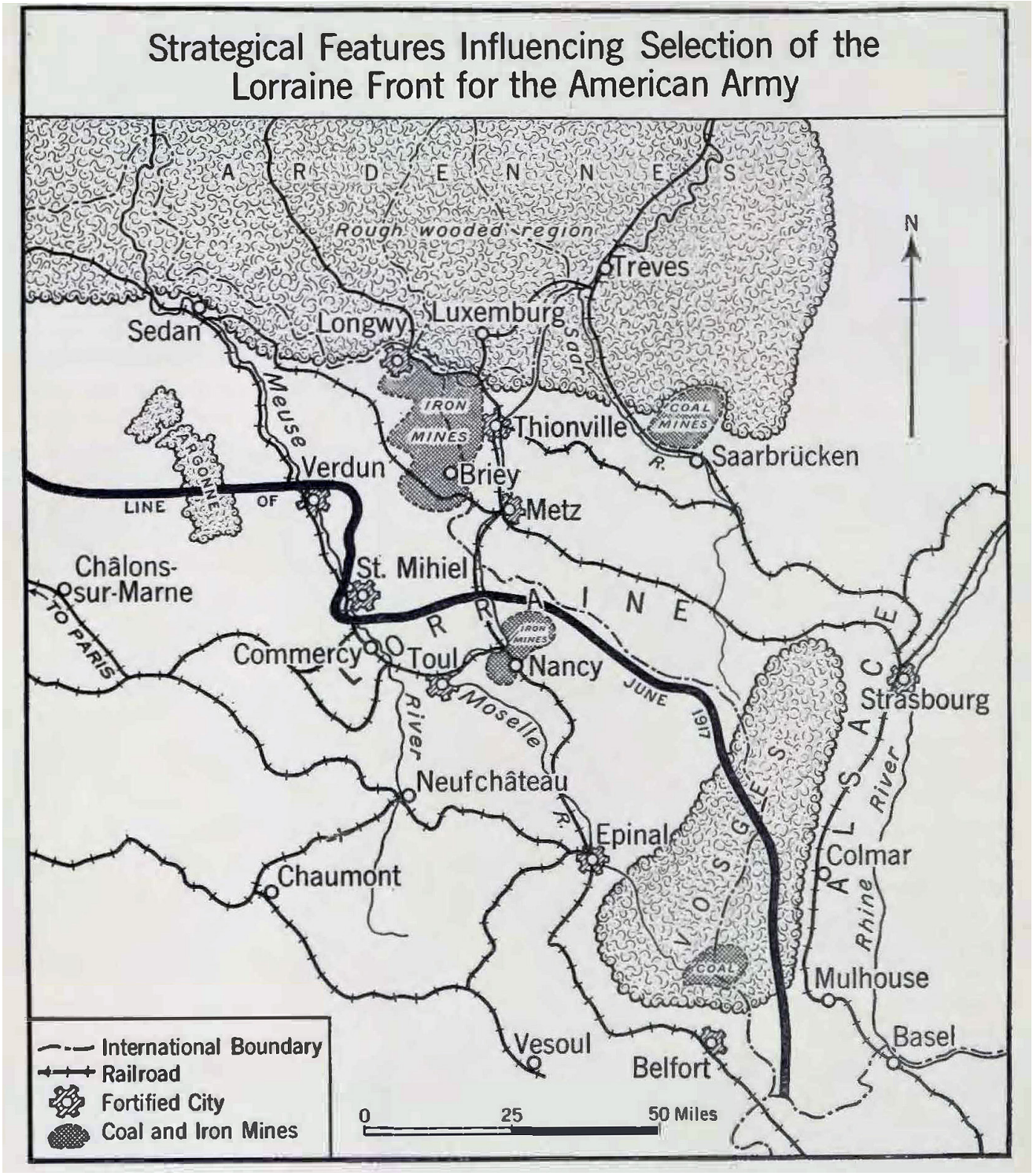
The Verdun Sector, as referenced in documents relating to the cryptologic effort, broadly referred to the area west of St. Mihiel and Verdun, encompassing what is now known as the Meuse-Argonne region.

The Allies also separated/divided the front into sectors, which were broken down even further into "Group Sectors" (referred to here as subsectors). This helped pinpoint German activity and provided a frame of reference that was used in intelligence reporting.

The relevant sectors, as described in William Friedman's *Field Codes used by the German Army During the World War*,[1] included the following:

ARGONNE Sector (F-Sector) Aisne River to eastern limits of Argonne Forest
Argonne Sector German III Army
- FY – subsector F-10, F-15, F-20
- DORMOISE – subsector F-25, F-35
- ARGONNE – subsector G-40, G-45, G-50

VERDUN Sector (G-Sector) Eastern limits of Argonne Forest to Moulainville
Verdun Sector German V Army (boundary extended spring 1918; included part of region formerly occupied by German Detachment C, but the AEF continued to use the older designations)
- W. MEUSE – subsector G-10, G-20, G-25
- E. MEUSE – subsector G-30, G-40
- ORNE – subsector G-50, G-55
- VAUX – subsector H-5, H-7



Map showing the Lorraine Front and strategic features. All AEF cryptologic work was done on this front. Map courtesy of the American Battle Monuments Commission, *American Armies and Battlefields in Europe: A History, Guide and Reference Book*, Washington, DC: US Government Printing Office, 1938, 16.

WOËVRE Sector (H-Sector) Moulainville to Moselle River
WOËVRE Sector German Detachment C
ÉPARGES – subsector H-10, H-20
ST. MIHIEL – subsector H-25, H-30, H-35
THIACOURT – subsector H-40, H-45

LORRAINE Sector (I-Sector) Moselle River to Rhine River[2]
LORRAINE Sector German XIX Army
BERSDORF[3] – subsector I-5, I-10
BLÂMONT – subsector I-20, I-25, I-30, I-45

Notes

1. William F. Friedman, *Field Codes used by the German Army During the World War* (Washington, DC: Government Printing Office, 1935), 1-2. This document is available at https://www.nsa.gov/portals/75/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_437/41751269079046.pdf. Accessed October 10, 2021.
2. Friedman identifies the sector as stretching from the Moselle River to the "Plaine" River; however, the river is likely the Rhine.
3. The location of this area is unknown and not further identified in the source; Bersdorf may be a region rather than a town, or this may be a typographical error on Friedman's part.

Chapter 8

The Radio Intelligence Section (G2A6)

Major Frank Moorman (see sidebar), one of the three officers in the US Army who had expertise in codes and ciphers before the war, was selected to lead the American Expeditionary Forces (AEF) Radio Intelligence Section (G2A6) and arrived in France on July 28, 1917, just weeks after General John J. Pershing and his advance party. While Moorman was en route to France, the first American draftees were chosen by lottery on July 20, and a few days after his arrival, the British began fighting the Third Battle of Ypres (Battle of Passchendaele) in Belgium. His immediate boss was Colonel Arthur Latham Conger, head of the G2A (General Staff of the AEF); General Dennis E. Nolan was in command of the G2 (Intelligence Section of the AEF General Staff).

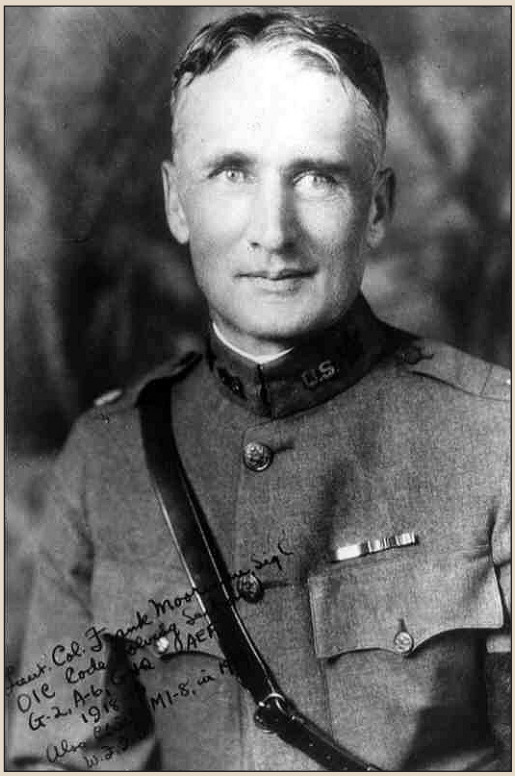
Moorman began his army career in the Philippines as an enlisted man. The oldest of six children in a single-parent family, he had not attended college because he had to work to support the family.[1] Moorman was commissioned in 1904 and was the star pupil of the 1915 class at the Army Signal School at Fort Leavenworth, Kansas, where he was taught by Captain Parker Hitt.[2]

After a short stint running the AEF code room in Paris, Moorman spent two months gathering information from the British and French to determine how to structure and organize the G2A6. Nolan had encountered British and French cryptologic efforts in June and July 1917 and remarked that the effort "was an intense and unremitting one which often yielded intelligence results of the greatest importance." Both men learned that as many as two-thirds of identifications of enemy divisions came from cryptologic work. Nolan noted the reticence of the French to discuss the work; they did not want their information shared with anyone other than General Pershing. The French, according to Nolan, did not even tell their own army commanders about their success for fear of compromising the source.[3] In October, Moorman consulted with Hitt, now a lieutenant colonel serving in Chaumont as assistant to AEF chief signal officer General Edgar Russel, about preparing intercept logs.[4] Samuel T. Hubbard, a junior officer in the G2A1 (Order of Battle Section) sent on a trip to British General Headquarters in December, was impressed with British radio intelligence efforts. Hubbard remarked he could not "recommend too highly that every effort be made to immediately equip Major Moorman with all the necessary apparatus and with every assistant [*sic*], even if other branches of our intelligence section must temporarily suffer, so that this phase of intelligence work will have the greatest possible development before we take over a sec-

Frank Moorman

Frank Moorman was born on September 10, 1877, in Greenville, Michigan, the eldest of six children. In the absence of his father, Frank worked as a shipping clerk to support the family. He joined the army in November 1899 at age 22 and went with the 1st Infantry to the Philippines. In 1904, he was commissioned a second lieutenant and eventually went back to the Philippines. He was a 1915 graduate of the Army Signal School, where he studied under Captain Parker Hitt.

According to his grandson, also named Frank Moorman, "Grandfather said his college was the Harvard Classics, a subscription series of the great works of Western civilization. He called it his five-foot university, from the length of the shelf on which the books fit." The historian David Kahn noted that "as a boss he was well regarded by his men for his fairness and blunt honesty."



Collection of the Center for Cyptologic History

Moorman arrived at AEF headquarters at Chaumont on July 28, 1917. He immediately took command of the G2A6, the Radio Intelligence Section, where he not only shepherded the codebreaking and cipher breaking work but also, through close coordination with Robert Loghry, influenced the direction of the Signal Corps Radio Section's collection effort.

Samuel T. Hubbard, a junior intelligence officer in the G2A1, remembered Moorman as "a most delightful individual" with a "charming character that made a great impression on all of us." Both Hubbard and Moorman were part of the Intelligence Service mess in the headquarters building; some of the officers, including Moorman, were billeted in the same building. Hubbard remembered that Moorman, who was very quiet at meals, burst in late to dinner one night, having taken an unfamiliar shortcut in the dark and gotten lost in an "undesirable" section of town where he was besieged by prostitutes before he made a run for it. Hubbard and the junior officers of the mess were so amused by how flustered the "dignified" Moorman was by the event that they cooked up a prank. The next evening, they put a large statuette of Venus de Milo on a balcony to chill; they then snuck the cold Venus into Moorman's bed and waited for Moorman to turn in. Waiting on the staircase, they heard screams and rushed in to find Moorman with the cold statue. "Moorman knew we had schemed this up. He did what we had never seen him do before—he swore violently at us and we beat a hasty retreat, slamming the door behind us." It was a matter of great mirth in the mess for weeks.

J. Rives Childs remembered that Moorman didn't believe in recommending reserve officers for promotion. But when another officer recommended the reservist Childs, and he was promoted, "Colonel Moor-

man called me in and he said, 'Lieutenant, I want you to know I had nothing to do with your promotion, but I'm very pleased with it.'" Of that comment Childs remarked, "that was the kind of man … you couldn't help but liking him, you know, he was so frank and honest."

In 1920, while working in the office of the Chief Signal Officer in Washington, DC, Moorman founded Boy Scout Troop 33 in Takoma Park, Maryland. When he moved to Camp Vail (later Fort Monmouth), New Jersey, in 1922, he founded Troop 67 there. He retired in 1927 but kept in contact with Signal Corps issues and occasionally visited William F. Friedman at his offices. Moorman died on September 30, 1953, and is buried in Arlington National Cemetery.

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Hubbard, Samuel T. *Memoirs of a Staff Officer 1917-1919*. Tuckahoe, NY: Cardinal Associates, 1959.

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Moorman, Frank. "Frank Moorman writes about his grandfather, Lt. Colonel Frank W. Moorman, and his father Major General Frank W. Moorman." http://bsa-troop33.net/history/moorman_family.html.

tor. To do so without the necessary wireless is to go in half blinded."[5]

Intercept was Moorman's first requirement. Upon arriving in Chaumont, he requested that the Signal Corps organize a "Signal Company of wireless experts" to set up intercept stations. Moorman arrived at Chaumont to find his office "piled almost to the ceiling" with intercept (which may have come from French collectors as no American intercept stations had opened).[6] The AEF Signal Corps was already working on such a service and by September 1917, men arriving in France began setting up the AEF Signal Corps Radio Section (see chapter 10).[7]

It would take nearly six months to provide Moorman with enough intercept, supplies, and men to do the work. He opened the G2A6 office in Chaumont on the first of September; on September 25 Moorman was joined by First Lieutenant Hugo A. Berthold (see sidebar), an electrical engineer by training, with no known background in codes or ciphers. A few weeks later Army Field Clerk[8] Harry Block arrived to assist with their work.

Life in Chaumont

Chaumont, a pleasant city with a history dating back to the year 940, is located on the banks of the Marne River. Prussian forces briefly seized Chaumont in October 1870 during the Franco-Prussian War. Travel to Paris, about 170 miles away, was by train; by automobile, it was approximately 60 miles to the front lines of what was to be the American sector. This quiet city, with a population of about 16,000 in 1917, was chosen to be the location of American headquarters because of its proximity to the sectors of the front assigned to the AEF. The move from Paris occurred in late August 1917, with the AEF headquarters officially opening on September 1.[9]

The "large and airy" nineteenth-century buildings of the Caserne Damrémont (Damrémont Barracks) in Chaumont, on what is now Avenue du 109ème Régiment d'Infanterie, served as AEF headquarters. Building B (see photo) was the center

Hugo Alex Berthold

Hugo Alex Berthold was born in New York City on December 12, 1881. His father was born in Germany and was a merchant who became a naturalized American citizen the month before Hugo's birth. The family appears to have traveled back and forth to Germany frequently; Hugo grew up speaking fluent German. He graduated from Purdue University in 1904 with a bachelor of science degree in electrical engineering. While at Purdue, he was involved in many extracurricular activities. His yearbook gave the following tribute:

> Although Hugo has about evenly divided his time since his advent on this mundane sphere between this country and Germany, he is as thorough an American as any of us who have never been outside the limits of our own chicken yard. He is a natural born promoter, and as soon as he gets interested in any project (he is connected with nearly every enterprise about the University) things have got to move. He is the champion leg-puller of the school—he can collect money off anybody and everybody—and comes mighty near being able to get blood out of the traditional turnip. He will succeed in any capacity where hustling is required.

After graduation, Berthold worked as an electrical engineer in Manhattan. He was a member of the Officer Reserve Corps and was called up on August 29, 1917. He was immediately sent to France, sailing from Hoboken on September 7. He arrived in Chaumont on September 25 and jumped right into the job as Frank Moorman's deputy in the G2A6.

Berthold was efficient and appears to have been both competent at codebreaking and administration. He elicited different reactions in the men. William Friedman, though he thought Berthold had "peculiar ways," sought his approval and appreciated his counsel. J. Rives Childs found the older, balding, superior officer too Germanic for his taste and doubted his knowledge of cryptology.

Berthold went with the Third Army to run the G2A6 organization in Coblenz, Germany. When he was discharged on December 31, 1920, he remained in Coblenz for travel and study. He returned to the United States in August 1924 and took up various jobs involving electrical equipment. Late in life, in 1937, he married Dolores Osorio. He died on November 13, 1949, and is buried in Long Island National Cemetery in East Farmingdale, New York.

Sources

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Purdue University. *The Debris of 1904*. Purdue University Libraries, Archives and Special Collections, ID number PUD00017.

building, with Building A on the left and Building C on the right as seen from the compound's entrance. General Pershing's carpeted office was on the second floor of Building B, at the head of the main stairway. The G2 offices were in the left wing of Building B and sprawled both into Building C and

AEF Headquarters Building B, Chaumont, France. National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-010062

a variety of temporary, collapsible wooden barracks. These barracks and other temporary buildings covered the surrounding ground, leaving open a quadrangle in front of the three main buildings. Every day at 1100, weather permitting, there was a guard mount in the quadrangle and, from 1230 to 1330, a concert by the General Headquarters Band.[10] Hitt noted that the buildings were fumigated for three days prior to the AEF's arrival for "they were alive with vermin of every loathsome description." But Hitt explained that the AEF "installed electric lights and good American telephones" and that "we will make it liveable after a while."[11]

The G2A6, consisting of just Moorman, began in Room 85 of Building B on September 1, 1917. Room 85 was furnished with one table, a typewriter stand, and three chairs; as more personnel arrived, so did more furniture, until the room housed at least five large tables, several typewriter stands, and numerous chairs, wastepaper baskets, cuspidors, and a duplicating machine. Dark window shades were installed in late November so that evening work could proceed despite blackout regulations. Although the room already had a stove for heating, a larger one was added in December. By January 22, 1918, there were nine men, and they acquired more tables, chairs, file cabinets, drawing boards, and another duplicating machine. With eight additional people expected in the last week of January, the staff was moved to Room 59 in the same building and given two telephones.[12] Two months later, on April 1, 1918, with 30 people in place and another 17 arriving in May, the main office was moved to Room 69 on the fourth floor of Building C.[13] The section also used rooms 67 and 68.

On August 28, the operation had to move again, to another larger space, which was a building known as the Recreation Hall. This was a concrete build-

ing with numerous windows; the facility was dubbed the "Glass House" in a 1922 article by war correspondent William E. Moore. Moore claimed the codebreakers moved there "after one or two indiscretions of conversation had revealed the necessity of preventing the kind of information they handled being made the subject of office gossip about the big headquarters buildings." There is no evidence, however, that the move occurred for reasons other than needing space, although the privacy and isolation from other offices was probably welcomed.[14]

In order to relocate, the codebreakers had to put down their intercept, pencils, and graph paper to engage in a morning of manual labor to move the furnishings and files. William Friedman wrote to Elizebeth Friedman about the move and the lack of effort on the part of his fellow officer J. Rives Childs (see sidebar):

> Well, Wednesday morning we moved our office into a little building all to ourselves. It was quite a job moving everything from the fourth floor down to the first and over. It took all morning and everybody had to help. I must have travelled up those 4 flights (all long ones) ten times anyhow. In the middle of the procedure, when most of the staff had been moved I failed to note the presence of M. Childs. Just like his lazy old hide to duck off and leave when there's work to do. Well, it made me kind of mad—and the other fellows too! I sort of had an idea maybe he was hiding in a certain library so took a peep in. Sure enough there he was, reading a paper. I just looked at him and said nothing. [Ed] Woellner happened by then and I told him to take a look. He did and he was so mad he bawled him out right then and there. He came out rather sheepishly. He's a peach.[15]

Friedman also remarked that the workspace was nice, but he feared they would be very cold in the winter as "French heating systems are poor and scarce anyhow." But he was pleased to have a "choice location" as the informal but de facto advisor to Captain Berthold.[16]

As work wound down after the Armistice, the office moved back to Building B, first in Room 56 on December 3 and then to Room 59 on December 26, 1918.[17]

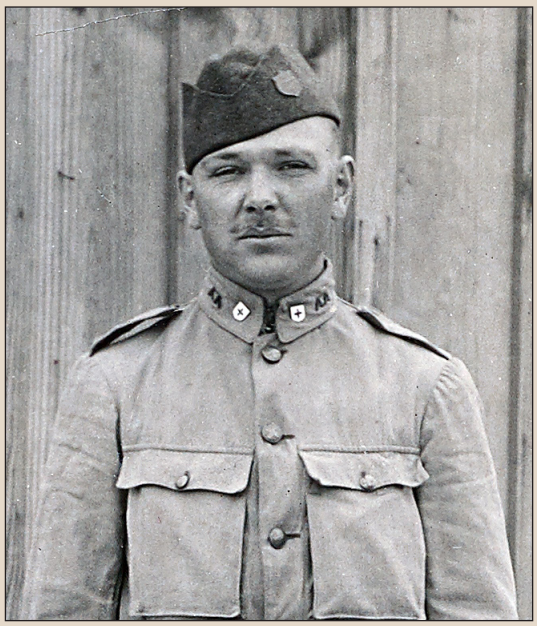
An assignment to AEF headquarters at Chaumont came with privileges not given to the average soldier. John Graham (see sidebar) found this to be true in several ways. When Graham and Lee West Sellers (see sidebar), two of those first four officers trained at MI-8 (the Military Intelligence Division [MID] Code and Cipher Section) and Riverbank Laboratories, stepped off their train in Paris, they found a billeting officer calling not just their names but that of General Leonard Wood. There was a taxi waiting to take the men to reserved hotel rooms. No other officers on the train received this sort of personal service, and Graham attributed it to the fact that the designator "intelligence officer" was "sufficiently unfamiliar to be impressive."[18]

At headquarters, Graham found it possible to be "inured to the constant presence of brass hats," but he was not prepared for General Pershing walking in while he was occupied in the "less than private" headquarter toilets. Graham recounted "nothing in Emily Post or the Officers' Manual gave instructions for such an encounter," but to his relief "the general spoke casually and thank God I had enough presence of mind neither to try to salute nor to snap to attention."[19]

General Nolan himself later explained his reasoning for keeping the main cryptologic force at headquarters:

> The real code man, the one making original solutions, has a difficult task. He must fix his mind absolutely on the work in hand. If his feet are cold, if he is hungry or thirsty or ill, if his office is noisy, if the light is bad, if he is wondering what became of his bedding roll during the last move, or what kind of a billet he will get after the next one, his

J. Rives Childs



Papers of J. Rives Childs, Accession #9256-b, Special Collections, University of Virginia Library, Charlottesville

James Rives Childs, who preferred to be called Rives, was born on February 6, 1893, in Lynchburg, Virginia. He attended the Virginia Military Institute for two years but transferred to Randolph-Macon College and graduated from there in 1912. His great-grandfather, John Early, was a founding bishop and chairman of the Board of Directors of Randolph-Macon College. Childs later received a master of arts in comparative literature from Harvard in 1915.

After leaving Harvard, Childs traveled to France. His passport application indicates he was going to visit friends at the American Ambulance Hospital outside of Paris. It is not clear whether he worked for the ambulance service himself. When he returned to the United States, he attended the officer training camp at Fort Myer, Virginia, in May 1917, and was commissioned as a second lieutenant on August 15. Although assigned to the 80th Division, he appealed to US Senator Thomas S. Martin of Virginia for support to join military intelligence. Childs was detailed to the Army War College on September 21.

Childs was in the group of four officers who received training at Riverbank Laboratories before going to France. He arrived at the G2A6 in Chaumont on February 1, 1918. Because he was mistaken by authorities in Washington for another man named Childs who was supposed to be a cipher expert (possibly Thomas M. Childs who worked in MI-8), he was assigned chief of the Cipher Section of the G2A6 and chosen for liaison duty with the British and French cipher bureaus. He left the G2A6 on December 3, 1918, to go with Captain Herbert O. Yardley to do work for the Paris Peace Conference. In April 1919, he was assigned to the American Relief Administration in charge of the commission to Southern Serbia. He returned to the United States in October 1919 and was discharged. Childs then had a memorable career, first as a famine relief official in Russia, then as a Foreign Service officer from 1923 to 1953. He authored 15 books and was president of the International Casanova Society. In retirement, he settled in Nice, France. After the death of his wife, he moved to Richmond, Virginia.

His book, *Before the Curtain Falls*, published anonymously in 1932 and in a different form in 1983 with his name attached and titled *Let the Credit Go,* provides an account of life in the G2A6 and the other officers he worked with. Childs attended the May 1975 dedication of the Friedman Auditorium at NSA and participated in a series of oral history interviews with the history staff. He died on July 15, 1987, and is buried at Spring Hill Cemetery in Lynchburg.

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John Alexander Graham

John Alexander Graham was born in Lexington, Virginia, on January 15, 1895. (While his gravestone says January 5, multiple documents filled out by Graham himself indicate he was born on January 15.) He was descended from one of the founders of Washington and Lee University and received his bachelor's degree from that institution in 1914. He was studying in France at the University of Grenoble when war broke out in August 1914 but, by August 22, was able to secure passage back to the United States. He taught high school French and Spanish in Richmond, Virginia, for several years.

John Graham, 1918 or 1919. John A. Graham Collection WLU 0307, James G. Leyburn Library Special Collections and Archives, Washington and Lee University

Graham applied for a commission on May 2, 1917, just a few weeks after the declaration of war, and was part of the officer training class at Fort Myer, Virginia, and later at Camp Lee, Virginia, in the summer of 1917. He received training in military intelligence and was one of the four officers selected by Herbert O. Yardley to attend training at Riverbank Laboratories before proceeding to France to work in the G2A6. Graham travelled with Lee Sellers, who had a family connection to Lexington, departing New York on December 27, 1917, and arriving at the Chaumont offices on January 18, a full two weeks ahead of their colleagues J. Rives Childs and Robert Gilmore.

While in France, Graham worked on a variety of code problems and was assigned in September 1918 to assist Charles Matz with the First Army Radio Intelligence Section. Frank Moorman's farewell note of November 30, 1918, speaks to Graham's "intelligent and whole-hearted cooperation" and abilities, as well as recognizes the fact that those abilities kept Graham away from the front line "where the chance for promotion and excitement has naturally appealed to all young men." The note acknowledged that the job away from the front "has been against your will, but the necessity has been recognized by you and you have accepted the situation cheerfully."

After the Armistice, he was sent to Coblenz, Germany, with the Third Army where he worked in civil affairs; he returned to the United States on July 5, 1919.

After the war he was offered a teaching job at the Virginia Military Institute but instead taught in the Romance Language Department at Washington and Lee University and obtained his master's degree from Princeton University. He was appointed full professor in 1940 and, in addition to teaching Spanish, founded the Department of Fine Arts and taught courses in music appreciation. Graham was also a composer, composing and arranging works for choirs and singing groups on campus and in town,

and he directed a Presbyterian church choir for 25 years.

Graham died on April 9, 1947, and is buried in what is now Oak Grove Cemetery in Lexington, not far from his G2A6 colleague Sellers. In 1958, the Rockbridge Historical Society presented an evening program of music composed by Graham, whom they remembered as a "composer, teacher, poet, wit, [and] *amicus musicae extraordinarius*."

Sources

Ancestry.com. Vital records. Accessed April 17, 2018.

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The Ring-tum Phi, Washington and Lee University, May 9, 1947.

> work is certain to suffer. On the other hand, if he is so far from the point at which messages are copied that it requires many hours for them to reach him, the value of his solutions when made will be much reduced. For these reasons, we kept our decoding experts at GHQ [General Headquarters]—near enough to the front to permit of rapid and sure communication and far enough away to insure against frequent changes in location.[20]

Enlisted men lived in the barracks on the headquarters compound. An exception to this was made on several occasions for the G2A6 when they began shift work in March 1918, for the men found it impossible to sleep in the barracks during the day.[21] Junior officers were expected to find quarters in town and to organize their meals through a mutually arranged mess, where they would pool their funds and arrange for a Frenchwoman, usually at one of their billets, to provide meals for the group. Many senior officers lived in the main buildings of headquarters where there was an intelligence section mess. Transportation was by foot, and a 30-minute walk to one's billet, along the winding streets and often in the rain, was not unusual. There were no streetlights due to blackout requirements; the walk home, after sunset, would often be cold and rainy.[22] William Friedman, who had needed a week after his arrival to learn his route home through the twisting streets,[23] recounted to Elizebeth Friedman the details of one such walk in September 1918:

> The walk home was so bad it was romantic. You have no idea how dark it gets in France—and there are no lights. It had rained hard in the evening and I guess I didn't miss a single puddle on the way—or maybe it was one long puddle of mud. When Ed [Woellner] and I walk together the puddles are a source of much amusement. He usually runs up a score of 150% or so—meaning that he'll step twice in the same pool—and the splash goes over my lower extremities. Sometimes it is so dark that we have to keep cigarets [*sic*] lit to act as a sort of head—and tail light so's others won't run into us.[24]

Friedman's experience with his billet was typical for a junior officer of the AEF.[25] In September 1918, Friedman paid $50 a month for the mess, and his room cost $12. This left him $31 from his monthly pay, and he estimated that he couldn't spend more than $6 on incidentals, so he figured he'd have $25 left over each month.[26] He was part of a group that had been spending too much money eating at the YMCA or at hotels or cafes, so he was delighted

Lee West Sellers

Lee West Sellers was born in New Orleans, Louisiana, on January 12, 1894, but spent most of his childhood in the New York and New Jersey suburbs of New York City, where his father worked first as a broker and then as the president of the Telepost Company. Sellers, the grandson of Confederate Brigadier General William Harvey Sellers, had family ties to Lexington, Virginia, where his father had taught at Washington and Lee University and socialized with the Lee and Jackson families.

Rare Book and Manuscript Library, Columbia University in the City of New York

Sellers graduated from Princeton University in 1916 and the Columbia School of Journalism in 1917. While at Columbia he worked for the *New York Tribune* as the assistant music critic. Though he is not wearing them in his photograph, Sellers wore thick glasses and later let colleagues believe he had only passed the army eye test by memorizing the chart. He attended the Plattsburg, New York, officer training camp in 1917, graduating as a second lieutenant, and was selected for training in military intelligence. He was one of the four junior officers selected for training in MI-8, then at Riverbank Laboratories, before going to France to serve as the core of the AEF's G2A6. He travelled with fellow officer John Graham, departing New York on December 27, 1917.

While at Chaumont, Sellers (a flautist) often played music with William Friedman (a violinist). Sellers's brother Barrington West Sellers was killed on August 4, 1918, while serving as a liaison officer with the 4th Division. The death of his brother prompted Lee to request a transfer to a machine gun unit. Frank Moorman, head of the G2A6, told him, "Pull yourself together … what we are all trying to do is to win the war. You've been doing good work here and you're worth a damn sight more to the General Staff than you are out there somewhere with a machine gun." Moorman advised Sellers to think it over for a week and if he decided he must go, "I'll tell you I need you here and don't want you to go, but if you insist I may forward your application." Sellers stayed and remained in the Code Section of the G2A6 until November 28, 1918, at which time he transferred to the G2B, the Secret Service Section, where he worked as an interpreter. Before he left the G2A6 he wrote a brief history of the organization. He died on June 2, 1919, after six weeks in the hospital at Chaumont of chronic nephritis, although his illness was attributed to "unhealed wounds and exhaustion" or "general breakdown caused by incessant work."

In 1921, Sellers's remains were transported to the United States and reinterred in his family's plot in what is now called Oak Grove Cemetery in Lexington. His colleague John Graham is buried nearby.

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[Childs, J. Rives]. *Before the Curtain Falls*. Indianapolis: Bobbs-Merrill, 1932.

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The Lee West Sellers Collection, National Cryptologic Museum Library, letters from Lee West Sellers to his family August 29 and August 30, 1918.
New York State Adjutant General's Office. Abstracts of World War I Military Service, 1917-1919. https://iarchives.nysed.gov/xtf/view?docId=ead/findingaids/B0808.xml.
Princeton Alumni Weekly 19, no. 36 (June 18, 1919), 744.
Randolph-Macon College Flavia Reed Owen Special Collections and Archives, J. Rives Childs Collection, World War I Papers, Volume 1.

that a mess had finally been organized. Friedman had breakfast provided at his billet by his "madame," a "kind old motherly soul" who "takes the best care of me" and who made sure that flowers were always in a vase kept by Elizebeth Friedman's picture.[27]

There was only one public bathhouse in the city, and it was only available on Wednesday, Saturday, and Sunday; men bathed out of a wash basin on other days.[28] It was a day of great excitement when a bathing room opened in the headquarters complex and was available to officers seven days a week, 24 hours a day. Unfortunately for the officers of the G2A6, the room opened about 10 days after the Armistice was signed.

Apart from the daily band concert in the headquarters courtyard, the YMCA, a short walk of about a mile from headquarters down the Avenue des États Unis, supplied a variety of musical and vaudeville entertainment. Friedman remarked on going to see a football game between two companies where, to the crowd's excitement, some airplanes were flying about. One plane circled the field, shut off its engine, dived toward the crowd, and then zoomed back up into the air, dropping advertisements for a French loan. After the game, it was off to the YMCA, where he sat next to former New York Giants pitcher Captain Christy Mathewson.[29] The men of the Signal Corps Code Compilation Section and Radio Section (before they moved to Toul), would have similar experiences.

The Problem of Staffing

When the AEF began, there was no office full of cryptologists for the US Army to pick up and move to France. There was no pool of trained men to fill analytic positions. The AEF had all the same staffing problems that MI-8 faced in Washington, with the added disadvantage that the men selected had to meet army standards for commissioning or enlistment and had to be transported overseas. And, of course, they had to be trained. Although General Nolan, head of the G2, would soon realize the importance of code and cipher work, he initially had a "misconception" of what was required. After the war, Nolan divulged to Moorman that "the next time he would put into this work the best brains of the country."[30]

Tireless in his efforts to staff his organization, Moorman repeatedly sent telegrams and memos to the MID in Washington, scanned lists of officers arriving from overseas, and made visits to the AEF schools at Langres, about 22 miles southeast of Chaumont. Moorman felt that those commissioned as cipher experts "should be those who have spent their lives studying hieroglyphics, cuneiform characters and the like, the idea being to get men familiar with the workings of the human mind and capable of long hours of close thinking even when no results are obtained…age should not be a bar to the selection of men for this duty."[31] Moorman wanted officers who knew German and "who were

able to think. The difficulty experienced in finding men who could actually think without a guardian was surprising." For clerks, Moorman required "ability to work" and, whenever possible, knowledge of German.[32] After the war, journalist William Moore claimed that Moorman:

> … selected his assistants because of their pursuit in civil life of unusual hobbies. The fundamental requisite, of course, was that all of them must understand the German language. Beyond that they need have little else in common. An infantry officer was chosen because his qualification card showed that, although a lawyer by profession, he had made considerable outside study in archeology. Another man was taken because he was a chess expert. An architect before entering the Army was shown by his card to have devoted years to the self-imposed task of studying Hebrew, Persian, and other Oriental languages. All of the G2A6 crowd had given proof of studious habits of mind in the pursuit of information that demanded close application and logical methods of thought. Almost without exception the officers so chosen proved able code experts when their talents were turned in that direction.[33]

Soon after he arrived, Lieutenant Philip B. Whitehead (see sidebar) wrote home about the diversity of the group:

> I am very pleasantly fixed for quarters. At our mess we are all from the Intelligence section. They are an interesting group of men. Like myself, they were picked for their knowledge of languages and they have all travelled a good deal. So we have a very interesting conversation. Between us we have been pretty much all over the world. When we are not discussing the war, it may be Spanish art, or Chinese footbinding, or Parisian theaters, or American politics, or almost anything under the sun that we discuss and argue about. We have someone who can speak Persian, Russian, Spanish, French, Italian, German, and perhaps a little of some other languages.[34]

Moorman identified and plucked his candidates out of the stream of newly commissioned young men arriving in France.[35] Some were fresh out of the officer training camp system.[36] Wesley J. Ladwig, who had turned 21 in October, and Charles H. Matz (see sidebar), who turned 22 en route to France, showed up just before Christmas 1917; Whitehead, on the verge of being 34-years-old and an established scholar, and Erwin H. Falk arrived early in the new year. Ladwig, Matz, and Whitehead were fresh out of the first class of the officer training camp at Fort Sheridan, Illinois. Although just 23, Falk was a veteran of the 1st Iowa Field Artillery who had served on the Mexican border in Brownsville, Texas, in 1916. Ladwig and Falk both sailed on the SS *Mongolia*[37] from New York to Liverpool, England, on September 11, 1917; Matz and Whitehead sailed one day later on the SS *Kroonland*,[38] arriving in Liverpool on October 2. Moorman had spotted Whitehead's name on a list on November 15 and snapped him up, anxious for help as the radio intercept station at Souilly, France, had opened three days before and the workload was more than he, Berthold, and Block could handle.[39]

In October 1917, Moorman had asked the MID to select and train four officers and six clerks.[40] The four officers—the aforementioned Childs, Graham, and Sellers, plus Robert W. Gilmore (see sidebar)—were chosen (or volunteered) from a military intelligence officer training session, sent to Riverbank for a few weeks, and then packed off to New York to await transport to France (see chapters 4 and 5). Graham and Sellers arrived in Chaumont on January 18, 1918, three months after Moorman's first request. And though they had left New York the same day, Childs and Gilmore, traveling together on a different ship, faced delays and arrived on February 1. These four joined Ladwig, Matz, Whitehead, and Falk to form the core brainpower of the G2A6. The Riverbank

Philip Barrows Whitehead

Philip Barrows Whitehead was born on January 29, 1884, in Janesville, Wisconsin. His father was a Wisconsin state senator. Whitehead received a bachelor's degree from Beloit College in 1906 and then studied at Yale University, receiving a master's degree in 1908, a bachelor of divinity degree in 1910, and a PhD in history in 1914. While at Yale, he taught Latin.

He spent two years doing postgraduate work in archaeology and architecture at the American College in Rome, Italy; he had work published in both Italian and English on early Christian architecture.

In June 1916, Whitehead resigned his faculty position at Yale to enlist as a private in Company L, 1st Regiment, Wisconsin National Guard. He spent six months on the Mexican border at Camp Wilson, near San Antonio, Texas. Like his soon-to-be-colleague Charles Matz, he attended the first officer training camp at Fort Sheridan, Illinois (10th Regiment, 10th Company, 2nd Battery), and was commissioned a first lieutenant in the artillery on August 15, 1917. He was sent to France in September and was assigned to the G2A6 on January 3, 1918. He was selected by Frank Moorman, who was in search of officers to staff his unit, because he knew German. In a letter home in 1918 he noted, "My knowledge of German is very valuable … I was a little rusty … but I am brushing up and it is coming back to me." While he was "disappointed" not to be on the front lines, he told his parents, "I have work that perhaps I am better fitted for than any other."

Whitehead was quite a success at the G2A6. He first worked for, and then was assigned as, the officer who would take charge of the Second Army Radio Intelligence Section. At the conclusion of the war, he prepared extensive assessments and recommendations on how to improve this sort of work in the future. Whitehead did not depart the G2A6 until June 1919, one of the last officers to do so, and may have assisted in organizing the records of the organization. He arrived home on July 5, 1919.

After the war, he continued his studies, going back to Rome in 1923. He was an assistant professor at the University of Vermont and later taught art and art history at Beloit College, where he was the department chair for 20 years.

Whitehead died on July 3, 1965, in Pearl River, New York, and is buried in Oak Hill Cemetery in Janesville, Wisconsin.

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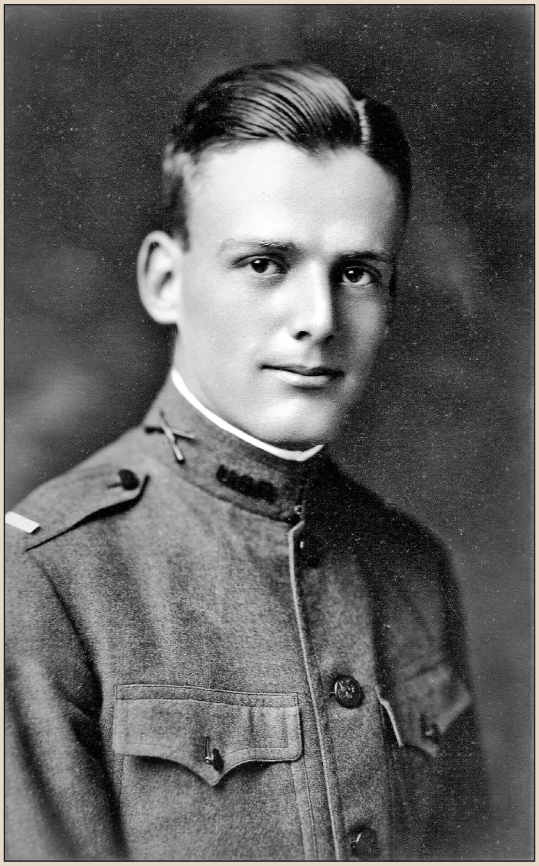
Charles Henderson Matz

Born into a wealthy and socially prominent family on December 13, 1895, Charles Henderson Matz grew up in a palatial house called Wynnecliff in the Winnetka, Illinois, community of Hubbard Woods. But his childhood may not have been as idyllic as it appeared. His father, a well-known attorney who also served as a director of the Chicago Savings Bank & Trust Company as well as the president of the Legal Aid Society of Chicago, was distant and stern. Matz attended his father's alma mater, Williams College, entering with the class of 1918 in the fall of 1914.



Matz, 1917. Personal collection of Joseph Anderson, used with permission.

In the spring of 1917, everything changed for Matz. His father, suffering from melancholia, committed suicide at age 57 by jumping from the eighteenth floor of the Belmont Hotel in New York City on March 15. Just three weeks after his father's death, on April 6, the day the United States declared war on Germany, Matz abandoned his studies and sought a commission. He attended the Reserve Officer Training Corps camp at Fort Sheridan, Illinois, from April 10 to May 10, joining the 11th Regiment, 5th Company of the first officer training course and receiving his commission on August 15.

Matz sailed to France on September 12 as a casual, an infantry officer not attached to a unit. Upon arrival, he completed the infantry training course at La Valbonne between October 4 and December 12. He was ordered to report to AEF headquarters, arriving on December 14, and was swept up in Major Frank Moorman's search for bright young officers. Matz reported to the G2A6 on December 20, 1917, along with Second Lieutenant W. J. Ladwig. They were only the third and fourth officers to report to the organization.

Matz became familiar with the work of the office, assisting Hugo A. Berthold in late December and early January with recoveries of the German code called Fritz 14. But Moorman clearly saw more in this young man, for, on January 19, 1918, he assigned Matz to take charge of the future Radio Intelligence Section of the First Army. Charlie, as his colleagues knew him, was trained to make deductions based on the material the G2A6 was producing from intercept. Matz worked independently, but in close contact with Moorman, from June until November 1918. After a short stint with the Advance Post of Command of the Army of Occupation's Intelligence Office in Trier, Germany, Matz, now a captain, returned to the United States on February 11, 1919, and was discharged the next day.

On June 11, 1919, Matz married Claire Dutton McGregor. On June 23, he received an honorary bachelor of arts degree in war science from Williams College, along with others who had left school to join the army. Matz attended graduate school at Harvard University and studied physics. There, he met Edwin Land who was working in an adjoining lab. Land later went on to employ Matz as a physicist at his Polaroid Corporation, where Matz worked until his retirement in 1969. Matz died on February 3, 1979. He was cremated and his ashes scattered in an unknown location.

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graduates would work on codes and ciphers; Ladwig and Falk worked the raw intercept, analyzing direction finding and conducting traffic analysis; and Moorman selected Matz as the officer who would lead the detached elements of the planned First Army G2A6. Whitehead, being a first lieutenant (the others were second lieutenants), was Berthold's designated backup.

At the end of December 1917, there were four officers on duty (of 12 authorized) and, briefly, there were no clerks (of the 34 authorized); Harry Block, the lone clerk to that date, fell ill early in December and was transferred to an organization in Paris on December 18. Edward J. Vogel, a court reporter from Chicago and son of German immigrants, stepped in on January 4.[41]

Six additional new clerks arrived on January 24, 1918. Vogel and the six men—Henri C. Jacques, Walter H. Kilbourn, Sterling Rhoades March, Samuel Stewart Shook, John A. McKenna (not to be confused with his older brother, James E. McKenna at MI-8), and John C. Meeth—became the backbone of the organization, all staying in the G2A6 until after the Armistice. Jacques was a New York attorney who graduated from Columbia University in 1912 where he was part of La Société Française. Kilbourn was a War Department stenographer, and March was a student assistant in history at George Washington University. Shook had worked in the State Department, and John McKenna was a bookkeeper for New England Telephone and Telegraph. Meeth, who had been a bank clerk in Baltimore, had some exposure to cryptologic practices because he came directly from MI-8, where he had worked as one of Herbert O. Yardley's first clerks.[42]

By early February 1918, Moorman had the heart of his organization. Many more officers and clerks would arrive, including 10 men trained at Riverbank in February and a handful more trained at MI-8 in September. The most well-known of these men is William Friedman, who arrived in July; "we have great hopes of him," Moorman confided to George Fabyan.[43] Edwin D. Woellner, one of the men from the Riverbank course, soon became the expert in communications security matters; he was a good friend of Friedman. Frederick Livesey, who was trained at MI-8, would have a future in cryptology with Yardley's Black Chamber in the 1920s, as would Donald Millikin, who taught cryptology

Robert William Gilmore

Williams College Archives & Special Collections, Photograph Files Persons Collection, Box 39

Robert William Gilmore was born in Kalamazoo, Michigan, on December 8, 1888. His father, John M. Gilmore, opened a dry goods store in Kalamazoo in 1881 and, just two years later, was a co-founder of the Gilmore Brothers Department Store, a city landmark until it closed in 1999.

When Robert Gilmore was just two-and-a-half years old, his mother died. Although his father remarried the next year, in 1894, Robert's oldest sister Ada, then just 12, took charge of her siblings, and they moved to Belfast, Ireland, in 1894 to live with an aunt. John Gilmore died in 1895; the children remained in Ireland until 1902. Robert graduated Williams College in 1911, residing with Ada in her New York City house during the summer. (Ada Gilmore, later Ada Gilmore Chafee, was one of an original group of artists in Provincetown, Massachusetts, who developed a woodblock technique later known as the "Provincetown Print.") Robert attended Harvard University, possibly the law school, but it is unknown whether he received a law degree. On February 7, 1916, he enlisted in Squadron A, Cavalry, of the New York National Guard and was sent to the Mexican border where he was at Camp McAllen, Texas, from July through December 1916.

Gilmore attended the officer training camp in Plattsburg, New York, from May to August 1917, and was assigned as a second lieutenant to the War College Division, where he was a member of the group of four officers trained at Riverbank Laboratories. Gilmore reported to the G2A6 in Chaumont on February 1, traveling with J. Rives Childs. While at the G2, he was part of the Radio Intelligence Group for both the First and Second Armies. He became a liaison officer attached to the French IV Army's cipher group in Strasbourg, in 1919 and returned to the United States in August 1919, where he was discharged.

By 1930, Gilmore was a stockbroker in New York. In June 1942, he was commissioned as a lieutenant commander in the US Naval Reserve and, in March 1944, was assigned as naval attaché and naval attaché for air at the US embassy in Tangier, Morocco. He retired to Biarritz, France, where he lived and traveled extensively with Henriette Donnet. Gilmore died in Biarritz, on May 17, 1967, and is buried in Père Lachaise Cemetery in Paris.

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at New York University during World War II and wrote a book on the subject, and Army Field Clerk Leonard Bichwit, who was an army cryptologist in that same war. But the eight officers and seven clerks present in the office in February 1918, along with Moorman and Berthold, were the team that would make the first American breakthroughs against German codes and ciphers.[44]

Some of the more experienced MI-8 men resisted Moorman's call. John Manly, in a June 1918 letter to Childs, remarked that they appreciated the work Moorman was doing that was forwarded to Washington, but that he, Yardley, John Powell, and James McKenna were busy as well. According to Manly, "all of us suffer from time to time from the temptation of getting over to your side of the water but thus far have been able to resist."[45]

Moorman needed a larger staff and kept searching for suitable men. It was not an easy task. In June, he requested eight officers. The MID explained that they would be sent after training but revealed that they, too, had trouble finding qualified candidates. On July 1, 1918, Moorman asked that the men be sent without MI-8's training, as help was "urgently needed."[46] In the middle of July, he asked the MID to send two officers and four clerks per month, at least until Yardley could return from his trip to Europe to investigate staffing matters. In August, however, the MID told Moorman that while they could send four clerks who knew German each month, they could only send two officers in the middle of September—and only two per month thereafter. The four clerks the MID mentioned in August turned out to be only three: Bichwit, Samuel L. Dresser, and John L. Koeppler, who did not arrive in Chaumont until October 1.[47]

In June and July, Moorman sent Matz and some of his most experienced staff to form the detached elements of the G2A6 for the First Army; in September, he had to cut the headquarters team to staff the Second Army effort. Moorman declared to Nolan in mid-September that these moves left his office "without personnel which is absolutely essential for the proper study and classification of German Codes. The situation is serious and no effort should be spared to furnish additional officers and clerks."[48]

Mission and Organization of the Work

Getting Started

After consulting with the British, the French, and his superiors in the G2, Moorman set out five types of work for the Radio Intelligence Section:

- Intercepting and decoding enemy messages (with the intercept done by the Radio Section)
- Locating and grouping enemy radio stations (direction finding and traffic analysis)
- Following enemy aircraft when they registered for artillery
- Extracting information from enemy telephone conversations
- "Controlling" or communications security monitoring of AEF communications.

Other work was added to the section's responsibilities along the way, including distributing communications security material such as codebooks; conducting liaison with the British and French; and determining how this new type of intelligence could best support military operations.[49]

Very little analytic work was done until December 1917 because there was not enough manpower. Moorman and Berthold gathered information, including old messages from the French, learned the British and French methods of operations, and gathered supplies. They visited the newly established AEF Radio Section radio intercept site at Souilly and arranged for the forwarding of the site's collected traffic. On October 29, when they received messages purported to be German trench code from the AEF Signal Corps radio station at Gondrecourt, Moorman and Berthold spent considerable time on them, with no success, only to learn they were American practice messages. Rather than being discouraged by this, they were cheered and "took much pleasure in speculating on the worry the practice messages must be giving the German code men."[50]

Berthold had no previous experience with codes or ciphers but had a quick mind, and Moorman was a good teacher. By December 3, 1917, the flow of messages from Souilly was improving, with 30-40 messages arriving each day. That same day, the French began sending codebook recoveries for the current three-letter German trench code used in the sector the Allies designated G (very roughly north and west of Verdun). This code was nicknamed Fritz 11 by the French; it also was called KRU for the letters that always appeared in the first position.[51] As time went on, Berthold would teach the new officers methods for solving German codes; his promotion recommendation compared his work favorably with officers in the French and British services and noted his "skill and close attention to duty."[52]

Colonel François Cartier and Captain Georges Painvin from the French Cipher Bureau in Paris visited G2A6 on December 14, 1917, and brought a book of words commonly used in German code messages and a code table. Moorman's first tasking to the Signal Corps intercept facilities came on December 17, asking for "as many messages from German ground stations in the Verdun sector as can be supplied" along with as many direction-finding bearings as possible.[53] On December 19, the first American recoveries of Fritz 11—made by Berthold and Moorman—were telegraphed to the French.[54]

Lieutenants Matz and Ladwig arrived at Chaumont on Thursday, December 20, greatly easing Moorman and Berthold's workload. Essential cryptologic tools such as index cards, graph paper, rulers, a German dictionary, and a Secret stamp all arrived in the office before the end of the year.[55]

Forming a Team

The small group rang in the New Year on January 1, 1918, by issuing recoveries for the recently changed German KRU code—this version nicknamed Fritz 14—before the British and French could do so. Berthold did the work, assisted by Matz and Ladwig. Later in the week when Whitehead, Falk, and Vogel appeared, work began to take on a more regular form, with the G2A6 sending their recoveries to the French every two or three days.[56]

Sellers and Graham arrived in the office on January 18. The next day Moorman, feeling the office required more structure, made initial work assignments. He put Berthold, by now the most experienced of his men, on a team with Sellers to work on the KRU trench codes that changed monthly. Whitehead and Graham took on the code the Americans called Nancy 1. (The French called this Albert 6, and the G2A6 quickly switched to the French terminology to avoid confusion.) This code was also a KRU code but used in the H Sector, the area encompassing the St. Mihiel salient.[57] Diplomatic codes and ciphers were reserved for Childs and Gilmore, who were on their way from New York. Falk got the field station (radio intercept) work and Ladwig the airplane stations, listening stations, general reporting, carrier pigeon work, and management of property. Falk and Ladwig, therefore, were the first American traffic analysts and direction-finding experts. Vogel became chief clerk. Matz was selected to be the radio intelligence officer for the future First Army (it would be formed in August 1918). For training, he received the reports he might be sent in that position and asked to make deductions from the information. Matz then wrote up his reports as though the First Army actually existed.[58]

Whitehead found the work interesting and absorbing although "it involves a great deal of routine work in recording and tabulating and analyzing." He revealed to his parents he was selected for the work because he knew German. Even though he felt his German was a bit rusty, it was coming back to him. Whitehead also commented, "our department is growing and will probably be quite important as time goes on."[59]

In January 1918, the American 1st Division moved into the Ansauville Sector, along the south side of the St. Mihiel salient, and the Radio Section installed both radio intercept sites and listening sta-

Table 1. Moorman's tasking priorities, January 26, 1918[62]

Priority	Subject
1	German Official Communiqués
2	Austrian Official Communiqués
3	Russian Official Communiqués
4	Bulgarian Official Communiqués
5	Official press of hostile governments
6	Official communiqués of all governments, hostile or Allied, not included in 1, 2, 3, and 4
7	Code and cipher messages between hostile states
8	Code and cipher messages between hostile and neutral states
9	Press of neutral and Allied states
10	Business and personal messages to or from subjects of hostile states
11	Weather reports from any source
12	United States press
13	All others

tions in that area (see chapter 10). The volume of code work increased steadily.[60]

The Radio Section and the French collectors were already sending the G2A6 German military communication intercepts. Near the end of January, Moorman issued his second formal tasking to the Radio Section, prioritizing additional types of messages he needed. He asked that the Signal Corps acquire the capability to intercept this information.[61] See table 1.

Sellers, Graham, Gilmore, and Childs had all departed the United States on December 27, 1917; Sellers and Graham arrived in Chaumont in mid-January. Gilmore and Childs encountered various delays and were for a time stuck in Paris awaiting orders until Berthold discovered they were there and sent for them. When the pair arrived at Chaumont on February 1, Moorman was away visiting the front.[63] Unbeknownst to Childs, Moorman believed him to be a cipher expert who had experience in commercial codes and reserved the G2A6 position analyzing diplomatic codes and ciphers for Childs. Sellers had learned of the confusion, and he or Graham advised Childs not to be surprised by the news.[64] Childs was struck by the fact that he received so much attention while Gilmore, who had traveled with him, was "practically ignored."[65] By February 14, Berthold had ordered some reference books on code and cipher at the suggestion of Childs and informed Moorman that Childs was "carrying out some very nice research work on some of the German codes and ciphers."[66]

When Moorman returned to Chaumont on February 20, Childs tried to confess his ignorance of ciphers only to be rebuffed by Moorman, who insisted "he did not intend to be misled by my excessive modesty into a failure to recognize natural ability."[67] He was almost immediately selected to be the office liaison with the British and French cipher bureaus, an assignment that gave him frequent opportunities to travel to Paris and London while his fellow officers were stuck in Chaumont doing less glamorous work.[68]

Part of the training for the G2A6 team consisted of visits to the French Army cipher sections and the Radio Section collection sites. On Friday, February 8, at 1000, Matz and Ladwig travelled via car to the headquarters of the French II Army at Souilly to consult with Captain Haas of that army's cipher office. After an afternoon and morning of discussion, on Saturday afternoon the pair travelled with the French II Army Gonio direction-finding officer and Captain Haas to see a French airplane compass station near Verdun. Matz and Ladwig then ventured with Haas to the French XIX Army Corps Headquarters to learn about their airplane and ground intercept stations and to visit a field radio intercept station. On Sunday, February 10, Haas, Matz, and Ladwig lunched at Fleury-sur-Aire

with the 13th US Engineers,[69] visited the US radio intercept stations at Froidos and Landrecourt, and returned to Souilly. They set out Monday morning with the French officer in charge of the listening station near the Bois de Cheppy, and then went a few hundred yards further forward for their first glimpse of combat troops in French frontline trenches. The pair returned to Chaumont by 1730 Monday evening, having gained a wealth of information about collection operations.[70] This trip provided enough information for Ladwig to begin routine reporting on airplane activity as well as a series of periodic map-based reports locating German radio stations.[71]

French Marshal Ferdinand Foch, then commander in chief of the Western Front, and soon to be commander in chief of Allied forces, visited Chaumont and inspected the G2A6 offices on February 14. Moorman was away and responsibility for explaining the effort likely fell to Berthold as second-in-command. None of the parties involved left any written record of the experience.[72]

On occasion the G2A6 was able to provide snippets of information that contributed to missions outside of the AEF, such as the February 1918 intercept about the location of the steamship SS *Sardinia* that was torpedoed by the German Navy.[73] While their primary focus was naturally to mine the communications of the German Army in France, the G2A6 made sure that any useful intelligence found its way to the right place.

On March 13, the office of just 18 people had its first big success. Led by Whitehead, who was filling in for the traveling Berthold, the team made significant progress solving the new German three-number code, introduced on March 11 (see chapter 11). Nolan later attributed the breakthrough on the code to Matz.[74] This experience brought credibility to the nascent American cryptologic effort. Collection of messages in this code became a priority, and the workload increased; the office began working three shifts on March 14.[75]

Operation Michael, the first of what would be five major German offensives in 1918, began on March 21 and continued until early April 1918. This first attack was at St. Quentin, another town held by the British Fifth and Third Armies near the Somme River. The AEF did not have responsibility for radio intelligence collection in this sector, but the G2A6 monitored changes to German forces in their area of responsibility. Americans would fight at Château-Thierry during the third offensive and the two subsequent offensives; however, AEF radio intelligence assets were not deployed to those areas, which were well covered by the French.[76]

As American forces began to move into positions along the front lines, the work of the G2A6 increased as did their manpower. On March 1, there were 19 men on the staff; by April 1 there were 28 and by July 1 there were 41; eight other arrivals had been moved to other organizations. The unit's early successes had been recorded in a logbook, but unfortunately the book was not used from March 23 until July 1. When the logbook was put back in use in July (and, to his credit, one of the clerks attempted to fill in the missing months), it became a purely administrative record of the comings and goings of the office and no longer provided authoritative documentation of achievements.[77]

As in any organization, there were close friendships as well as rivalries, for long hours, hard work, and constant change can bond people together or magnify their differences. Sellers and Graham, who both had ties to Lexington, Virginia, became close friends during their time in Chaumont (it is not known if they had met before arriving at the MID in the fall of 1917). In April 1919, it was Graham, then assigned in Germany, who was called urgently to Chaumont where Sellers was dying of nephritis. Gilmore and Matz had both attended Williams College—Gilmore in the class of 1911 and Matz as part of the class of 1918. Matz made sure that Gilmore was one of the people he took to run the First Army Radio Intelligence Section. Sellers, who played the flute, and Friedman, who played the violin, would sometimes "rend the air with vibrations wild" in a free weekend moment.[78] Woellner and Friedman spent

a lot of time together exchanging news from their wives, who were both working at Riverbank.[79]

And, of course, Childs, Gilmore, Graham, Sellers, and nine of the officers who arrived in the spring from training at Riverbank (Lieutenants Edward F. Roosevelt, Joseph F. Gunster, Nazard M. Coursalle, Vance L. Sailor, Donald D. Millikin, Roger R. Townsend, Kent Bromley, Edwin Woellner, and Clarence P. Bird) knew the man who had trained them, William Friedman, who finally arrived in Chaumont in mid-July. The men were competitive with each other, and there was some jockeying for the approval of their former instructor. When Friedman arrived at Chaumont, he was approached by Graham, who asked whether the Friedmans had "recommended Lt. Childs specifically and especially for certain work." William Friedman, writing to Elizebeth Friedman, exclaimed, "Of course we hadn't, and I told him so." William Friedman poked around a bit and learned that Childs had whispered to Woellner that Yardley had ranked Childs as the best of the first four trainees. The Friedmans had a different opinion about the relative abilities of the four men, ranking them Graham, Sellers, Gilmore, and Childs; William reminded Elizabeth that "there is nothing at all to Childs as we all knew."[80]

The office grew dramatically during 1918, but while 80 or more men are listed as being part of the G2A6 over the course of its existence, there were never more than 50-60 men working at one time at the organization's peak (including the teams supporting the First and Second Armies). The G2A6 staff actually present at headquarters in late September 1918 was fewer than 40 in number. Men left for various reasons: leave, illness, and unsuitability for the work. Twelve of the men on the final organization list did not arrive in Chaumont until October or November and were not fully trained at the time of the Armistice.

Turning the Corner—April and May 1918

On April 1, 1918, Moorman instituted a new office structure that would be used until the office doubled in size in May.[81] He also promulgated a set of standard procedures and reports that would be the basis of G2A6's future work.

Berthold was in charge of all code and cipher work in what was usually called the Code Section (though later in the war it was sometimes referred to as the Code and Cipher Section).[82] Whitehead, working with Army Field Clerk Sterling March and Private John T. Graham, took on the new three-number code. A large team worked on Fritz codes: Sellers; Gilmore; clerks Kilbourn, Shook, and Meeth; and Private Earl Frey. The two-person team of Graham and McKenna took on the Albert codes. Childs, along with Corporal Joseph Nathan[83] and Private John Mehan, covered not just the three-letter army code but naval, diplomatic, and commercial codes as well as ciphers. Finally, Army Field Clerk Gail DePierri handled classification of code—determining what code was used in a message.[84]

Vogel retained the job of chief clerk and had a staff consisting of Army Field Clerks Gilbert W. Daney, Augustus S. Mangene, and Alvin L. Perrie. This group typed up intercept and made copies for the Code Section, as well as handled other paperwork and administrative matters. Sergeant Edgar S. Anderson and Private Harry N. Tooliatos were added to the Clerk Section shortly afterward. Captain Herman E. Osann, who only stayed in the office for a few months, managed codebook distribution, sorting telegrams, receiving incoming documents, and facilitating distribution of translations. Clerks Henri Jacques and William C. Lyon worked with him.[85]

Matz received the assistance of Color Sergeant[86] John J. Wahl; Falk gained a clerk to assist with his traffic analytic work, Patrick B. Gallagher; and Ladwig was left on his own with his mixed bag of airplane intercept, listening stations, carrier pigeons, and property accountability.[87]

In April, at about the same time the office moved to three rooms in Building C, Moorman created a set of office procedures. Orders and directives were posted on a bulletin board each day; the officers had to check the board between 1200 and 1230. The staff could not use official stationery for

private correspondence. Some menial and less pleasant duties were shared by all and assigned by roster on a weekly basis. These included an army field clerk burning the contents of the waste paper baskets at 1500 and another distributing incoming paperwork each hour. Each week, one officer had Sunday duty, unlocking the office at 0815 and maintaining regular office hours with a clerk. As needed, officers and clerks worked night duty from 1730 to 0100, with one hour allowed for dinner if one other person was in the office.[88]

Officers who handled intercept from any type of collection facility prepared a daily memo evaluating the Signal Corps collection operators on the quality of their work, including an assessment of particularly good or bad points observed. Moorman combined this material into a weekly report, distributed on Thursdays to the chief signal officer.[89]

Moorman's work in building a cadre of men who could analyze and solve cryptologic problems was beginning to pay off; two accomplishments in April, documented in postwar reports, describe this outcome. On the afternoon of April 24, the Radio Section radio intercept station at Toul intercepted a message indicating that a German attack had been postponed because the weather was bad. German raids along the southern line of the St. Mihiel salient had been a regular occurrence when the 1st Division held part of that line in the first three months of 1918 and had increased after the 26th Division took over at the beginning of April. The large raid on the French village of Seicheprey on April 20 was fresh in the minds of the Radio Intelligence Section, although they were likely unaware at that time of the dramatic experience of their Radio Section colleagues during that raid (see chapter 11). Additional messages intercepted at 1325 and 1352 on April 25 ordered "absolute attention" and indicated the signal for the barrage. The G2A6 identified the intercepts and used them to notify American forces, who were able to prepare for the raid that took place on the night of April 25.[90] There is more to this story, but as far as the G2 management was concerned, this was a radio intelligence success (see chapter 11).

Three days later, on April 28, the station at Toul intercepted a message in code (which code is unknown) at 2105. It was rapidly decoded and found to be an order for an attack on American troops at 0100 the next morning. It took three-and-a-half hours to go from intercept, transmission to Chaumont, decoding, recognition of a reportable event, and issuing a warning, but troops were warned 30 minutes before the raid began (see chapter 11).[91] One result from these late April incidents was that the officer in charge of the G2 at night was authorized to call the French II and VIII Armies via the French operator at Chaumont if the local French mission could not be reached.[92]

General Nolan, recognizing that it was not just the G2A6 that did this work, commended the work of the Radio Section in obtaining the April intercepts and commented: "in this period of five days the information furnished by the [Radio Section] has probably saved more men than are engaged in this service. Such results would have been impossible without the energetic and loyal co-operation of the Signal Corps operators."[93]

By mid-May, the Radio Intelligence Section moved toward its final form, but adjustments occurred as needed. Berthold headed the Code Section, with Whitehead filling in for him when he was traveling. Childs led the diplomatic codes, special codes, and cipher work. Falk and Gilmore were paired on ground radio stations while Ladwig retained airplane radio and listening stations. Roosevelt acted as the adjutant of the section, in charge of distributing cryptographic material. Sometime during the summer Woellner was given responsibility for communications security.[94]

The Great Surprise of Traffic Analysis

The British and the French invented the modern art of traffic analysis in 1915-1916 when radio communications were coming into wider use along the front. Moorman learned of this work, which depended heavily on direction finding, during his

visits to the Allies in late summer 1917. Subsequently, the Radio Section established goniometric stations as soon as it was able in early 1918. Analysis of message externals (call signs, message numbers, cipher indicators, message times); charting communicants, message volumes, and transmission schedules; reconstructing communications networks; and locating communicants using direction finding were considered to be cryptologic skills by the onset of World War II, but at the time Moorman considered them "only slightly connected with code work."[95]

A Goniometric Section grew out of the work first done by Falk, who looked at the intercept coming in from ground radio stations, and by Ladwig, who analyzed the collection of airplane radios and the intercept from listening stations. Gilmore assisted with the work in May, and Woellner later spent some time on this effort. Their purpose was to derive information from the message externals and direction finding that would assist in constructing the order of battle, help solve trench codes, and tell the AEF Air Service where hostile aircraft would be located.[96]

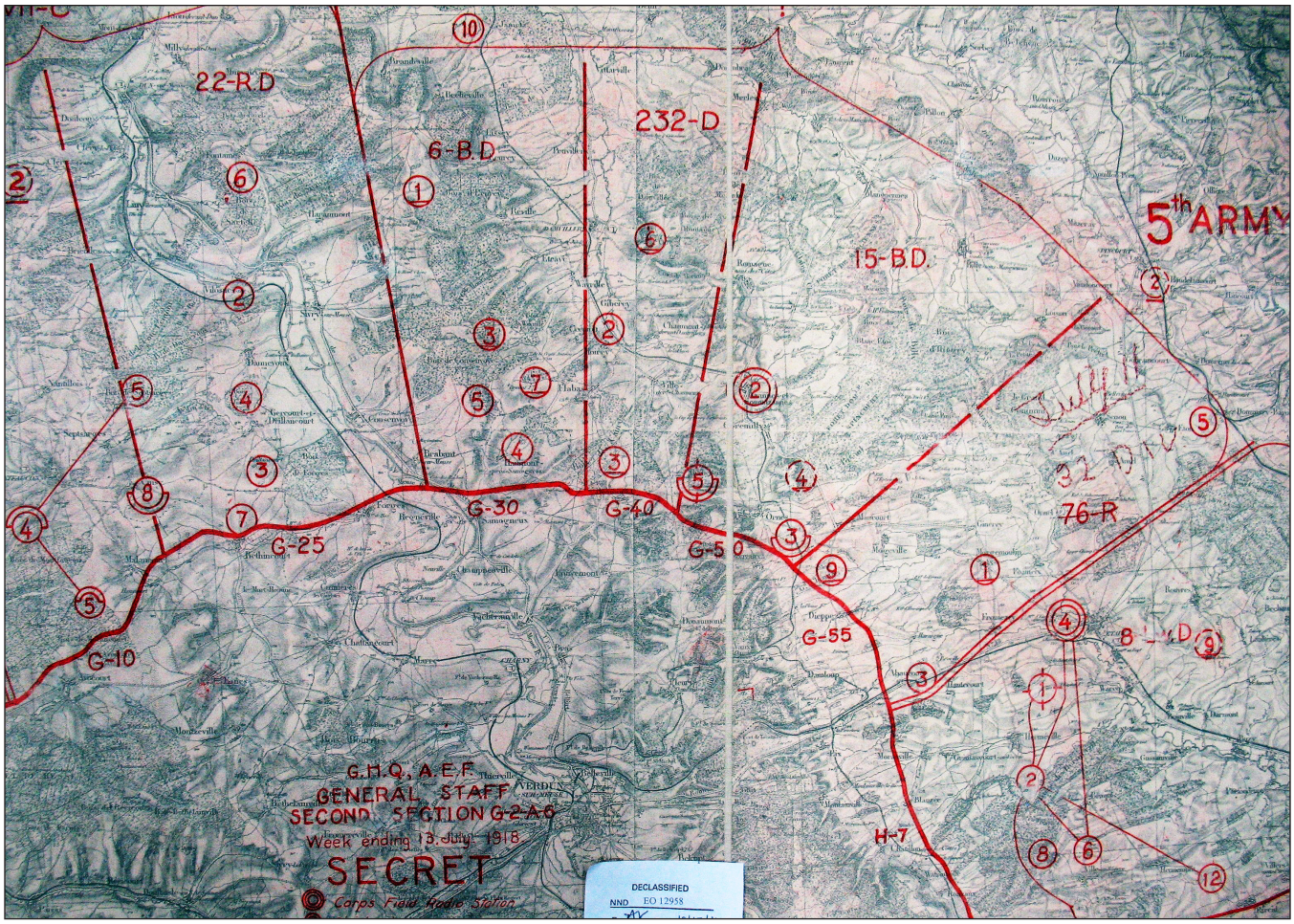
The analysts in the Goniometric Section discovered that prior to March 1918, German messages tended to only go between stations of the same division or between division and corps headquarters. By recording the location of the stations, identified through direction finding, Falk was able to recover boundaries between divisions, corps, and armies. In March, however, as the Germans prepared for their spring offensive, a system of daily-changing call signs appeared and German radio messages were being sent across what previously had been division boundaries. Analysis determined that a system of fake messages was in use; therefore, any message sent between divisions was meaningless.[97]

Traffic analysis provided significant and useful information on enemy intentions even when coded messages could not be read. A reduction in the number of radio stations indicated that no operations were expected in an area, while an increase meant an area was receiving reinforcements. The disappearance of stations linked to divisions or corps indicated either a withdrawal or a contemplated withdrawal.[98] In early May, this work paid off by supplying the first indication that German troops were being relieved in the Verdun Sector (see chapter 11).[99]

Every day, the goniometric analysts provided the Code Section with a list showing all the active stations and the call signs used the day before. They also produced a weekly report describing radio procedures (particularly as units were relieved), the use of radio deception, and information such as when a known German radio operator switched stations and when new operators appeared.[100] While the G2A6 Goniometric Section conducted analysis against the patterns of airplane communications, the time-sensitive nature of this information meant collectors at (co-located) radio intercept and goniometric stations were responsible for identifying and reporting real-time locations of German aircraft to the AEF Air Service so that American and French pursuit planes could be launched.[101]

Direction-finding analysis was done using a map board. A 1:80,000 scale map[102] was affixed to a large table. Each American and French goniometric station was located on the map, and the center of a circular protractor was placed over the site, with the zero-degree mark facing north. A string was tacked to the center, at the station location, and a weight placed on the other end of the string.

The goniometric stations along the front were each approximately 10 kilometers from the front lines and the same distance, more or less, from each other. These stations regularly telegraphed reports to Chaumont that provided the call sign of the sending station, the bearing of the station (azimuth), and an evaluation of the accuracy of the reading. At headquarters, the reports then were compiled and the bearings taken by each station for each call sign plotted using the string; the location of the station was marked on another map and reported once a week.[103] See map for an example of these reports. In June 1918, the accuracy of geolocation was believed to be within a one-half kilometer radius of the given position.[104]



An example of a direction-finding map, locating German radio stations in France, produced by the G2A6 for the week ending July 13, 1918. The area shown is north of the city of Verdun. NARA CP, RG 120, Records of the American Expeditionary Forces, Cartographic Entries 26 and 27

Reporting Out

In April, Moorman instituted a system of daily, weekly, and monthly reports, each with a particular distribution (see table 2). Various reports had been prepared prior to April, beginning with the first weekly report, with maps showing radio stations in the German V Army and Detachment C; these reports had been prepared as needed rather than as part of a broad organizational plan.[105]

Over time the distribution lists were adjusted and new lists were created. Distribution I was used for material intended for all the officers in the G2A6 (and on the bulletin board); at some point a Distribution L was added.[107]

On June 16, 1918, the first Weekly Code Section Report came out and discussed the codes and ciphers currently under analysis. While the office received 10 to 30 messages in an unspecified German naval code each day, this code was not analyzed in Chaumont; instead, it was sent to MI-8 and to Admiral William S. Sims's London office.[108] Eighteen weekly code section reports, produced between June 16 and November 20, 1918, provide great insight into the office's priorities and methodologies.[109]

Table 2. Regular reporting produced by the G2A6[106]

Report	Copies	Frequency	Responsible party	Distribution
Trench codes and keys	9	Daily	Code Section	Distribution A: War Department, British Ciphers, French Ciphers, LT Berthold
Wilhelm cipher and keys	9	Daily	Code Section	Distribution B: War Department, British War Office, French Ciphers, LT Childs
Diplomatic codes and keys	10	Daily	Code Section	Distribution C: War Department, British War Office, American Navy, LT Childs
German naval codes and keys	10	Daily	Code Section	Distribution C
Code Section Report	3	Daily	LT Berthold	Distribution E: G2 Battle Order Section, COL Conger, File
Foreign Radio Section Report	3	Daily	CPT Osann	Distribution E
Grouping of German field stations	9	Daily	LT Falk	Distribution H: Distribution Officer, Army, Code Section, MAJ Moorman
Field Station Activity Report	2	Daily	LT Falk	Distribution F: G2 Battle Order Section, File
Report to corps	3	Daily	Army	Distribution E
Listening set reports	8	Mondays	LT Ladwig	Distribution D: Army Radio Intercept, File, Distribution Officer
German Field Radio Stations	8	Wednesdays	LT Falk	Distribution D
German Airplane Radio Activity	8	Wednesdays	LT Ladwig	Distribution D
Work of Signal Corps operators	3	Thursdays	MAJ Moorman	Distribution G: Chief Signal Officer
Summary of code section reports	3	First of each month	LT Berthold	Distribution E
Summary of foreign radio section reports	3	First of each month	CPT Osann	Distribution E
Special report to G2A6	3	When necessary	Army	Distribution K: Special distribution as required
Codewords found	2	When necessary	Army	Distribution J: Code Section, File

The Weekly German Airplane Radio Activity report was first issued on May 5.[110] In July, G2A6 decided to combine this report with the weekly German Field Radio Stations report because the Germans were now using field radio stations for artillery work.[111]

An important G2A6 customer was the Order of Battle Section (G2A1). Another was the G2A2, which was responsible for issuing daily news bulletins that were largely based on the press intercept station's work. Raw information radio intelligence was not included in the various "Summary of Intelligence" bulletins; however, analysis from the G2A6 was incorporated into intelligence assessments without attribution in order to protect the source. The "Summaries of Information" provided a daily delineation of frontline and order of battle information, and this could not have been done without the analysis of radio intelligence.

Communications Security

Moorman was a stickler for communications security. He knew how much damage his organization could do to the Germans by reading their codes, and he hated making it easy for his German counterparts to do the same to the AEF (see chapter 12). The first of the Rivers series of American trench codes, the Potomac code, was issued at the end of June 1918. At about the same time the Radio Section installed a formal set of control stations to specifically monitor coded American communications. In conjunction with these developments, the G2A6 Security Section came into being, devoted to analysis of the intercepted material, particularly to monitor and critique the manner in which the troops used the new trench code. This analysis was a tool to help protect the code for as long as possible.[112]

From the time they were established, all radio intercept and listening stations had copied, deliberately or inadvertently, American messages. Violation of communications security, mostly in plain English, had been handled in various ways, very often by Moorman himself. At first there was just one control officer—Woellner. In late August, he was later joined by Falk, for some of Falk's work moved when the First Army Radio G2A6 formed and began doing traffic and direction-finding analysis. The control officers, who were not only familiar with American codes but experienced in breaking German codes, received the intercept and analyzed it to find instances of code misuse. They also tried to find previously undiscovered vulnerabilities in the codes and made recommendations to the Signal Corps Code Compilation Section for potential improvements. Violation letters went through channels to the unit commander where the improperly sent message originated, along with suggestions for improving security. All violation messages had General Pershing's signature. Each intercepted message was examined, and statistics were kept as to the use of alternate code values and nulls.[113]

The Security Section also received intercepted telephone conversations that they assessed, writing up violation notices as needed. There was a telephone monitoring setup in the section connected to the main switchboard; a stenographer listened in on all of the lines the control officer on duty selected. There was a warning on the first page of the headquarters's telephone directory notifying all that conversations might be overheard by the enemy or by the "AEF Security Service" (that is, the G2A6 Security Section). The control officer additionally had the authority to report use of long-distance lines for unnecessary or unimportant conversations as a means to relieve the overloaded lines.[114]

Moorman later commented that one commander objected to having monitoring sets in his area; they were installed despite his opposition. The very first monitored telephone conversation revealed the location of the division headquarters, the name of the commander, when named members of staff were to arrive at a clearly described point at a particular time, as well as the location of a regimental headquarters and that commander's name. The conversation was between the division commander himself and one of his colonels. As soon as the com-

mander received the report, he withdrew his objection to the monitoring.[115]

There are dozens of examples of violations. An in-depth memo dated September 20, 1918, cited misuse of code by the 356th Infantry two days earlier. Among the problems found in one message was the repetition of 18 code groups, 14 of which could have been avoided by using the provided alternate groups; words that were spelled out that were not needed or that could have been replaced by words in the codebook; the message, which was 120 groups, should have been sent in at least three parts; and the signature was given in plaintext.[116] The memos did not mince words. Colonel Willey Howell, the G2 of the First Army, informed the commander of the 2nd Division on September 1 that "messages sent by units of your command have been intercepted by one of our control stations. These messages were undoubtedly intercepted by German stations likewise. They positively identify your division as being in reserve."[117]

Falk and Woellner assessed the monitoring effort as effective and reported that once the system was understood the violations were "comparatively few."[118] But William Friedman later opined that Moorman felt all their efforts in issuing violation letters had been far from effective.[119]

Distribution of Codebooks

One assigned task that some officers of the G2A6 disliked was codebook distribution. In the United States, the Adjutant General's office would normally handle this administrative matter, but at some point "dissatisfaction was experienced in the way in which the matter had been handled" by the AEF's Adjutant General and the G2A6 was given the task.[120] Though the Code Compilation Section produced the codebooks, they were a much smaller unit that could not reasonably handle the distribution task. Therefore, the G2A6 set up an Adjutant Section of its own, run by field clerks. Only an officer, however, was entrusted with codebook delivery, so G2A6 officers took turns serving as couriers. Moorman took on many of the courier trips, sometimes combining a delivery with visits to confer with other units or his own men deployed to the First and Second Armies.[121]

Courier duty, which began in June when the Potomac code was issued, entailed being chauffeured in a car, often one without a windshield. Depending on the destination and the time of departure, the courier stayed overnight at the destination—possibly in a hotel room if one was reserved for couriers. If a car was not available, the courier might travel in a motorcycle sidecar. At least one courier trip made by Frederick Livesey in October resulted in an accident; Livesey did not miss any work time as a result. That same month William Friedman got lost in one town in the dark and fog while performing courier duty, the car circling to find the right road. He finally had the chauffeur stop in the center of town, found a private to escort them to the provost marshal, and then requested someone lead them out of town. Friedman arrived back in Chaumont after midnight but was thankful that he had a closed car in the damp, foggy weather.[122]

Graham was one who enjoyed the diversion from cryptologic work provided by courier duty. He called his monthly courier trip to the French GHQ in the "charming little medieval village" of Provins, about 50 kilometers from Paris, "one of the pleasantest of my duties." He recalled:

> The drive up one day and back the next along the picturesque French highways in a big open car with my own chauffeur pleased my sense of aesthetics and self-importance. Particularly did it oil my ego when we passed some American troops and a colonel or major, seeing a general staff car approaching would call his men to attention and stand by himself in a stiff salute. I know they were furious when they saw a measly 2nd Lieutenant sail by.[123]

The G2 office determined how many codebooks were needed and how they should be distributed.[124] G2A6 also distributed a range of communications security material, including codebooks, coordinate

strips and squares, liaison tables, and information on conventional signals used by the enemy.[125]

The material came to the G2A6 from the Code Compilation Section. Codebooks (distributed down to battalion level) and emergency tables (issued down to companies) were checked and packed, and then taken to the appropriate AEF army for further distribution. The office, after some experimentation, decided that each package would contain 24 codebooks and 33 emergency tables. After packages were wrapped, checked, and sealed, the number of books was indicated on the wrapper. All packages were stored at the G2A6 until needed for distribution; they were then sent out by courier or by the "Motor Despatch [*sic*] Service." Couriers, all of whom were G2A6 officers, could carry the packages as wrapped, but, if sent by Motor Dispatch Service, the inner wrapper was stamped SECRET, addressed in full, and then wrapped again. Receipts were sent with the books.[126]

Before the First and Second Armies were formed, codebooks were issued directly to divisions; after the two armies came into being, the books were issued to the G2 of each army, whose office would handle distribution. Codebooks were destroyed as soon as possible after they were compromised, and certificates of destruction were tracked. One or more sets of books were kept in reserve and tracked in a double-entry book system.[127]

The G2A6 also distributed the coding material used by air observers and by the Signal Corps Radio Section goniometric stations for securely reporting coordinates. As these materials came from the French military, the G2A6 would first receive notice from the French headquarters of a compromise and the date that the replacement would be put in place. The G2A6 then telegraphed the radio officers of the armies and the army group with the date, hour, and number of the strips. The strips and tables[128] were distributed with reserves, so they did not have to be couriered each time. Accompanying this material was a set of encoding tables from the French manual "Liaison for All Arms," the encryption system used by the air observers to encode messages. The turnaround time for replacing compromised tables was 48-72 hours.[129]

The G2A6 adjutant also compiled conventional signals used by the enemy, using material captured by US or Allied forces or recovered through radio intercept, to produce a pamphlet distributed to armies and intercept stations.[130]

The Home Stretch—June to November 1918

Moorman had an amazing number of things to manage as he entered his second year in France. He was still trying to find more men to staff the office, campaigning for better communications security, working out the placement of collection facilities, and carrying more than his share of codebook distribution trips. Despite his workload, he maintained a positive attitude. "Everything is going fine here," he proclaimed to British Expeditionary Forces cipher expert Oswald Hitchings on September 21,[131] while the chaos of the move of the First Army from positions in the St. Mihiel salient to the Meuse-Argonne front surely occupied the minds of much of the General Staff at Chaumont. Moorman was a prolific correspondent, even attempting to track down, at the end of September, some information for the grieving mother of Colonel Robert J. Maxey (not part of the G2A6) who was killed at Cantigny.[132] William Friedman called Moorman a "witty old sport" after he made a joke in mid-October about the Allies hindering the Germans' attempts to comply with Wilson's terms to get out of Allied territory.[133]

By June, it was clear that five of the eight members of the February class from Riverbank were not going to work out; only Gunster, Millikin, and Sailor would remain until the Armistice. The others were transferred to different offices. There were no new arrivals in June, but three men, including William Friedman, arrived in July. Two officers, four field clerks, and two enlisted men joined the office in August. These replacements were welcome, for in

June, Matz, Gilmore, Kilbourn, and Meeth departed for Toul to organize the First Army G2A6; when that army was formally established they moved to the new army headquarters at La Ferté-sous-Jouarre, then Neufchâteau, then Ligny-en-Barrois, and finally Souilly. By September, the First Army G2A6 numbered eight men.[134] Eight more men, including seven officers trained at MI-8, arrived in Chaumont in late September; at the same time Whitehead, Graham, and March left the G2A6 and deployed to the Second Army at Toul. Seven additional men eventually would leave the AEF G2A6 office in Chaumont for the Second Army. Clerks and some officers arrived in October and November, including two of the MI-8 trainees (Eugene Jackson and Charles G. Montross), but they arrived too late to do any work of substance.[135]

Friedman was put in charge of the Code Section. The section had four parts: three-letter codes, three-number codes, aviation codes, and meteorological codes. A clerk separated the incoming traffic and organized the material for duplication. Three-letter and three-number codes were sorted into piles for the G Sector and the H Sector.[136]

Analytic efforts continued to progress that summer. The French Cipher Bureau's Georges Painvin taught Childs how to solve the German ADFGVX cipher, and Childs began to solve keys for that system in July (the keys were from May 29).[137] G2A6 analysts participated in weekly office conferences to exchange information and ideas. At some point that summer an officer was assigned to join the clerks on the night shift, working from 0100 to 0815 each night for a month. The day shift began at 0830, but each week one officer had to come in by 0815 to relieve the night man "because it is a rather hard shift."[138]

In late July, a plan to move the G2A6 to Langres, where the AEF schools were located, arose. Moorman hurriedly drew up staffing plans that included G2A6 personnel at not just the First Army and Second Army but at the headquarters of each of the AEF's planned 10 subordinate corps. He concluded that the entire section, split between Langres and the various headquarters, would require 57 officers (40 more than the G2A6 had at that time) and 111 clerks (there were 23 present on that date). At some point this plan was dropped.[139]

August brought success for Childs, who broke a series of messages from General Kress von Kressenstein (see chapter 11). On August 12, William Friedman claimed to have discovered an obstacle in the production of results, which Berthold lauded in their weekly meeting as "the most important event in a long time."[140] The precise nature of Friedman's find is unfortunately unknown.

In September 1918, Moorman sent a list of G2A6 collection priorities to the Radio Section; this is the last general collection tasking I found in G2A6 records (the first had been at the end of January). Moorman asked that these types of messages (see table 3) be intercepted and sent to his office even if it meant developing new collection capabilities.

The rainy season had started, both in the St. Mihiel sector, where the First Army was preparing for the first major American offensive, and in Chaumont. On the night of the American attack, William Friedman wrote to Elizebeth Friedman not of the action (of which the men at Chaumont may not have had much detail) but of the rain. He'd bought a new pair of shoes and heavy socks at lunch time to replace the pair he'd soaked on the way to work and remarked that the office was "none too warm—but *c'est la guerre*." He divulged to Elizebeth his intent to lend his electric heater to Woellner, who was on night duty and would appreciate a cup of hot chocolate during the cold, wet night.[142]

The G2A6 had always received copies of German codebooks captured along the front, but after the St. Mihiel offensive the flow of captured material increased. A copy of the German three-letter trench code codebook arrived on September 17, and on October 3 Matz sent the G2A6 a codebook (for the KRUSÄ system, see appendix C), which had been captured in G Sector during the first few days of the Meuse-Argonne offensive. This material took

Table 3. G2A6 tasking to radio section, September 1918 [141]

Tasking priority	Type of message
1	Official communiqués (high power radio collection)
2	Code and cipher messages in the following order:
	a. Containing "FUER GOD" in the preamble
	b. ADFGVX messages with RICHI or RIZI in the preamble
	c. Any cipher messages with the following words in the preamble: ALACHI, GECHI, ITOCHI, or CHI
	d. Codes or ciphers consisting of numbers
	e. Codes or cipher consisting of four letters
3	Press dispatches from hostile governments
4	Neutral press
5	Business and personal messages
6	Weather reports from any source
7	All other collection

a lot of the guess work out of reading messages once the superencipherment was solved.[143] While the office was still busy, closer to the front Matz and his team at the First Army Radio Intelligence Section were completing the bulk of critical and time-sensitive analysis.

William Friedman was impressed with the abilities of a group of officers (Lieutenants Keener, Campagnoli, Livesey, Norris, Skinner, and Works), who had trained at MI-8 in July 1918, and set them to work on his projects shortly after their arrival in Chaumont on September 20. Second Lieutenant Rodman Chamberlin, who was known to have good knowledge of German and who had been wounded while with the 102nd Infantry of the 26th Division, joined this cadre; Second Lieutenant Albert A. Billing, who had arrived in August, was considered for the group, but it is not known if he was ultimately included.[144] Unfortunately, Chamberlin was transferred back to the 26th Division in mid-October. The new men worked in pairs and with Friedman alone to test their speed. The "smartest pair" of the new men were about half-a-day behind Friedman; he didn't provide their names but noted that they were both "quick and bright" and worked as German instructors at home. Since Keener and Works both taught German, it is possible Friedman was referring to them, but it is not known for certain.[145]

On Saturday, October 12, as the battle raged in the Meuse-Argonne,[146] the men stationed at headquarters found themselves standing in line for the rare appearance of candy at the quartermaster's store. William Friedman, anticipating a line two blocks long, had made arrangements with one of the clerks to buy him the limit: a one pound can. He expected that would last him about four days.[147]

By mid-October, influenza had struck many of the intelligence departments at Chaumont, but the G2A6 had evaded illness for the most part. Childs had been sick, and Moorman noted that his section was so well organized that the work went on as usual, not knowing that Childs had snuck into the office one day to make sure his team was on track and work was caught up.[148] Moorman declared to his subordinates that he expected that if William Friedman were away his section would function in the same manner.[149]

In early November, Childs's solution of the messages regarding General August Mackensen's withdrawal from Romania (see chapter 11) was described as "probably the most important message we have deciphered yet";[150] the achievement likely boosted morale in the days before the announcement of the Armistice. (See appendix C for lists of German codes and ciphers worked by the G2A6.)

Relationship with Other Organizations

Divisions in the Line

Both Moorman in the G2A6 and Major Robert Loghry in the Radio Section had to deal with the issues that arose when divisions moved out of the sectors, as the combined radio intelligence mission. Radio intercept and listening stations did not have their own telegraph lines, and they counted on being able to send their daily reports from the nearest division Signal Corps radio station; they also required other logistical support from the divisions. Because the G2A6 was dependent on the flow of information from the Radio Section—Loghry's troops collected the data the analysts needed—Moorman worked to make sure their needs were met. In May 1918, after receiving no reports from Radio Section men located in the 2nd Division area, Moorman discovered that the division had moved on and abandoned the Radio Section men, leaving them without support. Moorman requested that in the future he receive two days' notice so that alternate arrangements could be made for the signal collectors. In a similar vein he noted that the 26th Division had requested listening stations for a particular location, but while the Radio Section was making installation plans, those involved learned, unofficially, that the location was to be turned over to a French division and support was no longer needed.[151] Many of the same issues would arise with the 42nd Division's move out of the Baccarat Sector in June (see chapter 10). It is possible that the secrecy of the work precluded the supporting divisions from telling the G2 that they were moving; however, the divisions were well aware of the collection effort and were eager to have radio intelligence support. Moorman, as the senior officer and connected with the operational chain of command at headquarters, was better placed than Loghry to request a change of procedure.

Washington

While there was periodic correspondence between the MID and G2A6, there was almost no analytic interaction between the two organizations. The G2A6 saw MI-8 as a source of new men, and MI-8 had their own cryptologic problems to solve. The two organizations interacted on the subject of exchanges with Allies—partially as a result of John Powell's fact-finding visit early in 1918 and Childs's subsequent liaison work. Moorman later recounted:

> I do not think that Washington understood our problems in the beginning. We did not understand Washington, and did not make any particular effort to appeal to them for help. Later we discovered that there was such an organization as Washington, and at the same time they found out that we were in existence in France, and then a real effort was made to work together. This would have made more efficient work had not the signing of the armistice made further efforts in this line unnecessary.[152]

Beginning in September 1918, the G2A6 sent copies of British, French, and Italian intercept of the long-distance, transatlantic radio communications to MI-8, as agreed on by the Interallied Radio Commission.[153] But there was no analytic exchange relating to these messages.

The Allies

The initial planning and organization of AEF cryptologic work was based on an understanding of British and French counterparts.[154] Moorman maintained close ties with his peers in both countries throughout his time in Chaumont, realizing perhaps that this was the fastest way for his organization to become competent at its mission.

As early as December 17, 1917, the G2 approached the French to request permission to exchange intercept with the French II Army's Intelligence Section.[155] The G2A6 exchange with the French and the British was far more frequent

and comprehensive than that with their MID colleagues in Washington (which is not surprising as there were no-real time communications across the Atlantic). The G2A6 also had some very limited interaction with the Italians, particularly on the matter of exchanging diplomatic traffic originating from and destined for the Western Hemisphere (see chapter 2).

In May 1918, an agreement was drawn up between the Americans and the French to share intercepted traffic. Radio intercept from American stations at Souilly and Toul, as well as any future station, would be conveyed by telephone or telegraph to the staff of the army (whether French or American) on whose territory the station was situated. Daily reports for each station would go to the staff of that army's cipher section. Intercepted radio from French stations in territories where an American station was also present would be sent to the cipher section of all the armies involved.[156] Moorman stressed that Loghry should arrange with French stations to furnish information directly to the American First Army headquarters.[157] Intercept was not the only thing the parties exchanged; their technical reports on codes, traffic analysis, and German station locations also were shared.[158]

There were regular visits to Chaumont from François Cartier, head of the French Deuxième Bureau's Bureau du Chiffre; French cryptanalyst Painvin; Major Malcolm Hay, in charge of the British War Office's MI1(b) in London; and Oswald Hitchings, the cipher expert in MI1(e) at the British Expeditionary Forces headquarters. Moorman, Berthold, and later Childs would visit the French at their offices on 14 Rue St. Dominique in Paris and Hitchings at the British Expeditionary Forces headquarters. While Childs visited London during the war, neither Moorman nor Berthold made that journey. Matz, Whitehead, and other junior officers had multiple opportunities to meet with French officers assigned to French corps and army radio intelligence and goniometric positions to confer about intercept and analytic problems. MI1(b)'s military work "was placed at the disposal of the American cipher officers to the very fullest extent," but secrecy was maintained for diplomatic codes.[159]

Based on available records, the level of cooperation between the Allies in radio intelligence was not affected by the struggle for control of American military manpower experienced at the highest levels of the relationship. The cryptologic partnering was congenial, cordial, and cooperative in the extreme. Moorman, Colonel Louis Krumm (the commander of the AEF Signal Corps's Radio Division to which Loghry's Radio Section belonged), Loghry, and Major Howard R. Barnes (head of the Code Compilation Section) knew how much they had to learn and were humbly accepting of the constructive criticism the British and French gave the American efforts. Moorman, Hay, Hitchings, and Cartier, plus the junior officers that worked with the Allies, all reported good experiences. There are no indications that the volatility that characterized the interactions among General Pershing, British Field Marshall Douglas Haig, and Marshall Ferdinand Foch impacted the relationship of the cipher and radio intelligence sections with each other.[160] These leaders got on with their missions and appear to have left the politics of the war alone.

All the parties were generous in their praise of cryptologic Allies. Nolan's final report (referring to the entire intelligence effort, not just cryptology) recounts:

> The intelligence Services of the French, British, Italian, Belgian, and our own forces were based on the same principles and operated, in the main, in the same manner. None of them could, even for its own troops and front, operate efficiently without the aid and cooperation of all the intelligence services. Individually, their accomplishments could have but limited scope and value; together, working in close touch and harmony and with pooled resources, they formed a combination which at all times supplied their commanders, staff, and troops with

> the information that was necessary for the intelligent decision of military questions, great or small.[161]

Moorman described Cartier as "ready, willing, and able to help us at all times. His advice and assistance have been of the greatest service to us."[162] In a postwar letter to Cartier, he proclaimed "we have considered you the father of our section and have never hesitated to appeal to you in difficulty. You have always been ready to help us and be able to overcome the obstacles, and without you our service would have lost a lot of value, etc."[163] Moorman sang Hay's praises for he had "generously placed at our disposal the results of several years' work. He has never failed to respond promptly and fully to any of our demands for assistance." Similarly, Moorman said Hitchings "has cheerfully given us the benefit of his experience with enemy codes and ciphers, and permitted us to use his office as a training school for our own men."[164]

It is not known what Cartier thought of Moorman, but Hay developed a real affection for Moorman and the men of the G2A6. Hay's wife later wrote:

> He used to relate the story of his visit to Chaumont and the never-forgotten kindness of Major Moorman and his colleagues. He was also much impressed with the behaviour of the Americans and conceived for them an admiration and affection which endured to the end. He admired their eagerness to learn, their willingness to accept correction when necessary, and the promptness and efficiency with which they carried out new ideas and new projects. He was impressed by the fact that at Chaumont they carried with them their own printing press.[165]

Practical Matters

The AEF G2 was organized in a way similar to the French military intelligence system (as opposed to the MID in Washington, which was organized in the manner of the British system). Radios and training in their use came from the French. There were also many small ways in which cryptologic work was coordinated to make the American system, and exchange between parties, more efficient.

In October 1917, American radio intelligence work adopted the twenty-four hour clock, as used by the British and French, so that all collection would be marked in the same manner, making it easier to identify and de-duplicate messages.[166] All three parties also agreed to represent Morse code characters specific to the German language in the same manner so that intercept was mutually intelligible.[167] The analytic exchange of code and cipher recoveries with the French began on December 10, 1917. While the Americans had less day-to-day contact with the British, the same types of material were exchanged. In April 1918, the Allies formalized the exchange of communications and cryptologic material gathered through prisoner interrogations.[168]

On August 12, 1918, a protocol was signed between the Americans and the French on the subject of communications security.[169] Some cryptographic material was shared between the Allies to facilitate battlefield communications.[170]

The G2A6 received periodic bulletins from the Italian military radio intelligence service from at least April 1918 until September; these reports concerned high-power radio stations and were regularly translated by Whitehead and then by First Lieutenant Clarence Bird when Whitehead moved to run the Second Army Radio Intelligence Section.[171] The extent of the exchange and details about the ongoing relationship are unknown.

Powell's Visit

In late 1917, MID Chief Ralph Van Deman chose Captain John Powell, then working at Riverbank and serving as a liaison with MI-8, to visit the British and French cipher bureaus. Powell spent about two months in Europe, arriving sometime in January 1918 and visiting London, Paris, and Chaumont. He escorted and introduced Childs to those

bureaus before heading back to the United States on March 13, 1918. Powell had some adventures during his trip. British cryptologists took him to see a frontline trench and he had a chance to ride in an airplane.[172]

Powell first visited the French Code and Cipher Bureau in Paris, where he was joined by Berthold. Little is known about Powell's discussion with the French except that Powell believed that there was material in Paris that was not getting to the G2A6. After visiting the British Censor's office, MI1(b), in London and Hitchings in Saint Omer, Powell realized there was also British information that did not go to the G2A6. Powell came to Chaumont for a short stay. In his report for Nolan, Powell recommended that the G2 assign:

> … some officer familiar with this subject in constant contact with these three centers. Without some such contact you will find your own operators are laboriously travelling over the same ground which one or other of the offices named has already traversed; and the contact I have mentioned not only results in furnishing information already in possession of someone, but in the sharpening of the wits which an interchange of ideas and of methods invariably produces. If in your opinion it is possible for someone to serve as a liaison officer who could spend a portion of his time in passing between these headquarters, Paris, St. Omer, and London, extremely valuable results are bound to be achieved.[173]

Powell also urged Nolan to consider forwarding information to Colonel Van Deman and pledged to ensure that MI-8 would notify the AEF of any developments in their work. He allowed the G2A6 to make copies of material that he had collected for MI-8 from the British about code problems they had worked since the beginning of the war.[174]

Nolan sent a note for Van Deman with the departing Powell that stated "much good would result from a close liaison between the cipher section now being developed in your office and that at these headquarters." Nolan indicated that the AEF would send intercepted messages to Washington by mail, as well as notes as to solutions found and suggestions from the French and British cipher offices. The AEF also would distribute MID suggestions to the Allied cipher offices in a true international technical exchange. He expressed the hope that if the efforts of the four European offices (British War Office in London, British GHQ in France, and the French Code and Cipher Bureau as well as the AEF) could be combined with "a really big and efficient office in Washington, it seems to me we should soon be handling practically all the diplomatic and special codes and ciphers." Nolan closed by stressing the importance of this work to Van Deman, imploring, "I cannot too strongly urge your most cordial support with all the facilities and men you are able to procure."[15]

Liaison between the G2A6 and MI-8 in Washington did not expand much in the wake of Powell's trip; however, the immediate assignment of Childs to travel and work with the British and French is directly attributable to Powell's recommendations.

Childs's Liaison Work

One of the goals of Powell's visit was to facilitate better exchanges among the three allies. J. Rives Childs barely had time to settle into the routine at Chaumont before he was off on his first visit to Paris, traveling with Powell, Moorman, and Berthold on February 27, 1918.[176] Powell and Childs went on to London in early March for a conference on ciphers.[177] Moorman reported to Colonel Conger, head of the G2A, that a cipher exchange had commenced with the French, and Nolan reported the same to Van Deman.[178]

Childs's extensive trip report, submitted in March, indicates that Powell and Childs were treated well by Malcolm Hay but were unsuccessful with Room 40 at the Admiralty and did not have much luck with the US Navy at Admiral Sims's London office. After Childs returned to Chaumont

on March 11, Powell tried the Admiralty again but reported that he was not "able to breach their reserve."[179] Powell reported:

> After a week of ineffectual knocking at the door of the Admiralty people, I have had to give up in defeat. They 'played horse' with me for six days, putting me off each day, and finally they notified the US Navy people that they would not see me and if they gave up anything it would be to the corresponding official in Washington only, and then only on the request of the US Secretary of the Navy. I went to Col. French of the War Office who has been so kind to me, and told him my troubles, in the hope of enlisting his assistance. His reply was 'I don't think you should feel badly over such a refusal, as I have been trying for two years to get from them the same information and they refuse it even to the War Office.' He expressed his belief that they have not as much as was generally supposed, but that in capturing submarines they had of course captured several different codes which had enabled them to read several messages, but he did not believe that they know how to attack a new code unassisted by possession of a basic code.[180]

Childs first met Georges Painvin on March 8, 1918, in Paris and claimed he was with Painvin when the first ADFGX messages arrived at his desk.[181] Childs maintained a regular correspondence with Painvin between June and November on cipher matters and regularly supplied him with cartons of cigarettes, confessing to Painvin that all his luck with ciphers was due to Painvin's assistance.[182] He also kept up a correspondence with British cryptologists in MI1(b) (Hay, Oliver Strachey, and Captain Godfrey Leveson Brooke-Hunt) as well as MI1(e) (Hitchings) at various times between March and October.[183]

Childs returned to Paris for 10 days in April and then went back to Paris and London in mid-July. When he left London on July 30, he was diverted to British GHQ to meet with Hitchings and Lieutenant Duncan MacGregor and then traveled back to Paris to meet with Painvin.[184] During his meetings with Painvin, Childs focused on the double transposition ciphers used by the Germans on the Russian and Ottoman fronts. In London, Hay teamed him with Brooke-Hunt who was also focused on that region. Childs also arranged for further key exchange between Chaumont and London.[185]

Although Childs came into the war with very little knowledge of ciphers, he made the best of his natural abilities and was given the chance to develop his diplomatic skills through his regular in-person and on-paper liaisons with the British and French cipher bureaus. Though Childs's selection to lead the G2A6 cipher effort was based on Moorman's initial mistaken identification of him as a cipher expert, he succeeded at the work. Ciphers made up only a small portion of the office's work and perhaps that was to Childs's advantage, for his responsibilities gave him a degree of independent action not afforded the officers working the more pressing code problem.

Radio Intelligence Sections for the First Army and Second Army

Following the French Army model, the AEF established an intelligence apparatus, including a Radio Intelligence Section, for each of its armies. In the First Army, this organization retained the designator G2A6; in the Second Army, it was the G2A9. Both organizations were staffed by taking officers and men from the headquarters organization. While this left the G2A6 in Chaumont with shortfalls, particularly by September 1918, the move relieved the headquarters organization of much of the time-sensitive codebreaking and analysis and shifted the burden of support to operations on smaller teams that were co-located at First and Second Army headquarters. The army radio intelligence organizations were subordinate to the army G2; they also

reported to Moorman and relied on him for guidance and some supplies.

The officers in charge of these deployed units of the AEF G2A6 had a tremendous amount of responsibility. Not only did they supervise (and sometimes conduct) the analytic work and issue daily reports, but they kept the army G2 in the loop, worked with the Radio Section collectors who were detached to the armies, and liaised with French Army radio intelligence personnel. And, of course, they were unable to escape the job of distributing codebooks.

The First Army

In the fall of 1917, Moorman visited the British First Army to determine the best system for forming an army radio intelligence section "sufficiently flexible to fit any army which might be established and which could be duplicated as additional armies were created."[186] Although his section was still small, Moorman immediately began to plan for multiple army radio intelligence sections. In January 1918, Charles Matz was selected as future chief of the First Army Radio Intelligence Section, and Moorman began to train him for the job. Matz received all the incoming intercept and reports to handle as if he were at First Army headquarters. Berthold provided Matz with specific feedback each day and provided him with recoveries made by the rest of the team, just as if he were at a remote location.[187] On April 3, two clerks joined Matz and they moved to a separate room[188] away from the rest of the organization. Intercept arrived via a special telegraph line in the office.[189] Matz was required to solve codes, conduct analysis, and draft reports (for Moorman) as if the First Army was in battle.[190]

On June 12, 1918, Matz opened an office in Toul, co-located with the Signal Corps Radio Section. His two field clerks, McKenna and Meeth, joined him at Toul. Moorman's training plan provided Matz with exposure to the work of the signal collectors and allowed him to develop a rapport with the men who would be providing the intercept supporting combat operations. The move also placed Matz closer to the current front line along the southern side of the St. Mihiel salient where he began to support the I Army Corps, the 26th and 32nd Divisions, and the 94th and 95th Aero Squadrons. Matz found that in Toul he was dependent on the Signal Corps for transportation and asked Moorman for a small car or a motorcycle just a week after he arrived.[191] Moorman began working on the problem in earnest in early July, asking Matz if he had any experience riding a motorcycle.[192] Matz allowed that he had "a little" experience using a motorcycle with a side car but had never tried a motorcycle alone; he noted that in muddy or snowy weather a motorcycle alone would be practically useless.[193] In early August, the First Army G2A6 received a motorcycle with a sidecar to facilitate traveling with materials.[194]

Matz had some quick success, decoding a message on June 14 that revealed German expectation of an Allied attack (see chapter 11). He also made the acquaintance of Captain d'Abboville, the chief of the intelligence bureau of the French XXXII Corps then stationed in Toul, and he established a daily report to d'Abboville.[195] Matz also quickly developed a relationship with both the code and gonio officers of the French VIII Army. The French gonio officer complimented the G2A6 for their locations, which aligned "in almost every case" with his work, and, upon seeing Matz's direction-finding plotting system that used sliding weights, the French officer declared that he would adopt the same method.[196]

By the first of August, Matz and Moorman had arranged for all French collection stations to route traffic directly to Matz's office. Moorman directed Loghry, who was running the Radio Section at the same time that he was serving as radio officer for the First Army, to establish new American intercept sites only when "not practicable to obtain satisfactory intercepts or gonio bearings from the French."[197]

Matz joined the staff of the First Army at La Ferté-sous-Jouarre on July 29, 1918;[198] they moved to Neufchâteau on August 12, while Matz's team remained in Toul making preparations.[199] When

the First Army moved to its new headquarters in Ligny-en-Barrois on August 30, Matz was joined by Gilmore, who was detailed from his temporary job as head of the Second Army G2A9, as well as clerks Lyon and Jacques (coming from Toul).[200] Meeth and Jacques formed the Code Section, and Lyon and McKenna handled the Goniometric Section. By September 2, Matz had "given up" on Jacques for code work for "he merely doesn't seem to grasp it" and moved him to general clerk and trench code custodian. When Army Field Clerks Walter Kilbourn and Sterling March arrived on September 7, March teamed with Meeth on codes.[201]

The work of radio intelligence had caught the attention of the AEF Air Service by late August, and there was increasing interest in decoded German weather reports. The Air Service finally realized the importance of alerts based on airplane intercept. This prompted a call to install more aero intercept and aero gonio stations along the salient.[202]

War correspondent Moore described the offices of the G2 in Ligny-en-Barrois in the days before the St. Mihiel offensive, writing:

> Every one of the cubicles was filled with American officers and field clerks. They sat shoulder to shoulder, some at old-fashioned desks, other with pine tables before them, while a few utilized overturned goods boxes to work upon. On each table or desk were stacks of papers and a telephone instrument. The rooms were lighted badly, but garishly, with unshaded electric bulbs. The entire establishment hummed with a subdued roar of voices, telephones and typewriters. Men moved, when they had to, with an air of nervous repression. Their faces bore heavy lines of care that bespoke overwork and lack of sleep. Their voices held the timbre of excitement tightly held in, and in their eyes was a look of preoccupation.[203]

The First Army G2A6 worked every day until after midnight in the days before and after the attack on St. Mihiel, and Matz noted that the clerks pitched in at night and on Sundays "but even then they come back for extra hours when we can't finish up, which is pretty often."[204] A special unenciphered code was used to send keys and technical information to the G2A6 (see chapter 12).

It was in Ligny-en-Barrois that Matz and his team did the analytic work that affected the course of the St. Mihiel offensive (see chapter 11). This was the most important achievement of the AEF's combined radio intelligence effort during the war.[205] Matz provided the critical report to Colonel Howell, chief of the First Army G2, that led to the use of a barrage attack four hours before American troops began their attack. Of his team's work, Matz explained to Moorman that "we made our mistakes but we will know how to correct those particular ones the next time. There are many things in our work that I am not at all satisfied with and I am trying to improve them, but it will take time to attain anything near perfections. However I think I can honestly say that we proved the value of Radio Intelligence during the recent attack."[206]

There were some relaxed days at Ligny-en-Barrois after the victory at St. Mihiel. Often at 1700 the officers of the G2 spent an hour swimming in the canal that ran on the edge of town.[207] But soon the First Army began to move to a new headquarters co-located with the French II Army at Souilly, closer to the Meuse-Argonne region, and along the road to Verdun, the Voie Sacrée (Sacred Way). The First Army G2A6 remained in Ligny-en-Barrois after the rest of the G2 had moved, which caused some administrative and reporting difficulties. There also were no officers from the Radio Section at Ligny-en-Barrois, which created coordination problems that would only be overcome by the section's move to the "mud hole" that was Souilly on October 10.[208] Matz's team was reshuffled a bit to accommodate the establishment of the Second Army G2A9, with Graham replacing Gilmore as Matz's assistant. Wahl joined Lyon in the Goniometric Section, McKenna went to the Second Army

G2A9, and Edgar Anderson replaced March in the First Army Code Section.[209]

In early September, Moorman had asked Matz to think about developing a system of arbitrary designators for German radio stations, so that each station could be tracked through call sign changes. Moorman's first suggestion of a one-up trigraph naming system (AAA, AAB, AAC, etc.) did not work for reasons unknown; another system using the small numbers on squares of a particular map was also unsatisfactory. In October, Matz suggested assigning a letter to each column of the map—they were using the French *plan directeur goniométrique* (goniometric master plan)—from west to east. The first letter of the arbitrary call sign would be taken from the column and the second letter from the row on the map, which would be lettered from south to north. Matz also thought that dividing the five kilometer square markings into 25 one-kilometer squares and giving each square a letter would be helpful; this method would place a station within a square of one kilometer. Moorman pronounced this system "excellent" and replied that "to my mind, it is the plan we have been looking for ever since our section was organized."[210]

Matz and Falk also put their heads together to achieve analytic innovation by using the identification of airplanes supporting German artillery. They knew that artillery intelligence officers received reports from flash and sound ranging units that located the firing of German batteries. Matz and Falk thought this information could be combined with airplane alerts and subsequent radio intercept when the planes reported strikes. This system had just started testing at the time of the Armistice and reflects just one effort to make radio intelligence useful on the battlefield.[211]

While most of the intercept came from electronic emissions, on at least one occasion, the G2A6 of the First Army broke codes found with intercepted carrier pigeons. As the front line changed, the pigeons sometimes came home to find their location now in the hands of the Americans.[212]

The First Army Radio Intelligence Section and the Radio Section intercept facilities subordinated to the First Army were not affected by the fire (started by an overturned stove in the G2 office) that raged through the Signal Corps area at Souilly on October 30, 1918. The fire destroyed the office of Chief Signal Officer Parker Hitt and the barracks of the women telephone operators. The intercept work was placed some distance away from regular Signal Corps operations to avoid interference.[213]

The Radio Section shut down radio and direction-finding collection on November 17, 1918, but the First Army G2A6 remained at Souilly for a little while longer, forwarding information from the press intercept station at Souilly.[214]

Matz and the First Army G2A6 were singled out by General Nolan in his draft history of World War I. Nolan had visited the section during the St. Mihiel operation and, according to Matz, "found out what assistance we could give." Nolan remembered that "Lieutenant Matz and his assistants were constantly on the alert for German messages of all kinds. The results of his vigilance were most gratifying."[215]

The Second Army

In late July or early August, Robert Gilmore went to Toul to begin organizing the Second Army G2A9, but in late August he joined Matz at First Army. After the St. Mihiel offensive, Gilmore, March, and McKenna moved from the First Army to the Second Army; however, Philip Whitehead was put in charge of the Second Army G2A9 instead of Gilmore. Additional men were added from Chaumont. While Gilmore had been trained for the job with his stint in Toul and then service as assistant to Matz, his performance was not what was expected.[216]

Whitehead, Gilmore, Falk, and their clerks DePierri, McKenna, and March arrived at Second Army headquarters at Toul on Sunday evening, September 22, 1918. They were accompanied by Private John H. Endrum, who had been breaking

codes since May, and newly arrived Private Lawrence E. Hendricks and Bugler Leonard W. Robbins. Corporals Jess Kreuger and Lester Wolff and four (unnamed) telegraph operators completed the team.[17] By September 24, despite some difficulty getting their equipment, the section had set up their map board and had begun work.[218] The Second Army never saw combat, but the G2A9 was fully operational and supplied the Army G2 with information until after the Armistice. For reasons unknown, the section was designated the G2A9 rather than the G2A6.

Whitehead handled supervision and liaison; Gilmore, as his assistant, filled in when Whitehead was away from the office. Gilmore also had special responsibilities for the listening station reports and airplane intercept activity, as well as collecting information from prisoner interrogations and other documents. Falk handled communications security violations and distribution of codebooks. DePierri was the chief clerk. McKenna and Hendricks teamed to work the direction-finding reports.[219]

March, Endrum, and Robbins formed the Code Section, splitting three shifts (0800 to 1700; 1500 to midnight; midnight to 0800). Kreuger kept track of reporting from airplane collection and listening stations, and prepared reports. Wolff handled traffic analysis duties, tabulating message activity and immediately reporting unusual activity, as well as charting code usage and activity of each German station heard.[220]

Because the Second Army was not in combat, Whitehead's section was not receiving any radio intercept as of October 7. Instead, they spent their time working with the listening stations and fixed goniometric sites in the Woëvre plain.[221] Whitehead found there was some difficulty in cooperation between the Radio Section's listening stations and the regimental intelligence officers and complained of such to the G2 of the Second Army on October 9, 1918. He recommended that the intelligence officers be advised that the listening stations were important for "immediate and reliable information" about enemy plans and activity, particularly from their intercepted telephone stations and ground telegraph stations. As the listening stations were close to the front line and "generally unable to report directly to the Army radio intelligence officer," it was important that the regimental intelligence personnel take full advantage of the service, as much of the value of the information was lost once it reached army headquarters. Some listening stations were having difficulties because when an intelligence officer was relieved, he did not inform his successor as to the location of the listening stations and how to get their information. Whitehead recommended that each station also receive the divisional Summary of Information so they could perform their work intelligently. This suggestion was approved by Lieutenant Colonel C. F. Thompson, the G2 of the Second Army, who told Whitehead to take up the issue with regimental and divisional G2s.[222]

On November 4, Gilmore made suggestions regarding the interception of enemy airplane frequency adjustments. He noted that the aero gonio intercept stations in the Second Army were the only effective means of combatting these adjustments and suggested that these stations be more closely coordinated with sound and flash-ranging stations, as was done in the British and French armies. Gilmore proposed that there be three aero gonio intercept stations on the Second Army front to align with the three sound and flash stations.[223]

Whitehead kept the Second Army goniometric work operational until German troops moved to the rear and their radio stations disappeared from the airwaves. The sites were discontinued on November 17, 1918.[224]

Yardley in Europe

In July 1918, planning was underway for Herbert Yardley to go to Europe. Van Deman had consulted Moorman, and Moorman prepared a telegram for Nolan's approval and Pershing's signature requesting Yardley's visit to Chaumont to assist in "coordinating the work on enemy codes" between

Washington and the AEF. The message also noted that the selection of men for duty in the G2A6 was a matter of importance, and suggested that Yardley could visit French and British code offices to study how they selected personnel.[225]

Wavering on the verge of a breakdown, Yardley claimed to have been too ill to focus on the plans, but said he went to Europe to liaise with the Allied cipher bureaus. The objective was to obtain information on codes and ciphers from the British and the French to prepare for an American postwar cipher bureau.[226] On July 30, Yardley was ordered to report to the AEF for three months of temporary duty. Nothing was mentioned about stops in the United Kingdom or France before reporting to Moorman at Chaumont.[227]

Working with Leland Harrison at the State Department, General Marlborough Churchill asked that Secretary of State Robert Lansing sign a letter to the Allied governments identifying Yardley as the officer in charge of the MID Code and Cipher Section as well as a representative of the State Department in this capacity. The letter also "requested that [Yardley] be given access to all material procurable through diplomatic channels which might in any way assist in the solution of enemy codes and ciphers."[228]

Harrison might have seen Yardley's trip as an opportunity to push his desire for a closer relationship between MI-8 and the British. In July, Harrison explained to Edward Bell, stationed at the American embassy in London, that his goal was for MI-8 to have "complete cooperation and exchange of information" with the British and French cipher bureaus although he admitted that the United States had "much to learn and perhaps nothing to offer." Bell reported to Harrison about the upcoming transatlantic radio conference and noted that Admiral Reginald "Blinker" Hall, director of the Admiralty's Intelligence Division, was opposed to the "general pooling" of information for fear of leaks.[229]

The original plan for Yardley's trip was for him to spend two weeks in London (August 15-September 1), then two weeks in Paris (September 1-15), and then two months at AEF headquarters in Chaumont (September 15-November 15).[230] On July 30, 1918, he was ordered to Hoboken, NJ, to obtain transportation to France.[231] But Yardley did not sail until August 16 and did not arrive in Liverpool until August 28.[232] He did not leave Britain for France until October 1, weeks after he was due in Chaumont.[233] Yardley would not return to the United States until the following April.

Yardley took his time reporting to Chaumont. He checked himself into the Ritz in London at the price of twelve shillings and sixpence per night for three nights and then found less expensive lodging at 70 Comeragh Road in Hammersmith for three shillings a night. In his month in London he spent $389.24 ($7,037.33 in 2021 dollars or about $207 a day for his 34-night stay in the United Kingdom).[234]

He first visited Colonel Charles French of the British War Office and Bell at the American embassy. He made little progress with the British and spent days drinking "a great deal of tea" as well as whisky and soda.[235] Bell introduced him to Admiral Hall, who refused to give Yardley material needed to work on the Berlin-Madrid diplomatic traffic.[236] Major Hay at the War Office had a dummy office set up to deal with "visitors from neutral countries or others whom he thought it advisable to confuse," and Yardley appears to have been entertained there by a staffer, "a certain man who was able, when required, to give the impression of the typical British idiot." Not only did Yardley not get any information from MI1(b), he later described their work in a patronizing manner, which was a source of great amusement to Hay and his staff.[237] Yardley, certain that the British were reading American ciphers, claimed to have sent a secret message home "that the British would be unable to decipher" using a Mexican government cipher to encipher the military attaché code.[238]

In Yardley's 34 days in the United Kingdom he spent parts of nine days at the War Office, parts of four days visiting the British Office of Censorship, and three days at the Admiralty. He hosted nine dinners with British officers "to obtain military infor-

mation"; the cost of these dinners ranged between $200 and $300 in 2021 currency.[239]

By September 23, the G2A6 was wondering what had happened to Yardley, for he had not made an appearance or even sent word as to his whereabouts.[240] On September 30 and October 1, Moorman made efforts to locate Yardley and had cablegrams sent to AEF Base Section 3 in London. Moorman believed that Yardley had arrived in London on September 9 but "since that date nothing has been heard from him." He implored Base Section 3 to act, noting that "if this officer is still in England he should be ordered to report at these headquarters without further delay.[241]

While Moorman was trying to locate him, Yardley traveled to Paris on October 1, 1918. There he was met with the same level of skepticism that had greeted him in London. Colonel Cartier had been advised by an Admiralty officer, on behalf of Admiral Hall, that the French should be on their guard against Yardley for he was indiscreet.[242]

While Yardley was in Paris, Base Section 3 in London claimed on October 18 to have no record of him; then, on November 5, Base Section 3 discovered that Yardley had arrived in Britain on the SS *Saxon* on August 28. They promised to search for him and to have him report to Chaumont "without delay."[243]

When Yardley arrived in Chaumont on November 21, more than two weeks after the last message about his location,[244] he was too late to be of benefit to the G2A6. Moorman later glossed over the incident, recalling that "Major Yardley was sent over but got lost somewhere between London and Paris, and so never got to us until after the Armistice was signed. On that account we never got the advantage of what he was going to tell us, nor to tell him what we needed."[245] Childs noted, "Yardley had disappeared in Europe for three months before he showed up at G2A6. We found now either he really disappeared or else the orders got all tangled up as they seem to have been."[246] William Friedman wrote home to Elizebeth Friedman that Yardley was "only going to be here a few days."[247]

At about the same time in November 1918, Moorman was asking G2A6 personnel about their reassignment preferences. As it turned out, after hearing Major Yardley talk, a few wished to go to Paris with him to decode and decipher the communications of the Paris Peace Conference delegates. By December 3, Yardley chose Childs, who had asked to return to the United States, and Frederick Livesey, who had worked for a time in MI-8 and wished to return there.[248] They were joined in Paris by clerks Meeth, McKenna, and Nathan.[249]

The officers ended up having a grand time in Paris, as well-described by both Yardley and Childs in their later books.[250] But they appear to have done minimal cryptologic work, for, despite the assignment to break codes and ciphers of the other powers attending the conference, Childs recalled "we had literally nothing to do."[251] The photo shows both men in their office in Paris. Yardley did, however, ask that the G2A6 in Chaumont send him a complete file of messages intercepted in the German diplomatic, naval, and colonial codes, as well as Spanish diplomatic codes and all ADFGVX messages. It is not clear what use these were in Paris.[252] Whitehead, the last man remaining in the G2A6, reported to Yardley that he had instructions to send all radio intercept to Colonel Charles H. Mason of the American Commission to Negotiate Peace's Combat Section in addition to the intercept that Moorman had arranged for Yardley to receive. It seems that Mason had been unaware that the material was already coming to Paris; it is possible that Yardley's office was receiving the intercept (the large portion of which would have been plaintext) but not making reports to other sections.[253]

Yardley returned home in April 1919, as did Livesey. Childs found a job with the American Relief Administration in Yugoslavia.[254]

G2A6 After the Armistice

> The French and Americans here have been celebrating since yesterday afternoon and I didn't know this place had so many people.

J. Rives Childs (l) and Herbert O. Yardley in their office in Paris at 4 Place de la Concorde, February 12, 1919. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-51371

> The place is all lit up, if you can realize what a change that means in these French cities which have been dark for almost five years. There are hundreds of flags out and parades, unorganized of course, are passing every few minutes. The boys just passed here, their bugles and their voices singing "Over there." This afternoon there was an official reception before the City Hall, otherwise known in every French city as l'hotel de ville, but only one man from our office was detailed to represent the department. Last evening we had a little celebration at our mess and after that a musicale at Capt Owen's billet which kept us until 10. Then we came over to the club to see the festivities but there weren't many going on.[255]
>
> —William Friedman, letter to Elizebeth Friedman, November 12, 1918

Within two weeks of the Armistice, men began to leave the G2A6. Colonel Moorman held a meeting of the staff on November 22 to discuss options for the men. At the meeting the group heard a pitch

from Yardley, who already had orders to report to Paris to set up a cipher section there. Moorman asked each man to turn in a slip that listed his skills and preferences for assignment.[256]

A handful of men wanted to go with Yardley. But the majority wished to go home. Fifteen went to Trier, Germany, with the Allied military government there; eight went to Paris (although it appears only two were with Yardley). Another dozen went to elements of the G2 in Chaumont; 17 or 18 were transferred back to their original units for disposition and discharge.[257] Captain Berthold and Lieutenant Sailor went to operate the G2A6 of the Third Army in Coblenz, Germany, where Army Field Clerk Donald A. Lindsay would join them.[258]

William Friedman was given the task of preparing a history of all the work done in the G2A6 since the beginning, and while he was uncertain why he was selected, he vowed to "make a job of it."[259]

Before he left France, Moorman singled out five officers for the "honor" of individual commendation letters signed by General Nolan, for he felt that their work merited more than a "statement that they belonged to an organization that did good work." Moorman felt these men "did good work personally … they gave up their ambition for transfer to more active duty where the chances for promotion and excitement naturally appealed to them. They worked loyally, efficiently, and to them more than anyone else is due whatever success was achieved …. I am personally, deeply indebted to them for their most faithful support." Berthold, Matz, Whitehead, Falk, and one unknown officer received letters from Nolan on January 8, 1919.[260]

Matz briefly spent time in Trier with the Third Army and returned home in early February 1919. Moorman, Whitehead, Friedman, and two clerks (Mangene and DePierri) remained in Chaumont for a few months more. Moorman departed for the United States in January; Friedman left in February after completing a history of the codebreaking effort. Whitehead stayed on as the sole officer of the G2A6, handling intercepted press messages; he and Mangene returned to the United States in June 1919. The work of the AEF Radio Intelligence Section was finished.[261]

Conclusion

The relatively small staff of the G2A6 and the two smaller Radio Intelligence Sections of the First and the Second Armies had a record of consistent success from the time of their code recoveries on January 1, 1918, through the time of the Armistice. The larger, more dramatic success stories are examined in depth in chapter 11. There were smaller, day-to-day successes solving messages and conducting traffic analytic work; these efforts contributed substantially to the work of the Order of Battle Section, particularly after June 1918 when the Radio Section had a greater number of radio intercept and goniometric stations in place.

General Nolan later expressed that to him "the little-known activities of the code and cipher section of our military information division were always much more interesting than the espionage work of Colonel Moreno's section; and with no reflections on the excellent work of our Secret Agents, of much more value in furnishing us with timely information of our enemies."[262] For the first time, but not for the last, the quiet value of radio intelligence in the context of the broader American intelligence effort was making itself known.

Notes

1. "Frank Moorman writes about his grandfather, Lieutenant Colonel Frank W. Moorman, and his father, Major General Frank W. Moorman," accessed June 28, 2010, http://troop33.takomaparkscouts.org/about-us/history/moorman.
2. *Army Schools Annual Reports, 1915* (Fort Leavenworth, Kansas: Army Service Schools Press, 1915), 42.
3. Dennis Nolan, chapter on codes and ciphers, first draft of proposed history of World War I (unpublished manuscript, n.d.), 2-3, US Army Military History Institute, Carlisle Barracks, Dennis E. Nolan Papers.
4. Moorman suggested that the following information, in this order, be recorded: intercept station designator, call letters of sending station, call letters of receiving station, date, and hour of receipt. Moorman to Parker Hitt, letter, October 16, 1917, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 120, Records of the American Expeditionary Forces, Entry 105, Box 5761.
5. "Report on Trip to British General HQ," January 1, 1918, NARA CP, RG 120, Entry 129, Box 5866.
6. John M. Manly, "The AEF and Colonel Moorman," in John F. Dooley, *Codes, Ciphers and Spies: Tales of Military Intelligence in World War I* (New York: Springer, 2016), 37-45. Manly was writing years after the war and had never visited France. While he had postwar conversations with Moorman, Manly was likely relying on information he received from Yardley and Powell.
7. Nolan, chapter on codes and ciphers, 4.
8. Background on army field clerks as the predecessors of warrant officers; the position can be traced back to 1896 as the headquarters clerk. "Army Warrant Officer History," accessed March 6, 2018, https://warrantofficerhistory.org/Hist_of_Army_WO.htm.
9. Joseph Mills Hanson, *The Marne: Historic and Picturesque* (Chicago: A.C. McClurg, 1922), 62.
10. The wooden barracks were of the French "Adrian" variety. Hanson, *The Marne*, 93-100.
11. Parker Hitt to Genevieve Young Hitt, letter, September 2, 1917, Moreman-Mustain Collection of Parker Hitt Material.
12. G2A6 Logbook, NARA CP, RG 120, Entry 105, Box 5769; Moorman to the Chief Operator, letter, January 23, 1918, NARA CP, RG 120, Entry 105, Box 5767.
13. G2A6 Logbook.
14. G2A6 Logbook; William E. Moore, "The Jerry Who Spoiled the War," *The American Legion Weekly* 4, no. 35 (September 1, 1922): 7-8, 26-28. Moore's description was picked up by David Kahn, *The Codebreakers* (New York: Scribner, 1996), 333. As far as can be determined, no one who worked there ever called it the Glass House. J. Rives Childs, in a 1977 letter to Center for Cryptologic History historian Hank Schorreck, called the article "a curious compound of truth and non-truth." J. Rives Childs to Hank Schorreck, letter, December 9, 1977, NARA CP, RG 457, Records of the National Security Agency, Entry P11, Box 85.
15. William Friedman to Elizebeth Friedman, August 29, 1918, George C. Marshall Foundation Research Library (ML), Elizebeth Smith Friedman Collection (ESF), Correspondence Series (CS), Box 2, File 15.
16. William Friedman to Elizebeth Friedman, August 29, 1918.
17. Memo of December 3, 1918, NARA CP, RG 120, Entry 105, Box 5767; Moorman, January 23 and December 26, 1918, NARA CP, RG 120, Entry 105, Box 5768.
18. John A. Graham, "The Mildly Military Memories of a Refugee, Intelligence Officer and Civil Affairs Administrator in World War I," 10-11, James G. Leyburn Library Special Collections and Archives, Washington and Lee University (WLU), John A. Graham Collection, WLU 0307, Box 7.
19. Graham, "The Mildly Military Memories of a Refugee, Intelligence Officer and Civil Affairs Administrator in World War I," 10-11.
20. Nolan, chapter on codes and ciphers, 5.
21. Nolan to Adjutant General of the AEF about commutation of quarters for code office night

work, March 14, 1918, NARA CP, RG 120, Entry 105, Box 5767.

22. William Friedman to Elizebeth Friedman, Monday night, August 26, 1918, ML, ESF, CS, Box 2, File 15. William Friedman comments on the length of the walk.
23. William Friedman to Elizebeth Friedman, Friday night, July 19, 1918, ML, ESF, CS, Box 2, File 14.
24. William Friedman to Elizebeth Friedman, Monday noon, September 10, 1918, ML, ESF, CS, Box 2, File 16. Ed is Ed Woellner, who trained at Riverbank and was billeted in the same house as Friedman.
25. For similar experiences see Forrest C. Pogue *Education of a General: 1880-1939* (New York: Penguin Books, 1963), 148-149; James Carl Nelson, *Five Lieutenants: The Heartbreaking Story of Five Harvard Men who Led America to Victory in World War I* (New York: St. Martin's Press, 2012), 176; and Betsy Rohaly Smoot, *Parker Hitt: The Father of American Cryptology* (Lexington: The University Press of Kentucky, 2022), 81, 83.
26. William Friedman to Elizebeth Friedman, Monday night, September 23, 1918, ML, ESF, CS, Box 2, File 16.
27. William Friedman to Elizebeth Friedman, Wednesday night, September 12, 1918, ML, ESF, CS, Box 2, File 16.
28. William Friedman to Elizebeth Friedman, July 19, 1918.
29. William Friedman to Elizebeth Friedman, Sunday night, October 27, 1918, ML, ESF, CS, Box 2, File 17.
30. Lieutenant Colonel Frank Moorman, Lecture Delivered to the Officers of the Military Intelligence Division February 13, 1920, copy courtesy of US Army Intelligence and Security Command (INSCOM) History Office.
31. Moorman, "Notes on Personnel Required by Radio Intelligence Service, AEF," undated, NARA CP, RG 120, Entry 105, Box 5765.
32. *Final Report of the Radio Intelligence Section, General Staff, General Headquarters American Expeditionary Forces 1918-1919,* Special Research History 014, NARA CP, RG 457, Entry 9002, Box 9.
33. Moore, "The Jerry Who Spoiled the War," 8.
34. "Lieut. Whitehead Writes of Work," *Janesville Daily Gazette*, April 29, 1918, 2, accessed August 15, 2021, www.newspapers.com.
35. Moorman's process was probably aided by use of the soldier's qualification card. In August 1917, the army's Committee on Classification of Personnel developed a card system that gathered all the essential information about a man's skills. General Pershing requested that every man sent to France should bring his qualification card. Among the information on this card was occupation and language skills. See *The Personnel System of the United States Army*, vol. I, *History of the Personnel System* (Washington, DC: Government Printing Office, 1919), 63, 85.
36. Ninety-day officer training camps were set up in 1917; these grew out of the Plattsburg Movement, a training program for young civilians that was part of General Leonard Wood's preparedness effort in 1913. A good source for information on this subject is John Garry Clifford, *The Citizen Soldiers: The Plattsburg Training Camp Movement, 1913-1920* (Lexington: University Press of Kentucky, [1972] 2015).
37. The SS *Mongolia*, the first US ship to test the German submarine blockade around Britain, was attacked by a German submarine in the English Channel on April 19, 1917; the navy gun crew on board drove it off with their three six-inch guns. Naval History and Heritage Command, "SS *Mongolia*, First Armed Action by United States Navy in World War I," accessed August 23, 2018, https://www.history.navy.mil/content/history/nhhc/our-collections/artifacts/exhibits/unitedstatesnavyarmedguards.html.
38. The SS *Kroonland*, while still a passenger liner working the New York to Liverpool run, complete with navy guns, was struck by a torpedo (which did not explode) and lightly struck by the submarine on May 20, 1917, just outside of Liverpool, and then had multiple U-boat encounters later that day. The ship was not yet officially a troop transport in September 1917 but was carrying men to Liverpool; one imagines that the men were fully aware of the May encounter

and braced for more of the same. Naval History and Heritage Command, "Kroonland," accessed August 23, 2018, https://www.history.navy.mil/content/history/nhhc/research/histories/ship-histories/danfs/k/kroonland.html.

39. G2A6 Logbook; *Final Report of the Radio Intelligence Section*. The arriving officer lists a great deal of information, for Moorman's request for Lieutenant Philip B. Whitehead on November 15, 1917, notes that Whitehead was a student of archaeology and a teacher who had read many German books but did not speak German well and that "good teachers like good cipher men must be capable of long hours of sustained mental efforts." Moorman, November 15, 1917, Center for Cryptologic History file series II.F.2.2, copy held by author.
40. G2A6 Logbook.
41. G2A6 Logbook; Moorman to A. L. Conger, "Need for Clerks, Radio Intelligence Section," December 28, 1917, Center for Cryptologic History File Series II.F.2.2, copy held by author.
42. *The Columbian* (yearbook), 1912, 343, accessed on April 18, 2018, via ancestry.com. Draft registration card for Henri Casimir Jacques, United States, Selective Service System, *World War I Selective Service System Draft Registration Cards, 1917-1918* (Washington, DC: National Archives and Records Administration, M1509), 4,582 rolls. Imaged from Family History Library microfilm. Accessed on April 18, 2018, via ancestry.com. The following draft registration cards from the same source and accessed on the same date: Walter Harry Kilbourne, John Alloysius McKenna, John Carl Meeth, and Samuel Steward Shook. "Added to G.W.U. Faculty," *Evening Star* (Washington, DC), October 30, 1917, 20, accessed on April 18, 2018, via ancestry.com. David Kahn, *The Reader of Gentlemen's Mail* (New Haven, CT: Yale University Press, 2004), 21.
43. Moorman to George Fabyan, July 15, 1918, NARA CP, RG 120, Entry 105, Box 5767.
44. Kahn, *The Reader of Gentlemen's Mail,* 127. Donald D. Millikin, *Elementary Cryptography and Cryptanalysis* (New York: New York University Bookstore, 1943).
45. Manly to Childs, June 4, 1918, Randolph-Macon College, Flavia Reed Owen Special Collections and Archives (RMC), J. Rives Childs Collection (JRC), Folder 3, General Cipher Correspondence.
46. Nolan to AEF Chief of Staff, memo, August 7, 1918, NARA CP, RG 120, Entry 105, Box 5761.
47. Marlborough Churchill to Nolan, August 16, 1918, NARA CP, RG 120, Entry 105, Box 5767; *Final Report of the Radio Intelligence Section.*
48. Moorman to G2, September 19, 1918, NARA CP, RG 120, Entry 105, Box 5767.
49. Moorman Lecture, February 13, 1920.
50. The Gondrecourt radio station was a standard Signal Corps site for communication and was not tasked with radio intercept; however, as common for this period, radio operators were known to listen to other radio stations when not transmitting or receiving their own messages. G2A6 Logbook; *Final Report of the Radio Intelligence Section.*
51. G2A6 Logbook.
52. G2 promotion recommendations, undated, in Center for Cryptologic History files but taken from unspecified RG 120 G2 files; copy held by author.
53. Moorman to Robert Loghry, December 17, 1917, NARA CP, RG 120, Entry 105, Box 5768.
54. G2A6 Logbook.
55. G2A6 Logbook.
56. G2A6 Logbook.
57. G2A6 Logbook.
58. G2A6 Logbook; *Final Report of the Radio Intelligence Section.*
59. "Lieut. Whitehead Writes of Work."
60. The increased volume of work is evident in the entries in the G2A6 Logbook and the paperwork generated by the office, which can be found in NARA CP, RG 120, Entry 105.
61. Moorman to AEF Chief Signal Officer, January 26, 1918, NARA CP, RG 120, Entry 105, Box 5757.
62. Moorman to AEF Chief Signal Officer, January 26, 1918.
63. Hugo Berthold to Moorman, February 1, 1918, NARA CP, RG 120, Entry 105, Box 5768.

64. It seems likely that the person named Childs that Moorman had heard about was T. M. Childs, who later worked in MI-8. Childs indicates in two oral histories, NSA-OH-1977-06 (April 19, 1977) and NSA-OH-1976-11 (September 10, 1976), that it was Moorman, and that both Sellers and Graham cautioned him. Sometimes Childs's tale has him hearing this from Moorman and sometimes from Berthold, but it must have been Berthold, as Moorman was away from the office on February 1 and did not return until February 20. Childs, interview, NSA-OH-1977-06; Childs, interview, NSA-OH-1976-11 (September 10, 1976). In Childs, *Before the Curtain Falls* (Indianapolis: Bobbs-Merrill, 1932) and Childs, *Let the Credit Go: The Autobiography of J. Rives Childs* (New York: K. S. Giniger, 1983), he says it was Berthold, which indeed it must have been.
65. Childs, interview, NSA-OH-1976-11.
66. Berthold to Moorman, February 14, 1918, NARA CP, RG 120, Entry 105, Box 5768.
67. Childs, *Before the Curtain Falls*, 116-119.
68. G2A6 Logbook; Moorman to Conger, March 4, 1918, NARA CP, RG 120, Entry 105, Box 5767; Nolan to Van Deman, March 4, 1918, Center for Cryptologic History file series II.F.2.2, copy held by author.
69. The 13th Engineers, railway men drawn from the largest railroads that ran through Chicago, were among the first American troops to arrive in France and were attached to the French II Army. They had been assisting the Radio Intelligence men in the Verdun Sector—the radio intercept stations at Landrecourt and Froidos—with transportation, clothing, rations, and other essentials. Moorman was effusive about their support in a June 3, 1918, letter to Conger asking for Colonel Nolan's signature in a thank you memorandum to the regimental commander. Moorman said, "No orders have been necessary to get their help. Their attitude has been that we are all engaged in the same work, that it is all for one object and paid for by the same man, and that anything they can do to help out is a part of their duty. Such a spirit is a very desirable one to maintain, and it occurs to me that an expression of appreciation from GHQ would not be out of place." Moorman to Conger, June 3, 1918, NARA CP, RG 120, Entry 105, Box 5767. The behavior of the 13th Engineers contrasted considerably with the treatment that the Radio Sector operators received from other units.
70. Wesley Ladwig to Moorman, February 12, 1918, NARA CP, RG 120, Entry 105, Box 5768; Matz to Major Magruder, February 12, 1918, NARA CP, RG 120, Entry 105, Box 5768. Matz also wrote a comprehensive trip report on the same day concerning French staffing, procedures, record keeping, and a frank contrast of American plans to the procedures of the French. Matz, Trip Report, NARA CP, RG 120, Entry 105, Box 5766.
71. Berthold to Moorman, February 14, 1918.
72. G2A6 Logbook.
73. Berthold to Conger, February 10, 1918, NARA CP, RG 120, Entry 105, Box 5761.
74. Nolan, chapter on codes and ciphers, 7.
75. G2A6 Logbook.
76. Moorman to G2, July 2, 1918, NARA CP, RG 120, Entry 105, Box 5768.
77. My reading of the logbook and other G2A6 papers leads me to believe that the office was too busy to keep the logbook current until more staff arrived in the summer. July 1, 1918, notation in G2A6 Logbook.
78. William Friedman to Elizebeth Friedman, Friday evening, October 11, 1918, ML, ESF, CS, Box 2, File 17.
79. Later in life, Childs and Gilmore, who had traveled to France together, would find themselves both living in the south of France, but they never met up again.
80. William Friedman to Elizebeth Friedman, August 10/11, ML, ESF, CS, Box 2, File 15; Fabyan to Ralph Van Deman concerning four officers, December 10, 1917, NARA CP, RG 165, Records of the War Department General and Special Staff, Entry 65, Box 2241.
81. Memorandum on duties and assignments, April 1, 1918, RMC, JRC, Folder 2.
82. For purposes of this book, this will be called the Code Section and all the subordinate parts of the G2A6 will be called sections. Some later works

term these units as subsections, but the use of "section" in found throughout wartime documents.
83. Nathan had a background in codes and had started 1918 in the Chief Signal Officer's organization working on a trench code. However, he does not seem to have worked in the Code Compilation Section. Hitt to Nolan, January 15, 1918, NARA CP, RG 120, Entry 105, Box 5767.
84. Memorandum on duties and assignments.
85. Memorandum on duties and assignments; also memorandum of April 6, 1918, NARA CP, RG 120, Entry 105, Box 5767.
86. Army enlisted ranks in World War I differed greatly from the modern army. By 1919, there were 128 distinct ranks, each with its own insignia, broken out by branch. A color sergeant was an infantry designation, which ranked above a first sergeant and below a battalion sergeant major. Other archaic enlisted ranks seen in the G2A6 and the Radio Section include bugler, master signal electrician (the highest enlisted rank in the Signal Corps), cook, and chauffeur.
87. Memorandum on duties and assignments.
88. Memorandum on duties and assignments.
89. Memorandum on duties and assignments.
90. Nolan to Edgar Russel, message, November 25, 1918, NARA CP, RG 120, Entry 105, Box 5761; Nolan, chapter on codes and ciphers, 8.
91. Nolan to Russel, November 25, 1918.
92. Moorman to Conger, May 1, 1918, NARA CP, RG 120, Entry 105, Box 5767.
93. Nolan praises the "Radio Intelligence Section," which was the initial name of the Signal Corps Radio Section. See chapter 10 for details on the name change. Nolan to Russel, May 1, 1918, Center for Cryptologic History file series II.F.2.33, copy held by author.
94. G2A6 undated memo, NARA CP, RG 120, Entry 105, Box 5761.
95. Moorman, "Code and Cipher in France," *Infantry Journal* XVI, no. 12 (June 1920): 1039-1044, 1043-44.
96. *Historical Background of the Signal Security Agency*, vol. 2, World War I (Washington, DC: Army Security Agency, 1945), 200, Special Research History 001, copy held by National Cryptologic Museum Library.
97. Moorman, "Code and Cipher in France."
98. *Final Report of the Radio Intelligence Section*, Enclosure E, 41-46.
99. Memorandum summarizing information provided by the Radio Intelligence Section that was not obtained from any other source. Moorman to Colonel Dengler, memorandum, May 10, 1918, RG 120, Entry 105 Box 5761.
100. *Final Report of the Radio Intelligence Section*, Enclosure E, 41-46.
101. *Final Report of the Radio Intelligence Section*, Enclosure E, 41-46.
102. An excellent discussion of the maps used by the AEF can be found in Maurer Maurer, *The U.S. Air Service in World War I*, vol. III, Appendix D, 718, accessed October 13, 2018, https://media.defense.gov/2010/Nov/24/2001330064/-1/-1/0/AFD-101124-028.pdf.
103. *Final Report of the Radio Intelligence Section*, Enclosure E, 41-46.
104. Moorman to Loghry, June 25, 1918, RG 120, Entry 105, Box 5767.
105. Nolan, chapter on codes and ciphers, 6.
106. Memos, April 1, 1918, RMC, JRC, Folder 2, Organization/Administration, copies held by Center for Cryptologic History.
107. Breakout of each distribution list is not known. Memos, April 1, 1918, RMC, JRC, Folder 2.
108. Weekly Code Section Report, June 16, 1918, NARA CP, RG 120, Entry 105, Box 6696.
109. File of Weekly Code Section Reports, NARA CP, RG 120, Entry 105, Box 6696.
110. "Weekly German Aeroplane Radio Activity Report," May 5, 1918, NARA CP, RG 120, Entry 105, Box 6699.
111. German Field Radio Station Reports, NARA CP, RG 120, Entry 105, Box 5768.
112. *Historical Background of the Signal Security Agency*, vol. 2, 207-209.
113. *Final Report of the Radio Intelligence Section*, Enclosure G, 50-52.
114. Moorman, "Code and Cipher in France"; *Final Report of the Radio Intelligence Section*, Enclosure G, 50-52.

115. Moorman, "Code and Cipher in France."
116. William Friedman, *American Army Field Codes in the American Expeditionary Forces During the First World War* (Washington, DC: War Department, 1942), later issued as Special Research History 315 by the National Security Agency, Appendix 22, 261, declassified November 21, 1973. NARA CP, RG 457, Entry 9002, Box 86.
117. Friedman, *American Army Field Codes in the American Expeditionary Forces During the First World War*, Appendix 22, 263.
118. *Final Report of the Radio Intelligence Section*, Enclosure G, 50-52.
119. Friedman, *American Army Field Codes in the American Expeditionary Forces During the First World War*, 25.
120. *Final Report of the Radio Intelligence Section*, Enclosure F; *Historical Background of the Signal Security Agency*, vol. 2, 203.
121. G2A6 Logbook.
122. William Friedman to Elizebeth Friedman, Friday night, October 18, 1918, ML, ESF, CS, Box 2, File 17.
123. Graham, "The Mildly Military Memories of a Refugee, Intelligence Officer and Civil Affairs Administrator in World War I," 14.
124. Howard Barnes, *Report of Code Compilation Section, General Headquarters American Expeditionary Forces December 1917-November 1918*, reprinted as a Technical Paper of the Signal Intelligence Section, War Plans and Training Division Washington, 1935, with a foreword by William Friedman, Special Research History 321 by NSA, 31, declassified November 21, 1973. NARA CP, RG 457, Entry 9002, Box 87.
125. Hugo Campagnoli, "Report of Adjutant of the Section," *Final Report of the Radio Intelligence Section,* Enclosure F, 47.
126. Campagnoli, "Report of Adjutant of the Section."
127. Campagnoli, "Report of Adjutant of the Section." This system was governed by AEF General Order No 172.
128. See picture of the strips and tables in chapter 12.
129. Campagnoli, "Report of Adjutant of the Section."
130. Campagnoli, "Report of Adjutant of the Section."
131. Moorman to Oswald Hitchings, September 21, 1918, NARA CP, RG 120, Entry 105, Box 5767.
132. Moorman to Chaplain F. P. Joyce, September 30, 1918, NARA CP, RG 120, Entry 105, Box 5767. It is not known how Moorman may have become acquainted with Maxey who served with the 28th Regiment of the 1st Division.
133. William Friedman to Elizebeth Friedman, October 11, 1918.
134. First Army headquarters moved to Souilly in mid-September after the St. Mihiel offensive.
135. *Final Report of the Radio Intelligence Section*, 17-18.
136. William Friedman, *Field Codes Used by the German Army During the World War* (Washington, DC: Government Printing Office, 1935), 7-8 (later published as SRMA-012), accessed October 27, 2018, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_437/41751269079046.pdf.
137. The most widely used German cipher, used mostly between army corps and division headquarters, was introduced on March 1, 1918, and was known as the ADFGX, for it only used those letters. The cipher used both substitution and transposition methods, and expanded to six letters (adding a V) on June 1, 1918, becoming what is known as the ADFGVX cipher. A 6x6 matrix was labeled with ADFGVX on each axis; the matrix was filled with letters and numbers to create a substitution table. Each letter thus became a digraph. The digraphs were written out left to right in 20 columns. Each column was numbered with a transposition key; the message was then composed by selecting the columns in numerical order to generate the text.
138. Friedman complained that Childs never came in on time; even when he was on relief duty, the earliest he would arrive would be 8:35 or 8:40. He also said that Vance Sailor, on night duty for August, told him that he (Friedman) was the only officer who relieved Sailor at 8:15 without fail. William Friedman to Elizebeth Friedman, August 29, 1918.
139. Moorman regarding plans to move some of the G2 to Langres, July 26, 1918, NARA CP, RG 120, Entry 105, Box 5767.

140. William Friedman to Elizebeth Friedman, August 12, 1918, ML, ESF, CS, Box 2, File 15.
141. Moorman to Chief Signal Officer, September 4, 1918, NARA CP, RG 120, Entry 105, Box 5767.
142. William Friedman to Elizebeth Friedman, Wednesday night, September 12, 1918.
143. G2A6 Logbook.
144. Moorman to Nolan; Nolan to Moorman, June 18, 1918, Center for Cryptologic History file series II.F.2.2, copies held by author.
145. William Friedman to Elizebeth Friedman, Sunday night, September 29, 1918, ML, ESF, Box 2, File 16.
146. The Meuse-Argonne was the largest battle in US history up to that point. It lasted 47 days and involved 1.25 million American troops. Approximately 117,000 Americans were wounded or killed.
147. William Friedman to Elizebeth Friedman, October 11, 1918.
148. Childs, *Let the Credit Go*, 30; Childs, interview, NSA-OH-1976-11, 11.
149. Friedman did not take it as the compliment that was likely intended, writing "why he should pick on me I don't know." William Friedman to Elizebeth Friedman, October 21, 1918, ML, ESF, Box 2, File 17.
150. G2A6 Logbook.
151. These men may have been working at the French goniometric station at Woimbey or perhaps a listening station run by the French, for no known American stations were in that area in May. Records of precisely where Radio Section men were embedded in French stations are scarce and must be reconstructed from multiple sources. Moorman to Conger, May 18, 1918, NARA CP, RG 120, Entry 105, Box 5769.
152. Moorman Lecture, February 13, 1920.
153. Moorman to Chief MID, November 22, 1918, NARA CP, RG 165, Entry 65, Box 3437.
154. Curiously, although the AEF G2 was structured along the lines of the French Deuxième Bureau, for a period of time weekly reports prepared by Berthold used the British numbering convention, thus instead of G2A6 he used the notation Ia6 (that is, I for intelligence, a6 for the section, dropping the leading "M") to represent the Radio Intelligence Section. Weekly reports dated February 10 and February 16, 1918, NARA CP, RG 120, Entry 105, Box 5767.
155. Nolan to Major Hue, December 17, 1917, NARA CP, RG 120, Entry 105, Box 5768.
156. French Military Mission to the American Army, memorandum on the exchange of German radios intercepted by French and American listening posts, May 13, 1918, NARA CP, RG 120, Entry 105, Box 5768.
157. Moorman to Loghry, August 1, 1918, NARA CP, RG 120, Entry 105, Box 5768.
158. Some examples can be found in NARA CP, RG 120, Entry 105, Box 6696, although reports of this type are found in nearly every box of Entry 105.
159. *History of MI 1B*, The National Archives, Kew HW 7 35, 7.
160. See David F. Trask, *The AEF & Coalition Warmaking 1917-1918* (Lawrence: University Press of Kansas, 1993); David R. Woodward, *Trial By Friendship: Anglo-American Relations 1917-1918* (Lexington: The University Press of Kentucky, 1993); and Phyllis L. Soybel, *A Necessary Relationship: The Development of Anglo-American Cooperation in Naval Intelligence* (Westport, CT: Praeger, 2005) for discussions of the political and control struggles faced by the Americans, British, and French. See also Mark Ethan Grotelueschen, *The AEF Way of War: The American Army and Combat in World War I* (Cambridge: Cambridge University Press, 2007), particularly 25-58 for discussion of doctrinal differences and disputes between the AEF and the Allies.
161. "Final Report of Assistant Chief of Staff, G2 (Nolan), June 15, 1919," *The United States Army in The World War 1917-1919*, vol. 13 (Washington, DC: Center for Military History, 1948), 12.
162. *Final Report of the Radio Intelligence Section,* 18.
163. Marcel Givierge, *Étude Historique sur la Section du Chiffre*, vol. VI (unpublished manuscript, n.d.), 243-257. National Cryptologic Museum Library.
164. *Final Report of the Radio Intelligence Section*, 18-19.

165. Alice Ivy Hay, *Valiant For Truth: Malcolm Hay of Seaton* (London: Spearman, 1971), 60.
166. Moorman to Conger, October 16, 1917, NARA CP, RG 120, Entry 105, Box 5767.
167. Moorman, October 31, 1917, NARA CP, RG 120, Entry 105, Box 5761; Hitchings to Moorman, October 26, 1917, NARA CP, RG 120, Entry 105, Box 5761.
168. Russel to John J. Pershing, April 12, 1918, NARA CP, RG 120, Entry 129, Box 5866.
169. *Protocol E.U.F. of August 12th 1918*, NARA CP, RG 120, Entry 765, Box 19.
170. Hitt to Nolan, October 11, 1918, NARA CP, RG 120, Entry 105, Box 6699.
171. Folder labelled "Italian Army," NARA CP, RG 120, Entry 105, Box 5753.
172. Fabyan was not amused by the risks Powell took while in Europe. Fabyan to Van Deman, April 8, 1918, NARA CP, RG 165, Entry 65, Box 2243.
173. John Powell to Nolan, February 25, 1918, RMC, JRC, Folder 3.
174. Berthold to Conger, asking for permission for a rush photocopy job, February 26, 1918, NARA CP, RG 120, Entry 105, Box 5761.
175. Nolan to Van Deman, February 26, 1918, NARA CP, RG 120, Entry 105, Box 5761.
176. G2A6 Logbook.
177. Moorman to Conger, March 4, 1918.
178. Moorman to Conger, March 4, 1918; Nolan to Van Deman, March 4, 1918.
179. Childs, "Report on Investigations of Codes and Ciphers made under Special Orders No 57, Par. 20, at British Military Intelligence in London," March 22, 1918, RMC, JRC, Folder 3.
180. Childs, "Report," March 22, 1918.
181. Childs, *Let the Credit Go*, 32.
182. Childs to Georges Painvin, June 8, June 21, and July 11, 1918, regarding cigarettes; August 22, 1918, about Painvin's assistance. All in RMC, JRC, Folder 3.
183. Childs Correspondence, RMC, JRC, Folder 3.
184. Childs Travel Orders, RMC, JRC, Folder 1.
185. Childs to Moorman, August 13, 1918, RMC, JRC, Folder 9.
186. *Historical Background of the Signal Security Agency*, vol. 2, 177.
187. Compilation of daily notes to Matz, February 1918, NARA CP, RG 120, Entry 105, Box 5761.
188. This was Room 67 in Building C, Center for Cryptologic History File series II.F.2.2, copy held by author.
189. *Historical Background of the Signal Security Agency*, vol. 2, 183.
190. Nolan, chapter on codes and ciphers, 6.
191. Matz to Moorman, June 20, 1918, NARA CP, RG 120, Entry 105, Box 5755.
192. Moorman to G2, July 2, 1918.
193. Matz to Moorman, July 13, 1918, NARA CP, RG 120, Entry 105, Box 5755.
194. On August 6, 1918, Berthold, on his way back from delivering codebooks, picked up Gilmore in Toul and took him to Langres to claim a motorcycle with a side car; Gilmore drove it back to Toul for the use of the First Army G2A6. G2A6 Logbook.
195. Matz to Moorman, June 15, 1918, NARA CP, RG 120, Entry 105, Box 5768.
196. No details are available on the precise technique involved, but probably refers to the map board system used at headquarters. Matz to Moorman, June 14, 1918, NARA CP, RG 120, Entry 105, Box 5755.
197. Moorman to Loghry, August 1, 1918.
198. Matz, "Final Report of the First Army," November 15, 1918, in *Final Report of the Radio Intelligence Section,* Enclosure C, 29-36.
199. Matz, "Final Report of the First Army."
200. Matz, "Final Report of the First Army."
201. Matz to Moorman, September 2 and September 7, 1918, NARA CP, RG 120, Entry 105, Box 5767.
202. Robert Gilmore to Moorman, August 25, 1918, NARA CP, RG 120, Entry 105, Box 5755.
203. William E. Moore, "The Crisis of St. Mihiel," *The American Legion Weekly* 4, no. 23 (June 9, 1922): 7.
204. Matz to Moorman, September 16, 1918, NARA CP, RG 120, Entry 105, Box 5756.
205. The US victory at St. Mihiel was extremely important to the course of the war and the morale of the AEF, yet it has often been overlooked by historians. See Mark E. Grotelueschen, "The

Doughboys Make Good: American Victories at St. Mihiel and Blanc Mont Ridge," *Army History*, no. 87 (Spring 2013): 7-16.

206. Matz to Moorman, September 16, 1918, NARA CP, RG 120, Entry 105, Box 5767.
207. John C. Parish, "Intelligence Work at First Army Headquarters," *The Historical Outlook* XI, no. 6 (June 1920): 213-217.
208. Matz to Moorman, September 16 and September 24, 1918, NARA CP, RG 120, Entry 105, Box 5767; "Mud hole" from Parish, "Intelligence Work at First Army Headquarters," 214.
209. Matz, "Final Report of the First Army."
210. Moorman to Matz, September 4, 1918; Matz to Moorman, October 3, 1918; Moorman to Matz, October 5, 1918. All in NARA CP, RG 120, Entry 105, Box 5756.
211. Matz to Moorman, September 16, 1918; Radio Division monthly report, November 1917, NARA CP, RG 120, Entry 2042, Box 31.
212. "Decoded German Radio Messages," October 6, 1918, NARA CP, RG 120, Entry 74, Box 6199 cites intercept of a message by carrier pigeon with a message from September 29, 1918.
213. Hitt, "A Study of the Service of Women Telephone Operators of the AEF," November 13, 1918, NARA CP, RG 111, Records of the Chief Signal Officer, Entry 45, Box 400. There is no entry for the First Army CSO files in RG 120 at NARA; records of the First Army signal effort can be partially reconstructed from material filed with the AEF CSO and other organizations.
214. Matz to Moorman, November 17, 1918, NARA CP, RG 120, Entry 105, Box 5756.
215. Nolan, chapter on codes and ciphers, 6; Matz to Moorman, September 16, 1918. Matz told Moorman that Nolan's visit "might be of help in anything further you need … We had all kinds of luck to help us along, and the rest came from the system that the work of the whole section, ever since you started it, has produced."
216. On August 25, 1918, Matz sent a long memorandum to Gilmore "to be read by all field clerks in your section." There had been problems with errors in the reports made by the section at Toul, and they were attributed to the rush in meeting the courier deadline. Matz counseled that "from now on we will work not for the purpose of getting everything finished by the time the courier leaves, but for the purpose of making our reports as accurate as possible." On September 2, 1918, Matz wrote Moorman of Gilmore that "I am trying to give him as much responsibility as possible and I think he is showing great improvement already." It seems likely that Moorman's doubts as to Gilmore's abilities led to his replacement by Whitehead. See RG 120, Entry 105, Box 5767 for the referenced memoranda.
217. Kreuger and Wolff appear on no other rosters of the G2A6, so it is not known when they arrived in the organization or how they came to be assigned to Whitehead. It is possible they arrived in Chaumont just before the departure to Toul and were reassigned directly from Toul to other units after the Armistice, which would explain the lack of records at headquarters. *Historical Background of the Signal Security Agency*, vol. 2, 196.
218. Philip Whitehead to Moorman, September 24, 1918, NARA CP, RG 120, Entry 105, Box 5767.
219. *Historical Background of the Signal Security Agency*, vol. 2, 197-198.
220. *Historical Background of the Signal Security Agency*, vol. 2, 197-198.
221. Whitehead to Moorman, October 7, 1918, NARA CP, RG 120, Entry 105, Box 5767.
222. Whitehead to G2 Second Army, October 9, 1918, NARA CP, RG 120, Entry 105, Box 5767.
223. Gilmore to G2A6, November 4, 1918, NARA CP, RG 120, Entry 105, Box 5767. Gilmore seems to have been building on ideas proposed by Whitehead to the G2 of the Second Army on October 2, 1918, NARA CP, RG 120, Entry 105, Box 5767.
224. Whitehead to Moorman, November 17, 1918, NARA CP, RG 120, Entry 105, Box 5767.
225. Moorman to Nolan, July 19, 1918, NARA CP, RG 120, Entry 105, Box 5761.
226. Herbert O. Yardley, *The American Black Chamber* (New York: Ballantine Books, 1931), 132.
227. Peyton March to Pershing, telegram, July 30, 1918, Center for Cryptologic History file series II.F.2.2, copies held by author.

228. Churchill to Leland Harrison, July 29, 1918, NARA CP, RG 165, Entry 65, Box 2244.
229. Patrick Beesly, *Room 40: British Naval Intelligence 1914-1918* (London: Hamilton, 1982), 248.
230. MID Memos relating to Yardley's European assignment, NARA CP, RG 165, Entry 65, Box 2244.
231. Yardley ordered to duty in Europe as a military observer for three months. War Department Order No. 177, paragraph 26, July 30, 1918, NARA CP, RG 165, Entry 65, Box 2244.
232. Passenger list, NARA CP, RG 92, Records of the Office of the Quartermaster General, 1774-1985, Box 565, accessed July 20, 2018, https://search.ancestry.com/cgi-bin/sse.dll?indiv=1&db=NARAWWITroops&h=2327021.
233. Yardley's expense records, NARA CP, RG 165, Entry 65, Box 2244.
234. Figures accessed August 15, 2021, https://www.in2013dollars.com/us/inflation/1918?amount=389.24. For comparison, the July 2021 government per diem in London was $526, accessed August 15, 2021, https://aoprals.state.gov/web920/per_diem_action.asp?MenuHide=1&PostCode=10219.
235. Yardley, *The American Black Chamber*, 136.
236. Beesly, *Room 40*, 249.
237. Hay, *Valiant For Truth*, 60-64.
238. Yardley, *The American Black Chamber*, 136.
239. Conversion accessed August 17, 2021, https://www.uwyo.edu/numimage/currency.htm.
240. William Friedman to Elizebeth Friedman, Monday night, September 23, 1918.
241. Correspondence between Moorman, Nolan, and Base Section 3, October 1, 1918, Center for Cryptologic History file series II.F.2.2, copies held by author.
242. Givierge, *Étude Historique*, vol. VI, 243-257.
243. Correspondence between Moorman, Nolan, and Base Section 3, November 5, 1918, Center for Cryptologic History file series II.F.2.2, copies held by author.
244. G2A6 Logbook.
245. Moorman Lecture, February 13, 1920.
246. Childs interview, NSA-OH-1976-12.
247. William Friedman to Elizebeth Friedman, November 22, 1918, ML, ESF, Box 2, File 18.
248. Personnel papers in NARA CP, RG 120, Entry 105, Box 5767.
249. Childs to Whitehead, December 15, 1918, NARA CP, RG 120, Entry 105, Box 3522.
250. Yardley, *The American Black Chamber*, 149-154. Childs, *Before the Curtain Falls*, 157-176.
251. Childs claims that both Yardley and Friedman approached him to join their organizations at some point, but he found cryptology "too confining." Childs interview, NSA-OH-1976-11.
252. Whitehead to Yardley, February 6, 1919, NARA CP, RG 120, Entry 105, Box 5767. These large files sent from Chaumont to Paris ended up in Childs's possession and can be found in the collection of his papers in Randolph-Macon College Flavia Reed Owen Special Collections and Archives, J. Rives Childs Collection.
253. Whitehead to Yardley, February 6, 1919.
254. Yardley, *The American Black Chamber*, 155. Childs, *Before the Curtain Falls*, 176.
255. William Friedman to Elizebeth Friedman, November 12, 1918, ML, ESF, CS, Box 2, File 18.
256. Personnel papers in NARA CP, RG 120, Entry 105, Box 5767.
257. Personnel papers in NARA CP, RG 120, Entry 105, Box 5767; *Final Report of the Radio Intelligence Section*, 17-18.
258. *Intelligence Section of General Staff HQ AEF in Germany Coblenz as of December 25 1920*, NARA CP, RG 165, Entry 65, Box 2880. Booklet with picture.
259. William Friedman to Elizebeth Friedman, November 20, 1918, ML, ESF, CS, Box 2, File 18.
260. Moorman to Nolan and Nolan to Moorman, January 8, 1919, Center for Cryptologic History file series II.F.2.22, copies held by author. Moorman also arranged for special letters to nine of the army field clerks in the G2A6 and seven of the enlisted men.
261. No record can be located to show when DePierri departed France.
262. Nolan, chapter on codes and ciphers, 1.

Chapter 9

The Code Compilation Section of the Signal Corps

Dubbed "the Wonder Boys of France" by William Friedman,[1] the Code Compilation Section (CCS) of the American Expeditionary Forces (AEF) Signal Corps (see photo) was formed in January 1918 to produce new codes for the American forces. Although this unit was subordinate to the Signal Corps, it remained at AEF headquarters at Chaumont when the Signal Corps organization moved to the headquarters of the Services of Supply at Tours in March 1918. That same month, the section moved from its first offices (in an unspecified location) to Building A, Room 51, in the headquarters complex.[2]

US Army cryptography was unprepared for the circumstances of war in 1917. There was one code—the 1915 War Department Telegraph Code—which was unsuitable for tactical correspondence. The army Cipher Disk, an elementary substitution system using a repeating key, was antiquated and insecure. Units often used the Playfair cipher (and would do so during the war), another system that was demonstrably insecure. Additionally, many units developed (or improvised) their own insecure codes, another practice that continued during the war. While the other nations fighting the war had been in a similar situation in 1914, cryptography had advanced, and the AEF was behind the learning curve.[3]

The need for a centralized codemaking department for the AEF had been evident to many people. In December 1917, General Dennis Nolan, chief of the AEF G2, explained in detail to the chief of ordnance why his proposed code system to indicate the qualifications of ordnance officers was less than ideal.[4] Edgar Russel, the AEF chief signal officer, had to weigh in on the same matter in mid-January 1918 and told his colleague that "considerably greater accuracy and more general satisfaction" would be obtained with the 1915 War Department Telegraph Code if a special word list were made for ordnance needs. Russel concluded, "If the Ordnance Department adopts its own code for the special qualifications of its personnel, the precedent thereby established should permit the other Staff departments to do likewise, and eventually the Code Room will have to deal with such a multiplicity of codes that confusion will result."[5]

An experienced Signal Corps officer, Colonel Carl F. Hartmann, commander of the Army Signal School for the AEF (located at Langres, France), sent Russel a copy of a British trench code obtained from a British captain at the school and noted that "it would appear that something of the nature of this code will be required in our service and I desire to be informed whether such a code is in preparation or is contemplated." Hartmann offered to take advantage of the consolidation of the many departmental schools at

The Code Compilation Section, ready to return to the United States, April 1919. National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC 158244

Langres to gather from each school a set of phrases likely to be "most used in battle" that he would forward to the proper authorities compiling such a code.[6]

On January 3, 1918, Russel instructed newly reported Second Lieutenant Edward R. Halloran[7] to gather information and data on trench codes in use by the combatants so that there would be background information available for compiling American trench codes. Under the guidance of Major Frank Moorman, Halloran obtained British, French, and German codes and began extracting relevant information. He also collected "phrases peculiar to our Army" as well as technical phrases compiled from American units already in the trenches.[8]

When Captain (later Major) Howard R. Barnes (see sidebar) arrived in Chaumont in February 1918, Halloran became his assistant. Barnes had been a clerk for the State Department when the United States entered the war. He was "chosen not for any pretentions he may have put forth as a cryptanalyst

Howard Russell Barnes

Howard Barnes was born December 17, 1879. During his youth, his family moved to Washington, DC, where he attended public school and then attended (but may not have graduated from) Georgetown University. He variously worked as a clerk, secretary, and stenographer. In July 1908, Barnes was appointed to a stenographer and typewriter position at the State Department with a salary of $900 a year. Barnes was extremely musical—he sang tenor and played the piano—and belonged to several musical societies in Washington.

Barnes, April 1919. NARA CP, RG 111. Photographic Collection, 111-SC 158244

Barnes steadily progressed through the ranks as a clerk, reaching the level of "class one" in late 1909, "class two" in June 1911, and "class three" in June 1913. It has been suggested that Barnes worked as a code clerk at the State Department, but the only evidence of this is from the April 1, 1919, *Report of the Code Compilation Section* in which he said he had "been engaged in code work for several years both as an operator and in the construction of codes." This implies he performed code work at the State Department, but there are no records confirming that. The precise nature of his work at the State Department is unclear. From November 1914 to July 1916, he was detailed for duty in the American embassy in London. In December 1916, his wife died, leaving him with two young children.

In late November 1917, Barnes applied for a commission in the Signal Officer's Reserve Corps, and he was assigned to active duty on December 13. He sailed for France from Hoboken, New Jersey, in early January 1918, where he took charge of the Code Compilation Section in early February.

He returned to the United States on April 25, 1919. With others from the Code Compilation Section he worked for the Signal Corps completing the War Department Telegraphic Code of 1919 (issued in September 1921). Barnes remarried in 1921 and was working as a bank clerk in Philadelphia when he died on September 26, 1930. He is buried in Arlington National Cemetery.

Sources

Ancestry.com. Vital records. Accessed August 4, 2018.
Howard Barnes Papers. National Cryptologic Museum Library.
Kahn, David. *The Codebreakers*. New York: Scribner, 1996.
Register of the Department of State: November 18, 1914. Washington, DC: Government Printing Office, 1914, 58.
Register of the Department of State: December 15, 1916. Washington, DC: Government Printing Office, 1917, 72.

but because he had at least some experience with codes and their handling in communications."[9] The section started with Barnes, three second lieutenants, and one corporal. The lieutenants—Mark J. Ryan, Wallace B. Chambers, and Halloran—all had previous code experience.[10]

The work of the CCS was distinct from that of the Signal Corps Code and Cipher Section, which was responsible for encrypting and encoding AEF message traffic. This organization did not develop codes and used the 1915 War Department Telegraph Code until the CCS was able to provide alternatives. However, the two organizations did interact in the person of Colonel Parker Hitt, who, as the executive to Russel, had a supervisory relationship with the Code and Cipher Section and then the CCS. Despite having other duties, Hitt frequently served as a consultant to Barnes and helped develop some systems. In March 1918, in the absence of Russel, Hitt took the time to request that Barnes's Code Compilation Section have the use of Room 51 in Building A at Chaumont, a private room for developing codebooks that could be locked at night.[11]

Organizational skills and preparation made the CCS staff very efficient; codes were prepared in advance and held in reserve. The CCS did not rely on one codebook meant to be used with a changing series of distorted alphabets and keys for superencipherment. This method, while easier to print and distribute, was insecure because loss of a codebook could compromise all future key systems. By preparing multiple codebooks complete with encipherment material, the CCS could quickly replace the entire system when a code was compromised or lost. The burden of the work fell on headquarters, where codes could be compiled under relatively calm and normal conditions. By putting all the needed material in one book, the system eased the work of frontline code men who frequently had to code messages under bombardment, gas, or on the move.[12] This system relied on rapid replacement of books to maintain secrecy. Because the section was small, it needed assistance distributing codebooks to the troops away from headquarters and the task was given to the G2A6 (see chapter 8).[13]

Barnes believed that codes had to be suited for use in the field and had to outwit the temperament and habits of the operators. For instance, when selecting a null to vary the code groups, operators tended to pick the most convenient one, so the section eventually put nulls on every page. Straightforward construction with encoding and decoding sections were the hallmark of the codes produced by the CCS, as were the clearness of type and the convenient size of the books.[14] He bemoaned the inclination of army personnel to avoid using codes and contrasted that to the navy, where every officer was trained in code from the beginning. It was not just carelessness in use of the codes that concerned Barnes; carelessness in handling the books and in keeping receipts was frustrating, and he noted that American codebooks were picked up all over the place.[15]

Organization

Nothing is known of how section members organized or divided up their work, apart from their location in Building A and the fact that they worked "almost every night until midnight."[16] The organization needed more space in early October 1918; Moorman chimed in that the space was "urgently needed" while reminding the G2 that the CCS was a Signal Corps organization.[17] At some point in mid-October some of their lights were taken away, and Barnes had to request some more to accommodate their late-night work.[18]

Staffing

Very little is known about precisely what each member of the CCS did or even how they were chosen. Barnes, Halloran, Chambers (who later replaced Halloran as Barnes's assistant),[19] and Ryan came from different backgrounds but had all reportedly worked with codes in one capacity or another. Apart from their names and ranks, nothing is known about the backgrounds of the other men in the section. See appendix A for their names.

Code Compilation

From the start the section's focus was on making codes, not creating ciphers. Barnes consulted not just with Hitt but with Moorman, for both men had

familiarity and expertise in the subject.[20] The goal was to provide a code that was sufficiently complicated to delay enemy solution but simple to use.[21]

The first US trench code was produced in February 1918 when the section had only five people.[22] General Nolan's draft history states that the first codebook was produced "after seven months training," but perhaps he meant that the book was produced seven months after the AEF arrived in France.[23] There is no record of the Code Compilation Section receiving seven months of training. The section's report at the end of the war does not say when this code was produced, just that it was the first.[24] The material that guided the code's preparation was an obsolete British trench code, possibly the copy that Hartmann had given to Russel in January 1918.[25]

This first trench code was a very simple one-part code with a distortion table to encipher the code. The book was quickly made and simple for the CCS to produce (as opposed to a more secure two-part code) but pushed much of the work to the man at the front line who had to encipher the code.[26] The decision to choose the one-part format was likely made because there was an immediate need for a codebook as great numbers of American divisions were put into operations in frontline sectors in those early months of 1918.

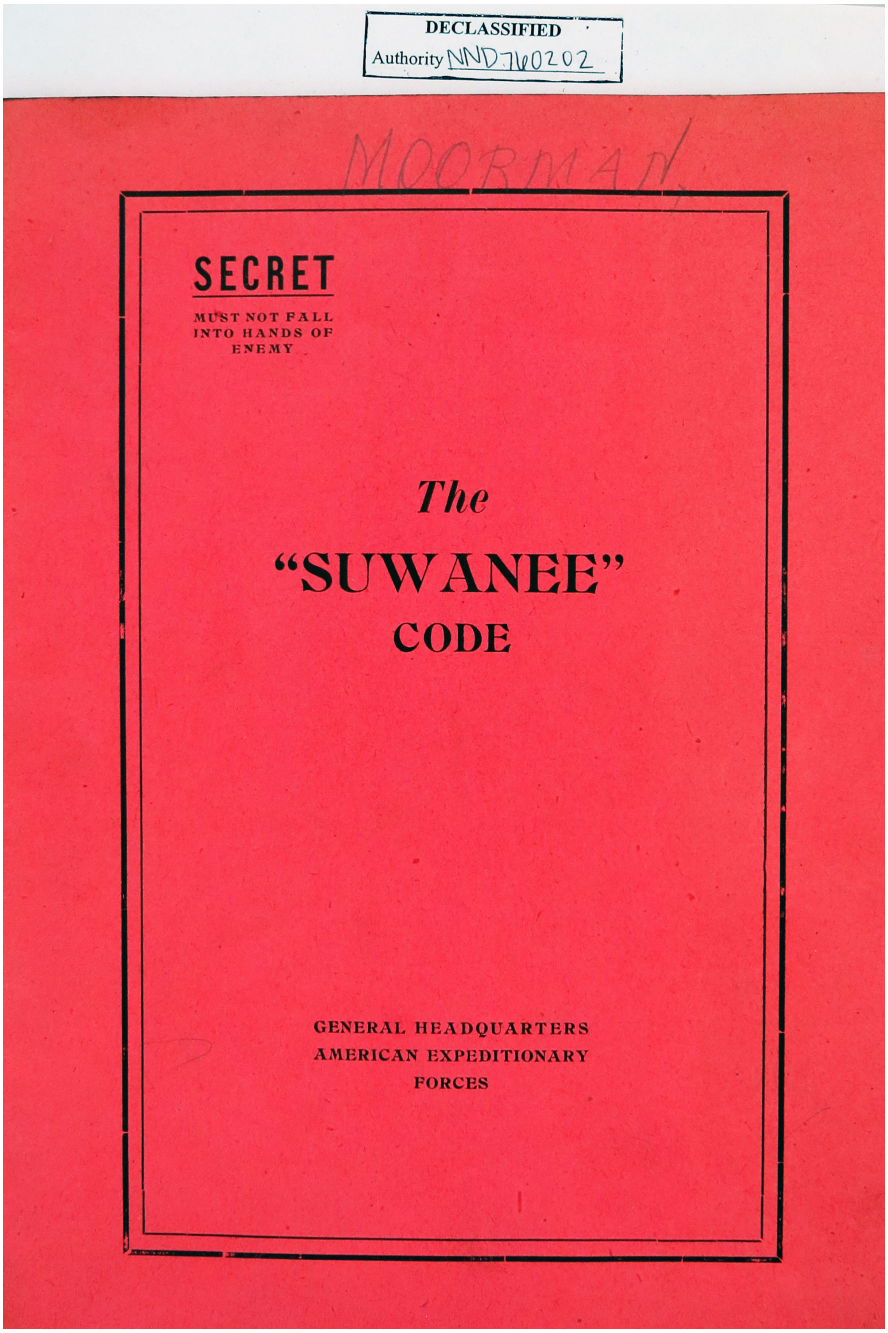
Captain Oswald T. Hitchings of the British Expeditionary Forces may have tested the code, as Nolan remembers that Hitchings declared the code was vulnerable to exploitation.[27] While this is entirely plausible, and the British would test the first of the American Rivers codes, no documentary evidence has yet been found to back up Nolan's assertion. On February 22, 1918, Russel asked the G2 to approve the code and provide instructions for its distribution.[28] A delay caused by Hitchings testing the code would explain the apparent delay in issuing the code, for it seems to have not been distributed when, in May 1918, it was tested by an officer of the G2A6, J. Rives Childs (see chapter 12). The G2A6 test, which assumed that the Germans would have captured the codebook itself, led to a decision not to issue the code. The book was withdrawn, and the CCS, now a few months older and wiser, began again.

Possibly with some advice from Hitt and Moorman, the CCS then produced a series of new trench codes, dubbed the Rivers codes, that could be easily replaced. The Rivers and the Lakes series of trench codes—14 different codes named for American bodies of water issued between late June 1918 and the Armistice in November 1918—are the best known products of this section. By the time the Huron code was compiled in October 1918, many innovations and refinements had been made, including an emergency code chart in the front of the book[29] (see photo).

When the British tested the Potomac code, they reported that "we have not been able to solve them or even to get any light. The Security appears of a high order."[30] Moorman, not one to praise lightly, reported that his office found the code "more difficult than any employed by the Germans," although not unsolvable. The men who tested the code provided some "long and highly technical discussions" to Moorman about means of attack, to which he offered Barnes access, and declared the book "excellent."[31]

Hitt complimented the section staff on their work and informed Russel that "we believe that this code system will be better than anything now in use on either side, and that messages intelligently sent will be perfectly safe." Russel even recommended both Chambers and Ryan for promotion for the good work they had done on the code.[32]

There were not just trench codes to make, but many other sorts of codes—a short frontline code of 500 words, a staff code that replaced the vulnerable 1915 War Department Telegraph Code, and a radio service code for operators to establish and maintain communications. There was a telephone code (also known as the Female Code since it consisted of women's names; this was developed by Hitt), a few short special-purpose codes, and a casualty code.[33]



The Suwanee codebook, issued July 15, 1918. NARA CP, RG 120, Records of the American Expeditionary Forces, Entry 105, Box 6378. (Note that spelling differs from the Suwannee River.)

Discussion of some of these codes is in chapter 12; a complete list of codes produced by the section is in appendix B.

Code Printing

The CCS was the envy of the British codemakers as it had a full-size printing press, located in the Office of the Adjutant General, at its disposal. Code had precedence over all material except general orders and bulletins; sometimes this delayed printing codebooks, but the delay did not matter once several codes had been compiled and were in stock. Every effort was made to keep two complete codes in stock. In the best case scenario, a completed codebook could be set, printed, and bound in five or six days of "normal" work "under the most favorable conditions." Three shifts, working 24 hours a day, could accomplish the job in 48 hours. An officer from the section had to be on duty during the entire printing process to monitor the work, destroy spoiled sheets, and destroy any mats on the presses that might have an impression from the book. Once copies were counted, the metal type was melted down. Often two or three officers were on duty in the printing office.[34]

The ink used for codebooks was water soluble; if a codebook could not be burned, users were instructed to dip the pages in water and then to rub the sheets "briskly until the printing disappeared."[35]

Relationship with G2A6 Radio Intelligence Section

The men breaking the codes in the G2A6 frequently provided ideas to the CCS. Once the G2A6 had established control stations (to monitor American radio and telephone communications) and a Security Section (to report communications security violations), the instances of misuse of the American codes were shared with Barnes so that future books could be improved (see chapter 8). Barnes felt that both the CCS and G2A6 should work closely to "profit by the mistakes made by the enemy as well as those of our own army and by the improvements observed in enemy codes."[36]

Barnes regretted that the distribution of codebooks fell to the G2A6; it was a difficult problem to solve and took the officers from "manifold other duties of equal importance."[37] But there is no indication that there was ever anything less than a cordial relationship between the two organizations.

A Code for Transatlantic Service

From the beginning of the US entry into the war, there had been a serious problem of capacity and speed for communications between the United States and France. Undersea cable could be slow, and the physical cable lines were vulnerable to being severed. High-power radio from one of the navy's radio stations on the East Coast directly to France was an option. Work began in March 1918 on a new American high-power radio station in France—Radio Lafayette—to help increase the communications capability to and from the AEF (see chapter 6).[38]

Whatever route these transatlantic communications were to take, a code was needed. In September 1918, Hitt discussed the matter with Barnes, and they agreed that the current staff code should not be used for this effort. Barnes was prepared to have his office construct a code and a set of distortion tables for encipherment when he learned that MI-8 had issued a "new Army Code" called Military Intelligence Code Number 5, which was being used for cable traffic. The new code contained a set of distortion tables for use in an emergency if messages had to be transmitted by radio. Hitt and Barnes agreed, without seeing the code, that it should solve the problem.[39]

Less than 10 days later, when Barnes had gotten a copy of the code and examined it, he reported to Russel that it was "very comprehensive, easy of operation, and apparently entirely adequate for transatlantic communications." There were secret instructions in a sealed envelope, which was not to be opened unless needed for emergency radio transmission; Barnes had not opened the envelope and explained that he had no authority to do so, but he presumed there were distortion tables inside. The new code was meant only for "ultra-confidential" messages, and the 1915 War Department Telegraph Code had to be used for routine work. Barnes felt that the distortion tables would provide only a temporary delay to enemy codebreakers and not be a great impediment. He suggested that Moorman and the G2A6 examine the emergency tables and offered, if needed, to formulate new ones.[40]

After the Armistice

Barnes, in his end of the war report, suggested the establishment of a central bureau in Washington for code compilation, one that could assess the army's needs, compile codes for emergency use, and instruct junior officers throughout the army. He was perhaps modeling his idea on the navy's "very efficient bureau and organization." He also hoped that the navy, army, and State Department could coordinate more thoroughly on the subject.[41]

There was no doubt that Barnes's group was "keen on the job," as Moorman would later say.[42] In mid-November 1918, after re-examining MI-8's new code, Barnes approached AEF Chief Signal Officer Russel to propose that his group prepare a replacement for the 1915 War Department Telegraph Code.[43] Russel, after a lengthy discussion with Hitt, agreed that this team could not be better occupied.[44] No doubt the work was necessary, but it also

enabled Barnes to keep his apparently tight-knit team together until they went home, for not one of his men was snatched up for another position, as was happening in the G2A6. The CSS men began their work in December. They had hoped to finish in March but were delayed by the illness of Hitt, who was assisting the group.[45] This massive replacement code, containing between 70,000 and 75,000 words, was completed on April 1, 1919. The final draft was to be printed in the United States. In March 1919, they also prepared and printed three new emergency codes—Field Codes #1, #2, and #3—as well as three sets of emergency code lists. Twenty-five hundred of each were printed but not distributed.[46]

Barnes and his men sailed for the United States on April 15, 1919, and reported to the Office of the Chief Signal Officer in Washington, with hopes they could finish publication of the codebook, a task they thought would take two to three months.[47] The code was completed in April 1920 and eventually issued in September 1921 as the War Department Telegraph Code of 1919 (short title SIGRIM).[48]

Conclusion

After an initial rough start with the problematic first trench code, the Code Compilation Section's work drew nothing but praise. They worked steadily and quietly, drawing no attention to themselves and leaving no record aggrandizing their personal roles, just a report explaining the work of the section. Halloran and Ryan were the only two to write the required Signal Corps Officer personal narrative, and they were both detailed away from the section at the time. Barnes submitted his report with a note: "Inasmuch as the officers of this Division have been continuously on duty at General Headquarters, American Expeditionary Forces, during the war, it was believed that a report of the activities as a whole would be more valuable from a historical standpoint than personal narratives since the activities of the individuals were confined to the more or less routine work of headquarters. The work of this Division, however, which was without precedent in our history, has been set forth in such detail as was possible without verbosity."[49]

General Russel penned a note to Barnes upon the section's departure in April 1919, which stated he knew "of no phase of Signal Corps work in this war that has brought into it a higher degree of professional ability, applied directly to fulfill an important need."[50]

Notes

1. "The Wonder Boys of France," from William Friedman, "World War I Codes and Ciphers," Lecture at SCAMP [Special Cryptologic Advisory Math Panel] 1958, William F. Friedman Collection, REG A38535, accessed on May 15, 2018, https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/friedman-documents/lectures-speeches/FOLDER_019/41700509073984.pdf.
2. Parker Hitt to Dennis Nolan, March 17, 1918, Center for Cryptologic History (CCH) file series II.F.2.19 (copy held by author). Note this is from National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 120, Records of the American Expeditionary Forces (in the correspondence of the AEF Chief Signal Officer, file number 311.5).
3. Friedman, *American Army Field Codes in the American Expeditionary Forces During the First World War* (Washington, DC: US War Department, 1942), 1, later issued as Special Research History 315 by the National Security Agency (NSA), declassified November 21, 1973. NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 86.
4. The code did not have uniform lengths of groups, made the confusion of letters inevitable, and had design flaws common to codes devised by someone unfamiliar with coming up with a code.
5. Nolan to Secretary, General Staff, December 13, 1917; Frederick H. Swartz, AEF Code Office, to the Secretary General Staff, December 20, 1917; Edgar Russel to the Commander in Chief, memo, January 11, 1918. All in NARA CP, RG 457, Entry P11, Box 214.
6. Commandant Army Signal Schools Carl Hartmann to Russel, "British Trench Code," January 11, 1918, NARA CP, RG 457, Entry P11, Box 214.
7. Halloran, a 22-year-old graduate of Gonzaga College and a native of Hyattsville, Maryland, arrived in France in January 1918. He resigned a position as a confidential code clerk in the State Department to enlist in the Medical Corps in the spring of 1917 and was commissioned a lieutenant in the Aviation Corps, then part of the Signal Corps. He served on the Mexican border with Company F of the 1st Maryland Regiment. His precise duties in the Code Compilation Section are unknown, but this young man had a future ahead of him. On July 29, 1918, he was transferred to establish the First Army Post Office, and then he was put in charge of the army's Code Section (coding and decoding messages). He may have been moved because he was familiar with the codes, and an experienced man was needed to ensure the job was done properly. In November 1941, Halloran joined the navy for intelligence training, but on December 7, 1941, he was assigned to press and overseas telephone censor work and then eventually as the commander of the Seventh Amphibious Force of the Seventh Fleet. After the war he was a public information officer. He retired as a rear admiral.
8. Edward R. Halloran, Narrative 576, January 9, 1919, NARA CP, RG 120, Entry 2040, Box 131.
9. Friedman, *American Army Field Codes*, 14.
10. Mark J. Ryan, Narrative 719, January 12, 1919, NARA CP, RG 120, Entry 2040, Box 132.
11. Hitt to Nolan, March 17, 1918.
12. Howard Barnes, *Report of Code Compilation Section, General Headquarters American Expeditionary Forces December 1917-November 1918*, 1. Reprinted as a "Technical Paper of the Signal Intelligence Section," War Plans and Training Division, Washington, 1935, with a foreword by Friedman. Reprinted as Special Research History 321 by NSA, declassified November 21, 1973. NARA CP, RG 457, Entry 9002, Box 87.
13. G2A6 Logbook, NARA CP, RG 120, Entry 105, Box 5769. Friedman, *American Army Field Codes*, 21.
14. Barnes, *Report of Code Compilation Section*, 31-33.
15. Barnes, *Report of Code Compilation Section*, 31-33.
16. Barnes to George Gibbs with handwritten note from Gibbs, October 15, 1918, National Cryptologic Museum Library (NCML), Barnes Papers.
17. Frank Moorman to G2, October 3, 1918, NARA CP, RG 120, Entry 105, Box 5767.

18. Barnes to Gibbs, October 15, 1918.
19. Wallace B. Chambers, known as Bud, graduated from Yale University in 1915 and was 25 when he arrived in France, leaving a job at the International Cable Company. Barnes paid tribute to his work in Chamber's obituary, saying "I cannot speak too highly of his ability and loyalty to duty. His service was a source of great personal satisfaction to me, realizing as I did that in him I had an assistant competent and willing, should it devolve upon him to carry to completion the important confidential work of the office." Undated and unattributed newspaper clipping, NCML, Barnes Papers.
20. Hitt to Friedman, "Code Compilation," January 18, 1940, NCML, David Kahn Collection.
21. Barnes, *Report of Code Compilation Section*, 1-2, 33-34.
22. Friedman, *American Army Field Codes*, 10. There is a great deal of confusion in the historical record about when the first trench code was completed and how long it took to produce. This is complicated by the fact that the records of the Code Compilation Section do not survive as a cohesive whole. The records that survived the war in the files of the AEF were later removed from those files at some point in time by NSA; while those files have subsequently been declassified and released back to the Archives as part of NSA records, there are questions that remain unanswered.
23. Nolan, chapter on codes and ciphers, first draft of proposed history of World War I (unpublished manuscript, n.d.), 4, US Army Military History Institute, Carlisle Barracks, Dennis E. Nolan Papers.
24. Barnes, *Report of Code Compilation Section*, 2.
25. David Kahn, *The Codebreakers* (New York: Scribner, 1996), 328.
26. Friedman, *American Army Field Codes*, 13.
27. Nolan, chapter on codes and ciphers, 4.
28. Russel to Nolan, "Trench Code," February 22, 1918, CCH file series II.F.2.27, copy held by author.
29. National Security Agency, *American Army Field Codes Used in World War I, SRH-351*, Volume II, 29, NARA CP, RG 457, Entry 9002, Box 92. This is a compilation of AEF codebooks put together by NSA at an unspecified date in the 1980s and declassified in 1985; it differs from SRH-315, Friedman's *American Army Field Codes Used in World War I*.
30. Malcolm Hay to Moorman, June 24, 1918, NARA CP, RG 120, Entry 105, Box 5763.
31. Moorman to G2, July 13, 1918, NARA CP, RG 457, Entry P11, Box 214. The "long and technical discussions" have not been located by this author at the time of this writing.
32. Russel to Barnes, July 16, 1918, NCML, Barnes Papers.
33. Hitt to Nolan, March 17, 1918. Friedman, *American Army Field Codes*, 245.
34. Barnes, *Report of Code Compilation Section*, 30.
35. *Historical Background of the Signal Security Agency,* vol. 2, *World War I* (Washington, DC: Army Security Agency, 1945), 168, Special Research History 001, copy held by NCML. Also found in NARA CP, RG 457, Entry 9000, Boxes 1-2.
36. Barnes, *Report of Code Compilation Section*, 31.
37. Barnes, *Report of Code Compilation Section,* 31.
38. See chapter 6 for details on the establishment of Radio Lafayette.
39. Barnes to Russel, "Transmission of code messages by radio," September 2, 1918, NARA CP, RG 457, Entry P11, Box 214.
40. Barnes to Russel, "Transmission of Code Messages by Radio," September 11, 1918, NARA CP, RG 457, Entry P11, Box 214.
41. Barnes, *Report of Code Compilation Section,* 41.
42. Lieutenant Colonel Frank Moorman, Lecture Delivered to the Officers of the Military Intelligence Division February 13, 1920, copy courtesy of US Army Intelligence and Security Command (INSCOM) History Office.
43. "Construction of a new code for Trans-Atlantic communications," November 16, 1918, NARA CP, RG 457, Entry P11, Box 214.
44. Russel to Gibbs, November 22, 1918, NARA CP, RG 457, Entry P11, Box 214.
45. Henry G. Gale to Executive Officer, February 24, 1919, NARA CP, RG 457, Entry P11, Box 214.

46. Barnes to the Chief Signal Officer of the American Expeditionary Forces, "Supplementary Report of the Code Compilation Section," April 1, 1919, NARA CP, RG 457, Entry P11, Box 214.
47. Russel to the Chief Signal Officer of the Army, "Code Compilation Section of the American E. F.," April 11, 1919, NARA CP, RG 457, Entry P11, Box 214.
48. This code was used by the War Department until 1943/1944 when it was replaced by the War Department Telegraph Code of 1942 (SIGARM). Accessed October 5, 2018, http://chris-intel-corner.blogspot.com/2014/03/united-states-cryptologic-security.html.
49. Barnes, Narrative, January 2, 1919, NARA CP, RG 120, Entry 2040, Box 131.
50. Russel to Barnes, April 9, 1919, NCML, Barnes Papers.

Chapter 10

The Radio Section of the AEF Signal Corps

Although radio was still a developing technology during the First World War, the US Signal Corps had more than a decade of experience with wireless telegraphy by early 1917. Signal Corps radio stations at army posts along the US southern border had been informally conducting radio intercept since at least 1914, and radio intercept using truck-based radio sets took place during the Punitive Expedition in 1916.

The first Signal Corps venture into the world of radio was in April 1899, when First Lieutenant (later Major General) George O. Squier (who had a PhD in electrical engineering and would serve as chief signal officer from 1917–1924) and fellow Signal Corps officer James Allen successfully operated a radio link between Fire Island (New York) and the Fire Island Lightship, 12 miles away.[1] In 1904, Captain Leonard D. Wildman established a radio link across Norton Sound in Alaska, a location where a telegraph cable could not successfully be maintained due to ice floes, thus completing a secure line of communication on American soil from Nome to St. Michael. The Signal Corps was actively involved with shaping US radio policy through its participation in the Inter-Departmental Board on Wireless Telegraphy (the Roosevelt Board) and was part of the first international conference on wireless telegraphy in 1903 that examined radio policy and practices. Radio was part of the curriculum when the Army Signal School opened at Fort Leavenworth, Kansas, in September 1905. And the Signal Corps worked to develop portable radio equipment for army use; the first field sets were used in Cuba in 1906, and wagon sets were used in the Philippines in 1907 and 1908. By 1908, a new Signal Corps radio network was beginning to supplement the Signal Corps-constructed telegraph lines.[2]

The use of radio by militaries in wartime began just a few years after Guglielmo Marconi patented his "wireless telegraphy" system in 1896. The British military used radio during the Boer War (1899–1902)[3] and radio communications played a role in the 1905 Russo-Japanese War.[4] All the combatant armies in Europe used radio technology during the First World War. So it is not surprising that the American Expeditionary Forces (AEF) Signal Corps established a Radio Division upon arrival in France. The Radio Division, headed by Colonel Louis Krumm, who came to the AEF from the US Commerce Department's Bureau of Navigation with a wealth of experience in radio technology, handled all matters concerning American radio communication in France. And Krumm's division was the ideal place for what was initially called the Signal Corps Radio Intelligence Section. The Radio Intelligence Section was renamed the Radio Section in April 1918 to avoid confusion with the

G2A6, which was already using the name Radio Intelligence Section.[5]

The Radio Division did not form until October 1917, when Krumm arrived in France. From June 1917, when the AEF Chief Signal Officer (CSO) Edgar Russel, his executive officer Parker Hitt, and other members of the Signal Corps arrived in France, until October 1917, many discussions were held with the French military to address the need for a communications intercept capability. The French provided information on the operation of the radios they used and samples of their collection equipment; they also provided training for 13 American radio operators. A small group of Signal Corps officers prepared blank forms to be used to document collection, and new equipment was purchased.[6]

Krumm's assistant in running the division was Captain Robert Loghry (see sidebar), a man of great practical experience recently commissioned from the enlisted ranks, who had arrived in France in September 1917. Loghry was given control of the new Radio Section (then still called the Signal Corps Radio Intelligence Section); it would be difficult to imagine a better choice for the job. Loghry had spent many years working under difficult conditions in Alaska and had hands-on, technical competence, which likely gave him great credibility with the skilled men he would soon lead.[7] Krumm handled the executive work relating to radio policies, and Loghry had complete charge of the Radio Section.

Krumm and Loghry's first step was to take a 12-day tour, beginning on October 18, 1917, to observe the French Army's organization, equipment, and methods of collection.[8] Although the Americans relied on the French for the technology and methods of operation, they organized the service along the lines of the British. In the British Army, interception was technically controlled by the Signal Service, but the tasking of that service was under the direct control of the Intelligence Branch of the British General Staff.[9] The AEF Radio Section took direction from the G2's Radio Intelligence Section, the G2A6, as to where collection facilities were needed and what sort of intercept was wanted.[10]

The first intercept station—collecting press broadcasts and government communiqués, not military traffic—was established at AEF headquarters in Chaumont on September 17, 1917. This station's intercept was forwarded to the G2A6 (see chapter 8).[11] With only two operators working just daytime hours, the station collected an average of 15 messages and seven press reports per day during its first month. The plan was to have six operators at the station to provide 24-hour coverage.[12] The first full-time AEF radio intercept site, collecting German military communications, was set up near the headquarters of the French II Army at Souilly in mid-November; there the American operators could learn from the French operators stationed at the same place.[13]

Building the Radio Section was not as simple as putting some equipment in the field with a few operators listening for whatever they could hear. It was a large-scale operation that set up a staffing pipeline, trained operators, occupied existing stations, and constructed new ones when needed. Trained primarily by the French signal and goniometric service personnel, this group developed technology and improved techniques to accomplish their mission. The Radio Section grew from two stations in 1917 to a service operating dozens of stations (often in partnership with the French) that moved from location to location.

Life in the Radio Section

The anticipated move of the Signal Corps and the Radio Division to Tours (scheduled for the spring of 1918) caused Frank Moorman some consternation because of the close cooperation needed between the Radio Section and the G2A6.[14] The distance between Chaumont and Tours was approximately 250 miles.

But in late January 1918, Krumm arranged for the Radio Section to occupy facilities in Toul, 80 miles from Chaumont and closer to the front to provide better support to both collection stations and the G2A6. Toul, an ancient city said to have

Robert Loghry

Loghry in December 1918. National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-40373

Robert Loghry was born in either Coudersport or Ulysses, Pennsylvania, a rural area in the north central part of the state. Though February 27 is consistently given as the day of his birth, the year is uncertain; analysis of records reveals it was probably 1881 or 1882 and not 1877 as is given on his military paperwork. The family moved to Elmira, New York, when he was six. Loghry graduated from School No. 2, which went through ninth grade; there is no indication that he attended the city's free public secondary school. He then worked in an Elmira electrical shop.

In the summer of 1898, Loghry, claiming to be 21, enlisted in Company D of the 202nd Regiment New York Volunteer Infantry. Company D was mustered in mid-July and the regiment assembled at Camp Black on Long Island, New York, and then moved to Camp Meade in Middletown, Pennsylvania, in mid-September to prepare to travel to Cuba. But before the 202nd left the United States, Loghry transferred to the 6th Company of the Volunteer Signal Corps on November 21, 1898. By the spring of 1899, Loghry was released from his volunteer enlistment. He then joined the Signal Corps as a regular (not volunteer) soldier and served a tour in the Philippines, returning to the United States via Port Said, Egypt. By 1901, he was in Alaska.

Loghry was one of those members of the Signal Corps dubbed "Alaskans" who spent significant time in that territory in the early part of the twentieth century. From at least 1901 until 1906, he was part of the first expedition to build telegraph lines and knew senior Signal Corps officers George S. Gibbs, Edgar Russel, Leonard Wildman, and William "Billy" Mitchell (who re-enlisted Loghry in April 1902). Mitchell and his Signal Corps men spent months surveying the region east of Fairbanks; in 1902, Mitchell named a small tributary of Hutchinson Creek in the Fortymile region of Eastern Alaska "Loghry Creek." Loghry served another tour in the Philippines, from 1907-1910, and then spent six years in the United States. In early 1910, he married Laurena Johnson of Omaha, Nebraska, whom he probably met while at Fort Omaha before his 1907 deployment. He spent five years at Fort Leavenworth where he was on duty with Company A of the Signal Corps from late 1910. While at Fort Leavenworth he again worked with Colonel Russel, the head of the Army Signal School who would go on to be the chief signal officer of the American Expeditionary Forces. Here Loghry also met Captain Parker Hitt, who often worked with the men of Company A as part of his duties as an instructor at the signal school. Loghry

also may have met then-Lieutenant Frank Moorman, a student at the signal school from the autumn of 1914; the two men would work closely together in France.

In 1915, having risen to the rank of master signal electrician, Loghry was back in Alaska as the chief operator of the military telegraph system of the interior as well as the army radio station in Fairbanks, intent on finishing his military career in the place he loved. But the war intervened. Loghry was commissioned as a captain, traveled from Alaska to New York and then on to France, arriving in September 1917. He served as the deputy of the Radio Division and then the chief of the Radio Section of the AEF Signal Corps. He rose to the rank of lieutenant colonel. When he returned to the United States in 1919, he was put in charge of Signal Corps recruiting. He left active service in 1922 but was immediately put to work in a reserve capacity as a radio engineer for the 9th Corps in San Francisco. He eventually became commander of the California and Nevada Department of the Veterans of Foreign Wars before his death from pleural pneumonia on January 20, 1928, at the age of 47. He is buried in the National Cemetery at the Presidio in San Francisco, where VFW Post No. 466 carried the name "Colonel Robert Loghry Post" for many years.

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Tribune (Oakland, CA). "Col. Loghry, Radio Expert, Dies in S.F." January 21, 1928.

been founded by an Irish monk,[15] was a medieval bishopric annexed to France in 1552; it had an attractive cathedral and impressive fortifications designed by Louis XIV's military engineer Sébastien Le Prestre de Vauban. The city was about 25 kilometers from the front lines; many French and AEF airfields were in this area. The Radio Section and its associated Toul-based radio intercept, goniometric, and control stations would eventually be located on the grounds of the Marceaux Barracks, about a mile southwest of the city's fortifications (see photo).[16]

Little is known about the facilities the Radio Section occupied. There must have been provisions for housing enlisted men who were on breaks from listening stations. By the summer of 1918, the listening station men working the sites along the south side of the St. Mihiel salient were housed in Domèvre-en-Haye, a small town much closer to their stations. Rest periods involved spending time teaching at the newly established advanced school so that new operators would have the benefit of learning from those experienced in field operations.[17]

Marceaux Barracks, Toul, France, in 2015. Photograph courtesy of the author

After setting up intercept and co-located goniometric sites in Froidos and Landrecourt, both in the Verdun Sector in early 1918, that spring the Radio Section sent detachments of men to set up stations in the area first occupied by the 1st Division and then 26th Division on the south side of the St. Mihiel salient. Operators were also sent to train at French listening stations in the part of the Baccarat Sector then occupied by the 42nd Division.[18]

On February 21, 1918, 55 men in the Verdun Sector and the 1st Division area were formed into one detachment of Administrative Company F located in Toul and under the command of Lieutenant Herbert R. "Caribou" Smith (his nickname came from his time in Alaska). The goal was to regularize training as well as food and housing.[19] During the first half of 1918, housing, feeding, and keeping the Radio Section men aware of troop movements were continual problems.[20] The men in the Toul and Verdun Sectors now had an office that took care of their subsistence and pay.[21] Company F, however, could not prevent what happened in March when 1st Division troops withdrew from the front line without informing the Signal Corps elements, leaving listening station personnel essentially in no-man's-land.[22] On March 17, the planned move of the Radio Division headquarters from Chaumont to Tours took place. The Radio Section stayed closer to the front, with Loghry in Chaumont, Smith in Toul, and their men in the field or in school.[23]

Unfortunately, no such administrative structure was provided for the men with the 42nd Division.

The men working at Le Chasseur, a listening station in the Baccarat Sector, were never notified about troop movements and had trouble getting rations. They must have reported this fact up the chain of command, for, on June 22, 1918, Ernest Hinrichs (see sidebar) and John P. Keller, while sitting in the non-commissioned officers' club in Pexonne, were summoned outside to speak with a lieutenant colonel. He asked if they were from the listening service and then inquired how they got their meals. Hinrichs explained: "The signal platoon had refused us rations. The other kitchen in town was continually changing and at each change we had difficulty explaining why we wanted two days' rations and what we were doing around town anyway. They couldn't understand why we didn't eat with our outfit, and looked suspicious when we described the nature of our outfit. The root of the matter was that we wanted to eat at the signal platoon kitchen because the food was better."[24]

The lieutenant colonel ordered his lieutenant to speak to the signal platoon and tell them that the listening station men would eat with the signal platoon "by order of the commanding general." This deeply impressed the "grouchy mess sergeant" who, at suppertime that day, instructed the cook to "give them all they want, heap it on." After dinner, the sergeant approached them and asked "who the hell are you fellows, anyhow?" Keller spun them a yarn about going over the front line to ask the Germans what they were going to do next, then returning with the information for the general.[25] Just six weeks later, by early August, the Radio Section men had moved out of the sector and headed north.[26]

Keeping stations supplied with all the material they required was a challenge, and Lieutenant Horace E. Hull, the supply officer for the Radio Section, did his best, obtaining small wood stoves from French authorities and tracking down difficult-to-acquire amplifier bulbs. "Quite often," he explained "*un litre vin rouge* [a liter of red wine] would bring better results than a requisition" when looking for spare parts.[27] Hull, a 19-year-old railroad clerk from Alabama whose father was a telegraph operator for the railroad, would return to the Birmingham and Southern Railroad where he would work in various capacities for the rest of his life.[28]

Life in Toul included some of the same benefits as life in Chaumont, with access to the city's facilities and entertainment. Hinrichs recounted the excitement of an evening in Toul in August 1918. He and Anton Peterson walked from the barracks up to the railroad station to see what was happening and observed Algerian artillerymen, dressed in green and yellow, resting on the grass near their encampment. The rail yard was busy with freight cars, hundreds of horses and mules, and French sailors moving navy guns from a train. Hinrichs and Peterson walked to the Red Cross hut for chocolate and newspapers and then to a local café for beer. They entered the gates of the fortified town, showing their passes to a military policeman (MP) who warned they had to be out of town by 2130, and stopped in the "American Bar," which was too crowded. Another soldier took them to a local place where there was much merriment until Hinrichs looked at his watch. It was 2145. Their new friend tried to get them past the MP just as a siren blared, and they were pushed into a nearby cellar. After the explosions stopped, the men were summoned from the cellar by the MP, who sent them off to their quarters.[29]

At Toul the Radio Section was joined by representatives from the G2A6, first by Charles Matz and his First Army team on June 14, 1918, and then by Philip Whitehead with the Second Army Radio Intelligence Section; this promoted close cooperation between the sections and mission familiarization for both organizations. The G2A6 was situated very near the Toul intercept station and had a direct wire from the station; it received all the intercept, goniometric readings, and air alerts.[30]

But life in the field was more difficult than back at Chaumont, and the conditions were constantly changing. Whether working at intercept and direction-finding stations approximately 10 kilometers

Ernest Henry Hinrichs

Ernest Hinrichs was born on November 16, 1891, in Baltimore, Maryland, into two well-established German-American families in which German was regularly spoken. He attended Friends School and started with the engineering class of 1914 at Johns Hopkins University. Due to rheumatic fever, he was forced to drop back to the class of 1917 and then dropped out entirely in November 1915 due to health problems. In January 1916, he worked for the Chesapeake and Potomac Telephone Company.

Hinrichs enlisted in the military as a private on November 6, 1917. He departed the United States on March 22, 1918, as a corporal in a casual detachment of radio operators and began his service with the Radio Section on May 1. He worked at the listening station Le Chasseur in the Baccarat Sector, at the listening station Le Renard (on the southern side of the St. Mihiel salient), at Souilly, and was involved in the radio deception effort outside of Verdun in the last weeks of the war. He was promoted to sergeant first class.

Hinrichs returned to the United States on July 1, 1919. He worked as a Packard truck salesman and ran a cable code business at night. In 1921, Hinrichs started in dental school at the University of Maryland. He graduated in 1925 and opened a dental office. He died in January 1969 and is buried in Druid Ridge Cemetery in Pikesville, Maryland. After his death, his son, Ernest H. Hinrichs, Jr., compiled his father's war diaries into a book: *Listening In: Intercepting German Trench Communications in World War I.*

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from the front line or in a listening station right at the front line, the men were generally cold and somewhat out of touch with the work of their own forces. They might be in a "muddy dugout, with a gas curtain over the entrance," or "in the kitchen of an old stone house…damp, cold, and bare of everything that suggests a human habitation" and "covered with the grey mud of northern France."[31] The men often did not know the importance of their work, each one doing the mind-numbing task of receiving "groups of letters quite meaningless to him, put them on the wire, and got back a code message which he could not understand and did not know anything about."[32]

Staffing

Finding the right men for the job was not an easy task, even in the first months after the declaration of war. Many commercial and amateur radio operators joined the navy right away—some of them had previously worked as operators on commercial ships. The lack of experts meant the army had to train the men it needed, and this caused a delay in opening collection stations.[33] Krumm, while working as chief radio inspector for the Bureau of Navigation, had viewed radio amateurs as "an omnipresent American evil, like mosquitos." But Krumm's respect for amateurs increased when they volunteered for the Signal Corps, and he gave them great credit for their work in the field "under the most discouraging circum-

stance, under the most trying and uncomfortable conditions." In fact, Allied officers often mentioned to Krumm that they regretted that their countries had not had a supply of interested radio amateurs at the time of the war[34] (see photo).

When work began in the fall of 1917, there were only a handful of assigned operators, and members of the 2nd Field Signal Battalion were called on for assistance; Sergeant First Class LeRoy Claypool and eight men from that unit ran the station at Souilly.[35] A group of 53 operators arrived in November 1917; another group began training at the AEF Signal School in Langres in July 1918. A request went to the United States for 200 additional men, including 100 German speakers. One hundred were needed immediately, and another 100 by October 1 (the last group arrived on September 27). By the Armistice, 493 men had been on the roster of the Radio Section at one time or another with nearly 43 percent of the total still in training.[36]

There was a special effort to find German speakers to intercept communications. Skill in language had been the priority for frontline operators—they could be trained in telecommunications skills quickly, but the language was key. Krumm asked for more German speakers as late as early September 1918 and declared, "It is not necessary that the German-speaking men selected for listening station work be radio operators, but it is absolutely essential that they be able to understand German thoroughly and they should have sufficient education and intelligence to become fair TPS [the abbreviation of the French term for ground telegraphy: *télégraphie par sol*] operators within a short time. Lately the majority of the German speakers who have been sent to the Army Signal Schools for instruction in radio intelligence work have been uneducated, and unable to read or write the German language properly."[37]

Not just any German speaker would do—they had to display intelligence and English skills. Some of them were found in fighting units; Krumm noted, "It has been our experience that only about 60 percent of the men received for training in listening station work were properly qualified," and "the soldiers selected from the line troops on this side have in the past been much more proficient than those sent from the United States."[38]

Mission

In mid-December 1917, Moorman responded to a request to define the G2A6 requirements for the Radio Section. Moorman asked for as many messages from German ground stations in the Verdun Sector as could be supplied, and as many compass readings as possible on the same ground stations, as soon as possible. Once the section had the needed equipment and personnel, he also wanted to receive German airplane messages and direction-finding data, and suggested that all stations "be so constructed as to be readily moved as a new sector will probably be selected in the near future." At that time Moorman felt a delay of two or three days in receiving the intercept was not of particular importance, so that transmission by telegraph was not needed; on December 17, Moorman had just lost his only clerk and his staff consisted of himself and one other person. They were not equipped to handle a constant flow of incoming traffic.[39]

While Moorman greatly appreciated the messages he had received and the Radio Section's improvements in accuracy and format, he soon wanted a larger message volume to adequately train his newly arrived codebreakers. On January 10, 1918, he requested an additional radio intercept station, two direction-finding stations, at least one airplane (aero) intercept station, two airplane direction-finding stations, the establishment of at least two listening stations within 10 days, and enough people and equipment to support a complete army unit.[40]

By January 14, the Signal Corps was working to obtain the needed radio and listening post operators and had arranged to set up an additional radio intercept station and two direction-finding stations at Landrecourt and Froidos in the Verdun Sector. Operator training was underway at the AEF Signal School at Langres.[41] While there was "considerable

The men of the Radio Section, taken December 1, 1918, in Dieuleuard, France. The photographer mistakenly identified these men as part of the G2 and may have been confused by the fact that the Radio Section supported the G2, although it was a separate organization. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-40371

difficulty" in establishing and operating these stations in the French-controlled Verdun Sector, AEF CSO Edgar Russel believed that the stations would fulfill Moorman's requirements. The radio intercept stations would be able to collect both ground and airplane communications if needed. The airplane goniometric (gonio) work required wire communication between stations, but this was too difficult to set up at either Landrecourt or Froidos. The Radio Section was prepared to establish two listening stations once the desired locations had been determined; Moorman asked that they be set up in the area soon to be occupied by the 1st Division, along the southern side of the St. Mihiel salient, and that the priority in that area be monitoring American phone lines.[42]

The Radio Intelligence Specialist School at the signal school in Langres consisted of a five-week course that required students to have a general knowledge of elementary electricity, the ability to receive 25 words per minute, and a beginner's knowledge of German. Significant portions of each day

were spent in the practical operation of the school's collection stations; each student was to serve a tour in one of the stations (intercept, direction finding, or listening in) in one period of each day other than Saturday afternoon or Sunday. The practice stations were operated from midnight-0600, 0700-1130, and from 1700-midnight; men were scheduled on a rotating basis. Two hours of lecture or laboratory time occupied the afternoon hours.[43] In June, an advanced school was set up at Toul that specialized in training operators from the signal school for work in the intercept, gonio, and listening stations.[44] Other operators, particularly 40 destined to work with French Army stations, were sent from Langres to Gondrecourt in late May 1918.[45]

Intercept was generally copied by hand, except at the control stations and press intercept stations where it was typed. A wide variety of forms for recording intercept, direction-finding bearings, and other information were available, some of them designed by Frank Moorman. Stations were also supposed to keep logs, but little of this material survives.[46]

Reports and intercept were at first mailed to Chaumont, then telegraphed on at least a daily basis. The stations did not have their own telegraph or telephone equipment and had to make arrangements for transmitting intercept with a nearby signal unit. When the First and Second Army Radio Intelligence Sections were put into place, they received the intercept from the stations, although it may have also been sent to Chaumont.[47] A printing telegraph was installed between the Radio Section base at Toul and the G2A6 at Chaumont in May to improve the accuracy of reporting.[48]

As the Radio Station expanded its operations, Moorman paid attention to the details of their reporting and made suggestions for organizing the reports so that they would be more readable and useful in the analytic process.[49] He (and later his junior officers) regularly provided feedback about the handwriting of the operators, technical mistakes, and omissions, as well as praise for clearly written reports.[50] Loghry would later issue notes and a regular Radio Intelligence Circular to his operators based on feedback from the G2A6, stressing the need for accuracy in call signs, the use of the correct German time, and general omissions and sloppiness. The G2A6 was not shy about calling out individual operators, who were required to use their name or op sign (a two or three alphanumeric designator assigned to an individual, often their initials) on their intercept.[51] The G2A6 criticism was taken seriously; operators were required to initial the circular to acknowledge its contents; notations were made on the personal records of each operator, and Loghry noted that this feedback would be considered in making promotions.[52]

As the American efforts expanded, the French called a meeting for the chiefs of "Listening Post Sections" of the various French Armies, to be held at Plessis-Belleville on February 28, 1918, to discuss setting up listening stations for German wireless messages and methods for telephone monitoring. The Radio Section had no one to send, so the Signal Corps designated Lieutenant Edward Olson Hulburt,[53] accompanied by Sergeant Gaston Godeau, a French interpreter.[54]

Moorman, as chief of the G2A6, had final approval over the location of Signal Corps Radio Intelligence Service assets. By May 1918, the G2 levied additional requirements on the Radio Section. Moorman estimated needing a set of collection facilities for each anticipated AEF Corps area—one radio intercept station, two gonio stations, one airplane intercept station (later called aero intercept stations), two airplane compass stations (later referred to as aero gonio stations), several portable stations for testing sites, and two listening stations per division. All of these needed to maintain 24-hour service.[55] This request, based on the French model for a war of position, was unrealistic—the AEF would eventually form nine corps and have 43 divisions[56]—but Moorman was dreaming big.

On May 20, 1918, Moorman made some sweeping recommendations on station placement. He asked

that two aero gonio stations be located in the rear of the 26th Division (then located along the St. Mihiel salient). A special telegraph line would connect these stations to the radio intelligence officer at Toul. He proposed that the direction-finding work at Froidos and Landrecourt be discontinued, with the G2A6 then relying upon French stations in the region for bearings on ground-based emitters. The radio intercept station at Froidos, where there was no telegraph station, was moved to Souilly so messages could be telegraphed to Toul as received. An aero intercept station was to be set up near Toul. Moorman planned to move Charles Matz and two clerks to Toul to handle the analytic work from this new collection source, as well as the intercept at Souilly.[57]

In late June, Moorman notified Loghry that it might be necessary to establish stations on the Marne front, and inquired if it would be possible for him to set up one intercept station, two gonio stations, and one listening station if required.[58] It proved unnecessary to move Radio Section assets to the Marne.

One unexpected problem Moorman and Loghry faced in locating intercept stations was that some American troops objected to them being nearby because they were afraid that the stations could be located by German direction finding and shelled "whenever found convenient." Moorman proclaimed their fears "quite groundless" for, of course, the intercept stations were not emitting signals, and requested that the daily summary of information include a memo he had written on the subject.[59]

By June 1918, the Radio Section began to realign its listening stations by moving manpower to the St. Mihiel salient, pushing radio intercept and direction-finding stations at Landrecourt and Froidos back to Souilly, and setting up (in some cases taking over from the French) additional intercept and direction-finding stations in the area between St. Mihiel and Nancy. Loghry and Moorman's approach to collection would adapt to the military situation when the war of movement began in September.

Support to the First and Second Armies

Just as the G2A6 released personnel to work within the First Army, the Radio Division released Loghry to become the radio officer of the First Army on September 1, 1918. In this role not only did he supervise radio intelligence collectors, but he also managed all the radio networks and supplies needed for the St. Mihiel and Meuse-Argonne offensives. On October 22, Loghry moved to direct the combined radio activities of the First and Second Armies. Captain Ernest A. Thompson joined Loghry in the First Army as personnel and supply officer, Captain George W. Henyan supervised gonio and intercept stations, and Second Lieutenant George Alfred Benjamin (see sidebar) supervised the listening stations.[60]

Twenty-one men and equipment for gonio, intercept, and listening stations were sent to the First Army at their original headquarters at La Ferté-sous-Jouarre in August 1918. But as soon as they got there, they had to return to Toul because the army's sector of operations had changed abruptly.[61] On September 1, the majority of intercept, direction-finding, and listening stations in the First Army area came under the jurisdiction of Parker Hitt, chief signal officer of the First Army.[62]

A special telegraph wire connected the Radio Section office at Toul with the Radio Intelligence office at the new First Army headquarters in Ligny-en-Barrois. Intercept was telegraphed to the First Army G2A6 every hour. Gonio readings were telephoned to Toul where they were consolidated for transmission to the First Army. At the same time, the three gonio tractors, which used undamped wave (continuous wave) transmitters to communicate their results, were co-located with the three gonio stations, ensuring that reports could be sent by radio if the telephone lines were interrupted.[63]

Following the St. Mihiel offensive, Captain Thompson, Master Signal Electrician Frank Wade Ballard (who had begun the war as a corporal), and Corporal William F. DeWitt were sent into the

George Alfred Benjamin

Born in Grafton, Nebraska, on March 7, 1892, George Alfred Benjamin was a 25-year-old, married electrician, working for Western Union in Omaha, when he registered for the draft in 1917. He previously had spent three years in the Nebraska National Guard. In 1918, he was called up as a member of the 319th Field Signal Battalion and sailed for France in early May. He spent two months at the headquarters of the French VII Army at Lure, observing and learning about radio communications, radio intercept, and direction finding.

George A. Benjamin, taken December 1919. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-40373

On August 22, 1918, Benjamin was transferred to the Radio Section based in Toul and named listening post officer of the First Army. He supervised the establishment of listening stations on the south side of the St. Mihiel salient and moved posts to the new front line after the offensive. Promoted to first lieutenant on October 6, he reported to First Army headquarters two days later to establish listening stations on the Meuse-Argonne front.

In an account written immediately after the Armistice, he says, "It was during the period between October 9 and 18, the American soldiers' devotion to duty was demonstrated to me very strongly"; the men "worked practically continuously…to get the results desired, working in woods and gas and often ahead of the infantry outposts, with never a grumble as to food, clothing, or rest, but always showing a spirit of initiative and utter disregard of self, but a strong desire to further the common cause." Benjamin became assistant to Captain George W. Henyan, who ran radio goniometry (direction finding) for the First Army.

After the war, he returned to work at Western Union as an engineer in Minnesota. Benjamin died in July 1963; his burial site is unknown.

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newly occupied territory to attempt to locate former German stations in order to verify the accuracy of Radio Section direction finding. Some of the stations had been dismantled by the Germans as they left, and some of the equipment had been taken by American forces, but in many places some evidence remained that a radio station had occupied the space. The men determined that direction finding had been "very accurate."[64]

When the Second Army was formed on Octo-

ber 10, 1918, the Radio Section moved some support functions from Toul forward to Euvezin, where they were quartered in abandoned German dugouts on the side of a hill outside the town.[65]

Relationship with the French

Throughout the war, Radio Section men were trained by the French, co-located with the French, or took over positions occupied by the French so that resources could be used elsewhere. Much of the equipment used by the Radio Section was French. The French provided technical information and guidance, and the Americans first provided manpower and later improvements to methodologies, particularly in the area of direction finding. Krumm, Loghry, and more junior officers regularly conferred with their counterparts in the French II and VIII Armies.

While there were disagreements at times, the signal collectors of the two nations maintained a generally congenial and mutually productive work atmosphere. When the French left stations, many of the Americans not only missed their company but greatly missed their cooking.[66] Later in the war, some of the listening station personnel felt their work had been hampered by the French, who were sometimes considered inefficient (see the later discussion of problems at the listening stations on the Woëvre plain).[67] Even Krumm commented on the Allies' belief that American radio men were successful because they were fresh in the work; he recounts meeting a "New York boy of French parentage" who had joined the French Army three years earlier, noting that "our men never experienced the depressing effect of the discouraging battles as did the Allied operators—so it is fair to assume that the Allied officers were right in their estimate of American effectiveness."[68]

The generally good relationship with French collection personnel is credited to the efforts of Loghry, who, according to Nolan

> has by his energy and enthusiasm kept up the interest of his men and made the Radio Section of the Signal Corps a live progressive organization. When the section was short of men and equipment he arranged with the French Armies to help. He has maintained continuous and friendly relations with the French Radio men ever since the organization of the Radio Section. The fact that during the past year there has been no case of friction between the French and American Services and no instance in which either has failed to help the other when needed is due very largely to the tact and good judgment of Major Loghry. In his relations with this section and the members of a foreign army Major Loghry's actions have been a credit to himself and the service he represents.[69]

Intercept and Communications Intelligence at Division-Level and Below

When the I Corps was set up in January 1918, it took control of four divisions: the 1st Division (holding the line between Xivray and Flirey on the southern side of the St. Mihiel salient), the 2nd Division (between Dieue and Spada on the western side of the salient), the 42nd Division (between Lunéville and Baccarat), and the 26th Division (along the Chemin des Dames, the ridge in the region of the Aisne). The Radio Section located intercept stations with or near the 1st and 42nd Divisions but not the 2nd or 26th.[70]

Stations were specifically assigned to the 1st Division area (near Seicheprey) in the early part of 1918; whether this was a test to see if all divisions should be supported or a way to figure out the best mode of operations for the Radio Section is unknown. Few American divisions were occupying frontline sectors at that time, so this may have been a way to provide radio intelligence support to these early operations while ensuring that the Radio Section facilities were co-located with a command that could provide for their communication and supply

needs. The American intercept service was so new there was no US Army doctrine to determine how the work should be allocated; however, signal units (radio companies and field signals battalions) were expected to supply personnel to operate listening sets, intercept stations, and direction-finding units installed in their area.[71] This is why the men of the 406th Telegraph Company were directed to support the earliest listening stations near Montsec.[72]

After this experiment in the spring of 1918, intercept facilities were not specifically co-located with a divisional headquarters. When the 3rd Division asked to have intercept capabilities assigned, the request was refused, for the division was operating in an area already well covered by French radio intelligence, and Moorman wanted to avoid duplication of effort.[73] Moorman consulted with Parker Hitt, temporarily detailed as G3 (Operations Staff) liaison to the 3rd Division, about the request before turning it down.[74] Denied Radio Section support, the 3rd Battalion, 18th Field Artillery, part of the 3rd Division, had radio operators at the battalion command post maintain "listening silence" and record "all intercepts for inclusion in the daily intelligence report."[75]

By the middle of 1918, the Radio Section was supporting and supplying their own units independent of the division areas in which they were located. Routine intercept from lower units did not usually make its way into the larger AEF system.[76] While a specific provision for listening-in sets seemingly was not established for below army level, radio operators in the early years of radio before the war and during the war typically listened in for communications when not conducting their own radio business.[77] As in the example of the 18th Field Artillery provided above, this intelligence was used locally and, in a few cases, may have been passed up the chain and to the G2A6.

Intelligence units throughout the AEF took advantage of their organization's assigned signaling units' abilities to intercept German communications. A report dated June 12, 1918, from the 2nd Division's 4th Brigade during the Battle of Belleau Wood remarked that "wireless intercepted message of German planes taking observations of fire on cross-roads [*sic*], where road branches to PYRAMIDE, shells probably 150 caliber."[78] This information was probably collected by Signal Corps troops supporting the brigade. General John J. Pershing's final report noted that while every unit from battalion up had an intelligence detachment, only in divisions and larger organization was there the ability to "embrace all available means and sources, including radio interception stations and sound and flash-ranging detachments."[79]

From the uncorroborated report of a 42nd Division operator providing the key to break a new German cipher in June 1918 (see chapter 11) to the account of an unspecified regiment's intelligence officer picking up "suspicious phrases" using a "listening-in set" and warning of imminent attack and thus saving lives, there is substantial evidence that radio intercept was an intelligence tool for divisions. This intercept work was not systematic or regulated in any way by the Radio Section or the G2A6.[80]

Division G2 officers were not always aware of the extent of intercept and codebreaking efforts at AEF headquarters. On the night of August 12, 1918, an improvised wireless receiving set "rigged up by some Signal Corps wireless operators" of the 6th Division copied three coded German messages. The next day, the G2 of the 6th Division, W. E. Selbie, sent the messages to Chaumont, noting that he had "no data whatsoever regarding codes in use by the German Army" but they were trying to solve them nonetheless.[81]

Moorman quickly provided solutions to Selbie, noting that one message was too garbled to decode but explaining they were all weather reports intercepted by "our regular stations." He added that it was impracticable to furnish keys to divisions as there were so many different codes in use that changed rapidly. Noting that the Radio Section did "copy most of these messages," Moorman invited Selbie to send the G2A6 any intercept and promised to let him know if there was anything important. Selbie

was cautioned by Moorman that this information was secret because, while the messages were unimportant, there was a need to protect the extent to which the German codes could be solved.[82]

The 6th Division persisted in intercepting German communications and informed Moorman that on September 8, 1918, from their position at the PC (command post) Payroux, Sector Gérardmer, they received a ground telegraphy message that seemed to be intercepted within 1,000 meters of the post. Circumstances led Selbie to believe that it may have possibly been sent by a spy within the lines of the division. The G2A6 was unable to break the mixture of code and clear text and provided the message to the G2B Secret Service for further investigation.[83]

Sites—Types and Locations

The Radio Section established six types of intercept stations: listening stations, [ground radio] intercept stations, goniometric stations [initially focused on ground radio], aero [radio] intercept, control stations, and press intercept. These distinctions in station type and collection mission seem odd to us today. Stations were initially set up in late 1917 for specific categories of expected communication; thus, there were stations that focused on radio intercept from ground-based transmitters and others that focused on radio intercept from aircraft. By the summer of 1918, AEF goniometric collection was expanded to cover direction finding of both ground- and air-based emitters from the same facility. Listening stations changed little over time, and control and press stations had specific and distinct missions. This section details the types, locations, and history of AEF signal collection assets.

See appendix D for equipment used by the Radio Section.

Listening Stations

The listening stations, which collected both telephone and ground telegraphy, are the most well known, most written about, and the most "replete with thrills" of all Great War communications intelligence collection positions because of their proximity to the front.[84] The technical need for these stations to be no more than 800 yards from the front lines led to these cryptologists experiencing the war in a very different way than their headquarters-based colleagues. The ground telegraphy job was dangerous and required venturing into no-man's-land to anchor a stake trailing wire. This wire was connected to the intercept equipment in a trench or dugout near the front line. The information from these stations was useful, even though the station operators did not have the information needed to read encoded messages. Operators became skilled at noticing unfamiliar accents and chatter about locations of aid stations and supply dumps that revealed new troops moving into an area.[85] The French called these *postes d'écoute* (listening stations).[86] The British first called this technique *overhearing* and were also experimenting with the system in the British First Army area in the summer of 1915.[87]

TPS (ground telegraphy) was first used by the French beginning in 1915 and was made possible by the development of amplifiers that used three-electrode vacuum tubes. Ground telegraphy transmitters had a 50-watt induction coil and were powered by storage batteries. The coil was grounded by wires carried to ground plates, or mats, approximately 100 yards apart. The current between the mats carried the telegraphic transmission. The intercept stations used audio frequency amplifiers that were also connected to mats separated by 100 yards or more.[88] This crude means of communication was useful in some types of terrain when combatants were confined to trenches; it was not a viable means of communication during more mobile warfare.

Significant drawbacks of ground telegraphy included maintaining the long ground leads and the need to place the mats relative to each other in places where intercept could be maximized. Communications (and intercept) were rarely reliable for a distance longer than 2,000 yards, and the distance was reduced when water or another path of low electrical resistance existed between the transmit-

ter and receiver.[89] There was also the problem of interference, a machine-generated "electric screen" that the Germans operated that effectively blocked communications. One station, normally blocked by the screen, surprised the G2A6 in Chaumont by copying an important German conversation one day. This station still had a complement of French operators, and, after some investigation, Moorman learned that a bored French corporal, tired of having nothing to do, set out from the station with a mile of wire, crossed no-man's-land, entered the German trenches, and hooked up his wire to a trunk line of a German telephone junction. When he returned to the station, he connected the wire to his set and copied telephone calls for four hours. This daring corporal also brought back some of the German wire from their listening equipment since he could not bring back the whole receiver "as there were several German soldiers sitting around and he did not feel like making any disturbance."[90]

While the primary function of these stations was intercepting both enemy telephone and ground telegraphy, station personnel also monitored, or "policed," Allied telephone lines—both by inspecting the physical condition of the lines and by conducting communications security monitoring, which listened for "dangerous" language that might provide intelligence to the enemy. The German intercept operators were doing the same. Krumm recalled "many a high-ranking officer was embarrassed by having a verbatim report of his careless words handed [to] him a few minutes after he had completed a telephone conversation."[91]

In early 1918, the Radio Section took over two frontline listening stations from the French at Marvoisin and Seicheprey, both on the southern side of the St. Mihiel salient. Americans were also colocated at French listening stations in the Baccarat Sector. By May, 40 US operators were assigned to French listening stations—generally two Americans and two or more French per station. Despite the joint staffing, French authorities controlled the facilities and the work. The AEF would eventually take over many of these French stations. The Radio Section began numbering their stations but, by July 1918, abandoned this practice in favor of the French naming system.[92]

After the St. Mihiel offensive, operations moved to the new front line, and here the Americans were on their own without French assistance. Listening stations were attempted in the Meuse-Argonne but had to move frequently and were often ineffective because of the pace of operations. Division Signal Corps TPS station operators also used their gear to listen in to the enemy in their sectors (see chapter 11).

A postwar AEF history captured the inherent drama of these facilities:

> There is no more thrilling page in the romance of the war than the little history of the American listening stations of the Signal Corps. They were always to the front and sometimes in No Man's Land itself, but wherever they might chance to be located, they were, as one of the men described, "very near Heaven." Their business was eavesdropping, and if they didn't hear any good of themselves, they managed to do the doughboy lots of good. Time after time these men were caught by the spotlight of a star shell as they crawled out in the night toward the German lines and were seen no more. Often they were caught between a double barrage probably started by their own sentry. More often, however, they wiggled their way through barbed wire and shell holes, planted their wires, and returned to reap the benefit of their daring.[93]

There was no formal tasking; the men copied what they could hear. Copying was done by hand.[94]All the intercept was packed up and taken to a Signal Corps station where details could be telegraphed to the G2A6.[95] Some handwritten logs survive in records of the G2A6 indicating that they were couriered or mailed to Chaumont at some point.

A more formal system of reporting began in July 1918. Listening station operators made two copies

of their reports, which included signals received and translations of clear German; if anything was of importance, it was to be immediately reported to the nearest officers. If French or American plaintext telegraph was collected, or if telephone conversations of a dangerous nature were heard, the Signal Corps officer of the sector was to be immediately notified.[96] Both copies of routine reports went to the G2 of the division occupying the area of the station, who would note any action taken before forwarding the original to the G2 of the corps to which the division belonged and sending the duplicate to the division signal officer. Once the First Army was assembled, reporting would go up the chain to the army radio intelligence officer, who, after examining the report, would forward it to the G2A6, prepare a weekly report on listening station activity, and let the army G2 know of any matter requiring attention.[97]

Listening stations assigned to the First Army were directed to maintain a logbook, if they did not already have one.[98] The noncommissioned officer in charge was to make a daily record of his personal impression on enemy activity or inactivity, names heard, numbers of the German coordinate map, changes in the sector (new stations, new calls, new operators, artillery fire coinciding with messages), as well as modifications in lines and listening stations. If the station was attacked, the book was to be burned; when it was full, it went to the Radio Section to be consulted by the officer in charge of listening stations. On graph paper, the station counted enemy TPS calls, messages, and communications heard that could not be intercepted; the x-axis was for the day of the month and the y-axis for the number of calls each day. Copied calls were documented in black ink; messages heard or noticed but not copied were in blue; and red was used for distant communications heard but impossible to copy. This graph was to be forwarded to the Radio Section headquarters in Toul with a monthly report on the 28th of each month. The monthly report included an activity chart with the number of three-number code messages, the number of telephone conversations, and the hours that the generator was working each day. Each station was expected to assign arbitrary call letters to every station recognized by name or operator, and equate this arbitrary designator with each day's actual call sign.[99]

Stations also sent in a daily summary containing the number of enemy TPS calls, number of messages that could or could not be intercepted, number of distant messages that were impossible to copy, number of three-number code messages, number of German telephone conversations and calls with the analysis as to the meaning of important conversations, hours during which the generator was working, and a sketch of the "intensity" of each station that included call sign, net diagram, and signal strength (strong, average, weak, not heard). Noncommissioned officers were also to report their personal impressions about changes in the sector.[100]

South Side of the St. Mihiel Salient

(See table 1.)

American Stations near Montsec, March-June 1918

On January 25, 1918, Lieutenant Herbert R. Smith was put in charge of the Radio Section men assigned to the 1st Division area along the south side of the St. Mihiel salient. Smith was joined by eight men from the Radio Section on March 1. Sergeant George J. Braun; Private First Class Lucius V. Pease; Privates Albert A. Munch, Rene T. Verhelst, and Robert Forbes; and Acting Corporal Frank Bates Fairbanks (see sidebar) had just completed training and traveled from Langres. They were joined by Sergeant Eugene Peterson and Corporal Paul D. Herrold. As there were not yet enough men in the Radio Section to staff the stations in this area, two details from the 406th Telegraph Battalion filled in: Company D (in March and May) and Company E (in April and June).[103] The listening stations were not ready when the men arrived, and they were quartered in "a filthy attic in an aged French farmhouse" in Ménil-la-Tour. Braun, Verhelst, Munch, Peterson,

Table 1. Listening stations on the south side of the St. Mihiel salient

Location	Start date	End date	Designator, if known
Marvoisin (Sector H-3)	By February 1918	April 1918	Station #1
Xivray (Sector H-3)	April 1918	Probably June 1918	Station #1
Bois de Remières (Sector F-2)	February 1918	Early April 1918	Station #2
Seicheprey Cemetery (Sector F-2)	April 13,1918	June 7, 1918	Station #2
Forêt d'Apremont	Unknown, no earlier than August 1918 (French station)	September 1918	Lamartine
Forêt d'Apremont	Unknown, no earlier than August 1918 (French station)	September 1918	Baudelaire
Forêt d'Apremont	Unknown, no earlier than August 1918 (French station)	September 1918	Obligado
Near Mouilly (NW side of St. Mihiel salient)	Unknown, no earlier than August 1918 (French station)	September 1918	Muette
Bois de la Hazelle	June 1918	unknown	Station #5
Near Flirey	Taken over from French in July 1918; American presence in early June	September 13, 1918	Station #2, Le Renard (Fox)
Near Limey/Remenauville	Taken over from French July 17, 1918; American presence in early June	September 13, 1918	La Cigogne (Stork)
Between Limey and Fey-en-Haye[101]	Taken over from French August 26, 1918; American presence from July 15	September 13, 1918	L'Éléphant (Elephant)
Near Fey-en-Haye	Taken over from French September 1, 1918; American presence possibly as early as April	September 13, 1918	L'Épervier (Sparrowhawk)
South of Montauville	Taken over from French September 1, 1918; American presence possibly as early as April	September 13, 1918	Le Canard (Duck)
Near Pont-à-Mousson	Taken over from French September 1, 1918; American presence possibly as early as April	September 13, 1918	Le Chat (Cat)

Note: Start date reflects American presence. Many of these sites had been used by the French Army before the AEF Radio Section arrived.[102]

Frank Fairbanks

Frank Bates Fairbanks was born August 3, 1891, in Springfield, Massachusetts. He was a private in the Signal Corps reserve and was called up in October 1917; at the time, he was working as an electrical engineer for Westinghouse in Pittsburgh. He arrived in France near the end of December 1917. In March 1918, he set up the first listening station along the St. Mihiel salient at Marvoisin.

He was placed in charge of the listening station at Flirey in June and at the end of July was put in charge of all listening stations along the salient. His intelligence and competence were reflected in his rapid promotions; he became a sergeant first class on August 14 and master signal electrician on September 1. After the success of the St. Mihiel offensive, he was put in charge of establishing new listening-in stations on the new front. He was then commissioned as a second lieutenant on October 29 and appointed to the command of listening stations for the Second Army.

Fairbanks in December 1919. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-40373

Fairbanks was awarded the French *Croix de Guerre* for his work and promoted to first lieutenant in February 1919. In an end-of-the-war report he wrote: "A word should be said of the unusually high character of the personnel of this organization. It was carefully selected from the entire Signal Enlisted Reserve Corps of the Eastern Department and comprised men of unusual ability and specialists in all branches of electrical, telephone, and telegraph work. A large proportion of these men, who enlisted soon after the war was declared, have received commissions in the AEF."

In the 1940s, Fairbanks became the president of the Horix Manufacturing Company in Pittsburgh, his late father-in-law's company. Fairbanks died September 13, 1947, in Pittsburgh; he is buried in Homewood Cemetery in that city.

Sources

Ancestry.com. Vital records. Accessed July 12, 2017.

Fairbanks Personal Narrative 123. National Archives and Records Administration, College Park, Record Group 120, Records of the American Expeditionary Forces, Entry 2040, Box 130.

and Herrold were assigned to Bois de Remières near Seicheprey, and Fairbanks, Pease, and Forbes were assigned to Marvoisin (which would move to Xivray in April).[104]

When the 406th went to the Marne in June, Radio Section men were ready to fill the slots in other nearby stations.[105] Smith was relieved by then-Lieutenant Ernest A. Thompson, in April, when the Radio Section moved their Ansauville stations to Toul.[106]

Two groups of four men—three operators and one lineman—worked two shifts, four to six days on

and the equivalent time off at a rest billet. While on duty the men worked intercept for four hours and then had eight hours off. They slept in the dugout when they were not assisting in repair of the lines. The precise schedules varied by station; some stations, such as the one at Richecourt, may have had intercept shifts of six hours. At first the men spent their rest periods in Ansauville, where the Radio Section also operated a radio intercept and direction-finding site. When those sites were moved to Toul in April, the men traveled to Toul for rest every five days. The men from the 406th returned to their companies near Beaumont during their rest periods.[107]

Marvoisin/Xivray. First Lieutenant Bernard H. Rafferty and three operators took over a French listening station near Richecourt, in a sector held by the 18th Infantry of the 1st Division, in January 1918. While Rafferty called the site Richecourt, it is almost certainly what others called Marvoisin—the two towns are only a mile apart, and the station was likely between the two. Richecourt was in German hands. The site was within a few kilometers of the German stronghold at Montsec—at 380 meters, the only high ground for miles around—and the site's daily activity was closely monitored, both visually and by the German listening stations. Rafferty's timeline is slightly suspect as he says he reported to Ménil-la-Tour in mid-December; the 1st Division did not arrive until mid-January. As Rafferty had the assistance of 10 men from Company A of the 18th Infantry, the station probably got underway in January. The men "proved to be willing and daring workers." When the work had been underway for about 45 minutes, the group came under machine-gun fire, concentrated on their position but over their heads. It suddenly occurred to Rafferty that the Germans had been listening in on their work. The group rested an hour then continued their work "without any further annoyance from the enemy."[108]

The four men operated the station 24 hours a day, each taking a six-hour shift. Rafferty claimed to copy on average 50 pages of German telephone conversations each day as well as numerous messages in Morse code, which were encoded using a German trench code. He believed that the G2A6 were able to decipher these messages to obtain "very valuable" information."[109] Rafferty departed on February 10, 1918. He went on to be an instructor in radio intelligence at the AEF Signal School at Langres.[110]

Located in Sector H-3, the station at Marvoisin was of great value monitoring American communications since, at first, it could not hear any German communications. Through experimentation and repositioning of the grounded antenna, the site was soon able to supply intelligence. Moving the antenna was not a simple task. An unnamed private at the station volunteered to run the wire with a patrol to cover him. He crawled for three hours under cover of night to reach a point a few hundred yards from the station, crossing the American barbed wire to reach the edge of a creek. Here he buried a ground antenna and attached wires; it was already 2330 and the group needed to return by 0100. Although the Americans patrolling the lines knew that the team was out there, the team was shot at by their own patrol, and this triggered a German response. Several American batteries in the rear of the station began to target the station; the lieutenant in command of the group smelled gas, and the team put on their masks. Then the lieutenant "skillfully extricated us from one perilous series of shell holes into another less dangerous, until the panting patrol, dazed by the tumult it had unwittingly raised, blinded by fire, at last stumbled against its own barbed-wired entanglements." The operator dashed to retrieve the wire, found the opening in the barbed wire, and returned to the station.[111]

Apart from the inherent danger involved in adjusting the antenna, there was a crucial problem with Marvoisin—the infantry withdrew from the area at night and occupied it during the day. The operators withdrew from the station, carrying all the equipment, every night. In April 1918, the station moved a little bit down the road to Xivray so that operations could be carried on around the clock.

While at Xivray, the station collected and reported critical information during the April 20 raid on Seicheprey.[112]

Lieutenant Hulburt, who was working in the AEF Signal Corps Research Laboratory in Paris on problems related to intercept equipment, tested the newly developed SCR-72 amplifier at Marvoisin and Xivray during an eight-day visit in April; the station moved during his visit.[113] The new American amplifier proved to be superior to the French 3-ter amplifier (see appendix D) although in need of some design changes. While at Marvoisin, Hulburt also tested a filter that helped eliminate the electric screen that the Germans were using at nearby Montsec.[114]

The electric screen was a "roaring in the ground" presumed to be an electric generator installed to prevent German TPS and telephone conversations from being overheard. Men listened for the noise, which stopped for an hour or two every day (probably for equipment maintenance). All American telephone conversations were suspended during the quiet period; it was presumed that the screen was also blocking the Germans from intercepting the American lines and that in its absence communications were vulnerable.[115]

Unfortunately, continuous shellfire on Xivray's position made it difficult to maintain the wires, requiring all the men, aside from the operator on duty, to be out of the station, checking the lines and making repairs.[116]

Xivray had to be abandoned on June 7. Intercept indicated the Germans were preparing a raid on this position; the operators were disappointed that they had to leave as they were "anxious to copy the interesting messages which would be sent during the attack." Some of these men, including Fairbanks, were sent to the French station near Flirey (Le Renard). When the raid occurred a few days later, the Germans were repulsed and had heavy losses; the station's dugout was "completely demolished" by shelling.[117]

Seicheprey. The first station at Seicheprey was a dugout just off a communications trench in the Bois de Remières, 50 yards from the front line. Six feet square, the wooden floor was about a foot lower than the rest of the trench with the ceiling five feet above the floor. This space contained two bunks, a chair, and a horizontal board nailed to the wall to serve as a table. The equipment was on the table. One man remembered that when you stepped on some of the floorboards "you started a miniature geyser."[118] Another account described the station as a "dugout the size of a packing case, together with a smelly pool rising from the subsoil, and rodents a foot long to complete their discomfort"[119] (see photo).

Each day the lineman had to travel at least one hour through the trenches to bring in fresh storage batteries. The round trip could take three hours if the area was being shelled. The batteries were charged in Ménil-la-Tour (code name Maxey) and then taken to Beaumont (code name Boston) by motorcycle before being picked up for their trip through the trenches. The approach to Beaumont from the south was along Dead Man's Curve, which, though usually camouflaged, was clearly in view of the German guns on Montsec. One day Albert Custer of the 406th Telegraph Battalion made the hazardous trip; Corporal Drew called him a "d— fool" for doing it, but Custer insisted that he had to get the batteries so the station would not shut down. Though he was knocked down by the blast of a shell and missed by bullets twice, Custer made it back "just in time, as the station had just stopped operating."[120] While the radio equipment was always at the station, everything else—wire, batteries, candles—had to be carried in by the operators on every shift change. Food was carried to the station from Seicheprey, where it was cooked "in fireless cooker cans," which "kept it pretty warm if the carriers did not get tired and stop somewhere."[121]

It was not easy working in listening stations, disconnected from organizational support. As they weren't part of the units around them, they were rarely warned of impending raids or attacks. Ray Tritle, one of the men from the 406th later said,

The ruins of the town of Seicheprey, February 1919. Several Radio Section listening stations were established near here. The station in the cemetery remained in place, unseen, during the German raid of April 20, 1918. Digitization courtesy of Meuse-Argonne.com. NARA CP, RG 120, Records of the American Expeditionary Forces, RG 120-G. Photographs taken by the "Griffin Group" of areas occupied by American troops during World War I combat operations, 1918-1919, 120-G-1-SM-38-77, 120-G-1-SM-27-26

"We had plenty of everything but food; plenty of rats and cooties and lots of shelling and gas." On one occasion, the American infantry, in expectation of a German raid, moved back 600 yards and failed to inform the men at the station. The raid did not happen, although the area was shelled, which filled in the small trench leading from the communication trench to the station. Station personnel did not realize until the next morning that they had spent the night in no-man's-land.[122]

Later in March 1918, the station at Seicheprey was moved back toward the town and set up in a dugout in the corner of the cemetery. Built on ground level and constructed from the ruins of houses, the wall facing the front line comprised at least five feet of solid stonework. The roof was also of stone, about four feet thick. This station was spacious enough to have two decks of eight bunks each, with room for a table to hold the equipment. However, this station was in an area receiving a "sprinkling" of gas shells at 1700 each day. On March 23, Eugene Peterson and his crew, with gas masks on, noticed how the townspeople had gathered away from the shellfire in a place where the wind would carry the gas away from them and suggested the station personnel should move there. He left, but the others on duty—Braun, Verhelst, and Munch—did not follow. When the gas cleared away an hour later,

Peterson made his way back to the station where he found the three men at a Red Cross station. They had attempted to follow Peterson, but a shell burst beside them as they took off their masks. All three survived: Braun had been knocked unconscious by a shell fragment before being gassed, Verhelst was not seriously affected, and Munch was sent to the hospital.[123] The three were no longer fit for frontline duty. Peterson, a lineman, spent the night alone in the cemetery; he was not an operator and could not run the equipment. He called up Lieutenant Smith and asked for three more operators who arrived two days later.[124]

The station at Seicheprey went unnoticed during the German raid on the town on April 20, 1918, and the men were feared lost. They were not and proved to have set the standard for radio intelligence collectors remaining at their post. This story is told in chapter 11.

The French Stations from Flirey to Pont-à-Mousson, June-September 1918. The French had a large network of listening stations along the edges of the St. Mihiel salient. The Americans first worked with the French in these stations beginning in April, when a team of Americans under Sergeant Carleton R. McQuown[125] was co-located in three French stations close to Pont-à-Mousson (most likely L'Épervier, Le Carnard, and Le Chat).[126] From June through August, the AEF Radio Section took over a contiguous set of these stations stretching from Flirey to Pont-à-Mousson. There is tenuous evidence that there may have been a Radio Section presence in at least three French sites in the Forêt d'Apremont and in Mouilly. It is not impossible that Americans worked at other French sites in this region, but no definitive proof has been located.[127] When the French and Americans worked together, the French were responsible for general operations and location of the antenna. At first, two operators, one French and one American, were on duty at all times.[128]

By this time, Radio Section personnel for this sector had rest billets in Domèvre-en-Haye and spent three days on post and three days on rest. As few as three men might handle a station during their three-day shift.[129]

In June, a station was installed in the Bois de la Hazelle, although it is not certain that it was still there when the 89th Division was gassed in these woods on the night of August 7-8, 1918. The location seems to be just slightly too far from the front line to effectively intercept communications.[130]

Le Renard, 15 feet underground in a daisy field near Flirey, not far from a feature labeled "salliant du Renard" (Fox salient) on a French trench map,[131] was taken over from the French in July 1918 as was La Cigogne, which was housed for a time in an observation tower near Remenauville, although it possibly also had a dugout location. L'Éléphant, next down the line, was taken over on August 26, followed by L'Épervier, Le Canard, and Le Chat, so that American operators operated the line from Beaumont to Pont-à-Mousson.[132] Recently commissioned Second Lieutenant George Benjamin, who was transferred to the Radio Section on August 22, was immediately appointed listening station officer for the First Army. He supervised this line of stations.[133]

These listening stations were placed in preparation for the American attack on the St. Mihiel salient and provided the intelligence that revealed German troops had not withdrawn from the area (see chapter 11). Ernest Hinrichs of Baltimore, Maryland, was in charge of Le Renard. Hinrichs was the grandson of German immigrants, and the family continued to speak German at home. He kept a journal, later published by his son as the book *Listening In*, which provides a great deal of color and detail regarding the work of these men. He was on duty at Le Renard on the evening of September 11 and observed that the enemy was quiet, but the American wires were "entirely too active…there is more telephone talk than there should be."[134]

A little before 0100, the time the guns were to begin, Hinrichs left his post and went outside into the dark night. French artillery was arranged, in a line, across the daisy field. In a few minutes "the sky-

Table 2. Listening stations in the Baccarat Sector

Location	Start date	End date	Designator, if known
Unknown	April 1918. Moved to new location July 9	August 2, 1918	Station #3; Le Dragon (Dragon). Sometimes seen as Le Dragoon (Dragoon), which is probably the correct name.[139]
Unknown	April 1918. Moved to new location July 12	August 2, 1918	Station #4; Le Hussard (Hussar)
Near Badonviller	April 1918	July 4, 1918	Station #2; Le Chasseur (Hunter)

Note: Start date reflects American presence. Many of these sites had been used by the French Army before the AEF Radio Section arrived.[140]

line was ablaze," and Hinrichs watched a column of men on the nearby road moving into the front lines. He watched for an hour, returned to the station, and went to sleep. At 0500 Frank J. Weber woke him, noting that there was nothing to intercept, and that he and Paul E. Morach wanted to go out to see the action. By 0700 Hinrichs abandoned the urge to stay at his post and went outside as well.[135]

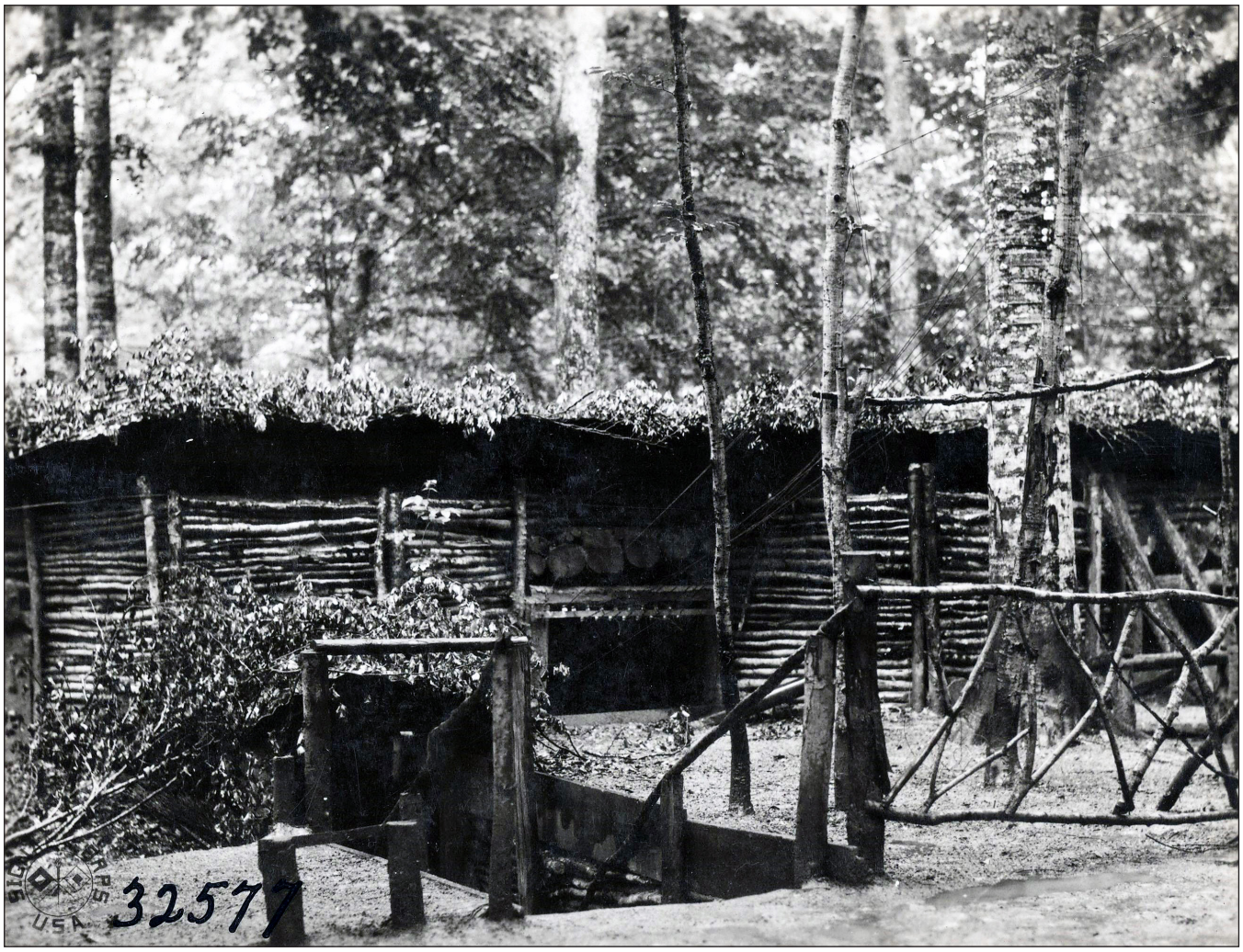
Hinrichs wandered through, and chatted with, the groups of German prisoners. One of them pressed a paper into his hand, saying it was a souvenir. It was 1100, and Hinrichs headed back to the station. He stopped to look at the paper, which proved to be a recent, annotated map of German positions in the salient. He hurried back to Le Renard, arriving just a few minutes before Ernest Thompson stopped by with an unnamed colonel and major. It is possible that these men were Krumm and Loghry. Thompson asked where the other men were and ordered Hinrichs to dismantle a station; a truck would be coming for the equipment at 1400. Hinrichs handed over the map to divert Thompson's attention from his missing colleagues. The truck took the equipment and Hinrichs to Toul. Morach and Weber found their way back to Toul on their own, stopping in Domèvre along the way to discover that the Radio Section had shut down the quarters there.[136]

On September 12, Loghry declared to Moorman that he was going to bring in the listening stations that had been along the southern side of the salient and hold them in readiness until the line stabilized and the Radio Section was able to install new stations on the new front.[137] However, the stations on the east side of the salient (L'Épervier, Le Canard, and Le Chat) stayed in place until at least September 16.[138]

Baccarat Sector

(See table 2.) Almost nothing is known about the precise location of these stations, but the men who worked at these locations were billeted in Pexonne. They were on post for 48 hours and off post for 48 hours.[141]

Most listening stations were extremely rudimentary, but one, named Le Chasseur by the French, was relatively comfortable and well-equipped for a frontline outpost. This station, northeast of Baccarat (outside the village of Badonviller), is the one described in detail by Hinrichs.[142] Le Chasseur was constructed by the French listening station services; Lieutenant Andre Delavie, the French officer who pioneered the concept of listening stations, described it as a "model post" in "a comfortable shelter on a slope of the road from Badonviller to Allar-



The Radio Section listening station "Chausseur," on the front near Pexonne, June 20, 1918. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-032577

mont."[143] The facility was built into the side of a hill with thick log construction. There was electric light and running water—the trickle of a spring running into a basin[144] (see photo of Le Chasseur).

Hinrichs arrived at Le Chasseur on April 25, 1918. Two months after Hinrichs's arrival, he noted that he had his "first real bath" (a very cold one) since arriving in the area in April, for the village horse trough had been turned into the community bathtub.[145] The bathing situation highlights the difference between life in this remote sector and that at AEF headquarters; in Chaumont William Friedman was able to bathe only weekly.[146]

Sometime in April, Americans in these three stations listening to German communications overheard a time and an "anxious" reply; the operators deduced an attack was imminent and alerted nearby units. With this warning, the 42nd Division repulsed Germans attacks on Ferme-le-Chamors (a nearby farm), Ville Nègre (a small settlement on the road between the station and Pexonne), and La Chapellotte (a hill near the front lines).[147]

Hinrichs tells a tale of a fellow soldier, Private William Gerard Greubel (whom he calls Treubel), that reveals a potential problem in using native German speakers. Greubel was born in Germany in 1894, and his family immigrated to the United States in 1901. He seems to have been just the type of person the army needed—spoke native-level German, had worked as an electrician, and had served in the New York National Guard.[148] But there was a problem. In early June 1918, while monitoring communications at Le Chasseur, Greubel supposedly intercepted a conversation that astonished his colleagues with its detail and specificity. This happened again days later, at a time Greubel was alone in the station, and the other operators believed he was making up intercept. The lieutenant in charge of his section investigated and found that Greubel was indeed falsifying intercept, and he was removed from radio intelligence duties, although he remained in the Signal Corps.[149] The fake intercept might have been sabotage, a deliberate attempt to be removed from the combat zone, or an unconscious reaction to the trauma of war.[150] A week or so before the fake intercept trouble started Hinrichs and Greubel encountered the bodies of dead German soldiers in a dugout.[151] After the Greubel incident, Moorman requested Signal Corps investigations of at least two other Radio Section men who were born in Germany and still had relatives there; at least one of these men was removed from listening station work and transferred out of the Radio Section.[152]

The 42nd Division left the Baccarat Sector on June 28. Wilbur R. Hogel and Snowden P. Beaman scrounged through the empty dugouts in the area and brought back a variety of treasures the division had abandoned—upholstered chairs, mirrors, china wash basins, guns, and a clock. The best finds were food—canned salmon and roast beef, sugar, and coffee—and several hundred rounds of ammunition. After a wonderful supper, the Americans indulged in some target practice and tossed some grenades for the fun of it until their French colleagues made them stop because they were afraid that the infantry would mistake the noise for Germans coming over the line.[153]

Hinrichs and some of the men departed Le Chasseur on July 2; however, Delavie remembered that the Americans and French celebrated Bastille Day (July 14) at the station with a feast and "abundant libations."[154] Because La Chasseur closed on July 4, it is possible that Delavie was writing about one of the other stations that remained open until August 2.

The Woëvre Plain

(See table 3.) On September 14, Frank Fairbanks and 11 men were sent to Souilly to join up with a detachment of French listening station operators attached to the French II Colonial Corps. These men together established a series of listening stations along the new front line created when the St. Mihiel salient was reduced. The group control (and rest area) was at Dommartin-la-Montagne, and stations were first established at Saulx-en-Woëvre and Fresnes-en-Woëvre. Stations were later added in the Bois de la Grande Souche, near Haumont and near Woël, and then at the Bois des Haudronvilles-Haut, controlled from Bois de la Creuë (near Vigneulles-lés-Hattonchâtel).[156]

At Saulx-en-Woëvre, a location described as "a desolate heap of ruins held by a handful of 'doughboys,'" the station personnel suffered a constant bombardment of shrapnel and gas shells, complaining only that the "shell fire interfered with the most efficient operation of our listening position." Shrapnel repeatedly cut the wires, but they were repaired "as fast as they were cut." On October 10, 1918, Privates First Class Oscar Meichtry and Jacob T. Krawitz went to repair lines after a severe gas bombardment and though they wore gas masks, were burned by the mustard gas that stuck to the wires; they were hospitalized. Later in October at the Fresnes station, Sergeant Elias VanderPyl and Private First Class Ernest H. Divoll were temporarily blinded by gas when they removed their masks to repair wires.[157]

Table 3. Listening stations in the Woëvre plain

Location	Start date	End date	Designator, if known
Saulx-en-Woëvre	September 20, 1918	November 1918	Station #1; HM-1
Fresnes-en-Woëvre	September 20, 1918	November 1918	Station #2; HM-2
Woël	September 20, 1918	Before November 1918	
Dommartin-la-Montagne	September 20, 1918	November 1918	HM Group HQ in control of Saulx and Fresnes
Bois de la Grande Souche, SW of Haumont Lès Lachaussée (Louisville Farm)	Late September 1918	November 1918	La Souche (Stump)
Bois de la Creuë near Vigneulles-lés-Hattonchâtel	October 20, 1918	November 1918	Group HQ in control of La Souche (Stump) and La Rebois (Reforestation)
Bois des Haudronvilles-Haut	Possibly early October 1918	November 1918	La Rebois (Reforestation)

Note: Start date reflects American presence. A few of these sites (outside the newly regained territory), particularly Fresnes, had been used by the French Army before the AEF Radio Section arrived.[155]

It may have been at La Souche, in the Louisville farmhouse (see photo), that the station caused something of a problem. George Sterling (see sidebar), a young candidate for master signal electrician, brought some batteries out to the facility. He stopped at a nearby artillery company to get directions and was pointed to a farmhouse and asked to tell the people inside "for Christ sakes stop cooking! Every time the smoke comes out of that chimney, we get a barrage over here."[158] The entire station was taken prisoner one night by an American patrol that had heard them speaking German. The patrol surrounded the station and ordered the men out, threatening to toss in some hand grenades. The operators were released from their brief captivity after proving their identity and explaining their work to the commander of the unit.[159]

Fairbanks believed these sites had a lot of problems that stemmed from joint French-American control. Days before the Second Army came into being, Fairbanks thought it time for the long-standing arrangement of joint French-American staffing and control of listening stations to end. In his view, the American practice of the chief listening station officer visiting the front and becoming familiar with the territory before setting up stations was more productive than the French system of sending a whole detachment, unfamiliar with the territory and without transportation, to visit various positions. The French system, according to Fairbanks, led to the inefficient location of stations on the Woëvre plain.[160]

The French, according to Fairbanks, believed the Americans still lacked the necessary experience to set up and operate stations; Fairbanks, in turn, declared that the French were unprepared and unfit

The Louisville farm, La Souche, 1919. The Radio Section set up a listening station in the ruins of the farmhouse in September 1918. Digitization courtesy of Meuse-Argonne.com. NARA CP, RG 120, Records of the American Expeditionary Forces, RG 120-G. Photographs taken by the "Griffin Group" of areas occupied by American troops during World War I combat operations, 1918-1919; 120-G-1-SM-38-77

to deal with the "changed conditions of present moment warfare." American operators had "superior energy and initiative" that made up for their lack of experience, as well as there being a "nucleus" of noncommissioned officers with months of training "who must shoulder the responsibility sooner or later." Fairbanks also thought it was much more difficult to get technical supplies from the French supply chain. He lamented that the Bois de Creuë group was sent out "without tools, not even plyers to repairs the lines, or insulating tape" and had been given unsatisfactory French wire that had high resistance and inadequate insulation.[161]

Fairbanks's grievances against some of the French personnel went on; he cited a lack of ambition and skepticism of new techniques; they were, on average, older than the Americans and, he claimed, less adaptable. He also complained that some of the French were less faithful to covering positions full time, for in some stations they shut down for meals and even for part of the night. By October, what had seemed charming about working with French collectors in early 1918[162] had faded and their perceived inefficiency become aggravating to some of their American colleagues coping with a war of movement. The French operators, on the whole, spoke better German than their American counterparts, but they were less proficient at copying Continental Morse; the Americans were better at copying through interference.[163]

Most annoyingly, Fairbanks complained, some of the French criticized the Americans for copying

George Edward Sterling

Born in Maine on June 21, 1894, George Edward Sterling was among the earliest amateur radio operators in 1908. When amateur licenses were issued as a result of the Radio Act of 1912, he obtained one of the first, 1AE.

Following his high school graduation, Sterling enlisted in the Maine National Guard and served with Company M of the 2nd Maine Infantry, based at Fort McIntosh in Laredo, Texas. Upon his return from the border, he was employed as a junior radio operator on the steamer *Philadelphia* of the Red D Line, sailing between New York and Latin America. He tried to enlist in the navy when war was declared but had not been released from the Maine National Guard. When he tried to transfer from the national guard to the Signal Corps, his commander would not let him go. In September 1917, when the 2nd Maine became part of the 103rd Infantry of the 26th Division, Sterling was off to war.

In France, he was sent to the French Corps Specialist School, where he learned signal tactics, and then served as an instructor at the Army Signal Corps school in Gondrecourt. As a master signal electrician, Sterling managed to get transferred to the Radio Section in mid-June 1918. He ran a training program for operators at Toul, was involved in a radio deception effort, and helped to interrogate captured German radio operators after the St. Mihiel offensive.

After the war, Sterling continued to work in radio and in 1923 joined the Bureau of Navigation of the Department of Commerce, where he was a marine radio inspector in Baltimore, Maryland, attending Johns Hopkins University at night. He was the radio inspector in charge of Fort McHenry for the Federal Radio Commission from 1927 to 1936. In 1937, Sterling took over the field division of the engineering department of the Federal Communications Commission (FCC).

Later, Sterling became the chief of the FCC's Radio Intelligence Division. On December 30, 1941, soon after Pearl Harbor, he told a meeting of government officials that the FCC monitored messages and needed direction-finding support. Sterling was one of the leading authorities on radio intercept and monitoring at that time. The FCC direction-finding project was designed to suppress Axis clandestine radio stations in Central and South America during the Second World War. Sterling became commissioner of the FCC in January 1948 and retired in 1954.

George Sterling died on November 14, 1990, and is buried at Pond Grove Cemetery on Peaks Island, Maine.

Sources

Ancestry.com. Vital records. Accessed September 21, 2016.

Quarter Century Wireless Association. "November 14, 1990—W3DF." Accessed August 9, 2018. http://www.qcwa.org/w3df-h0002-sk.htm. W3DF is the call sign of George E. Sterling, honorary member #H0002.

Sterling, George. Interview by Louis Benson and Jerry Coates. NSA-OH-1975-01 (December 17, 1975).

everything as tasked and made little effort to monitor the communications of French units. This attitude was affecting the less experienced American operators and causing them to slack off while on duty. Additionally, Fairbanks felt it was a waste of time to have the two listening station chiefs continually discuss matters and then have the same discussion between the two groups of noncommissioned officers.[164]

Careful to praise the French individuals to whom his criticism did not apply, Fairbanks urged that the American sectors should have stations under sole American control. He believed that the core of trained men could get new operators up to speed, and that by "working regular tricks at the front they will learn more in a day than they would in a week at any school."[165]

Benjamin, who was running the listening stations for the First Army, agreed with Fairbanks and thought the proposal would solve all the current difficulties; he urged release of personnel from French control. Colonel Parker Hitt, chief signal officer of the First Army, concurred and recommended that Radio Section operations in the Second Army should be directly under the army chief signal officer and should have "no connection with any Corps particularly the French Corps serving in the Army" and noted that he would have done this himself had the French II Colonial Army Corps stayed in the First Army.[166]

The AEF Second Army came into service on October 10, 1918. General George Gibbs, the assistant chief signal officer of the AEF, passed Fairbanks's recommendations to Colonel Hanson B. Black, the chief signal officer of the Second Army, on October 15 and recommended that he choose an arrangement that worked well for him. Gibbs explained that the French-American arrangement had existed because there was no solely American area of jurisdiction and so that the Americans could learn from the French.[167] The need for a formal policy on listening station manning was overtaken by events in the last few weeks before the Armistice. No change was made on the Woëvre plain, and in the Meuse-Argonne the Americans would be on their own.

Despite these problems, listening stations at Fresnes-en-Woëvre and Saulx-en-Woëvre were able to report that on October 26, German ground telegraph stations had moved back about two kilometers from the front line, perhaps because they expected an attack.[168]

Meuse-Argonne

While the approximate locations of the stations on the new front north and east of St. Mihiel are relatively well known, listening stations in the Meuse-Argonne are poorly documented because they moved frequently as the battle progressed (see table 4). Once the listening stations along the south side of the St. Mihiel salient were closed and moved to the Woëvre plain, newly promoted First Lieutenant Benjamin was sent to Souilly, where Major Loghry was tasked with setting up listening stations on the Meuse-Argonne front. Two detachments of listening station operators worked under Benjamin, one attached to the 35th Division and one to the 79th Division, as of September 26, 1918, at the start of the Meuse-Argonne operation. They brought the "light" listening station equipment that could be carried by hand.[170] Benjamin's sites near Nantillois and Chatel-Chéhéry did not collect any usable intelligence. The Radio Section learned that listening stations were only successful during a war of position and were not useful in a war of movement.

A second 11-day effort between October 9 and 18 involved six men who were taken to Baulney and sent out to establish stations.[171] Sergeant First Class Rene Verhelst; Corporal Matthew H. Scholosser; and Privates First Class Charles J. Brant, Stephen P. Foster, Henry C. Bukowski, and Anthony Leone worked under shell fire and in gas masks to establish five different stations (there is no record of their locations except that they were at infantry outposts). Benjamin had nothing but praise for the men who kept trying to establish these stations, searching for

Table 4. Listening stations in the Meuse-Argonne (not all sites are known)[169]

Location	Start date	End date	Designator, if known
Near Chatel-Chéhéry	October 1918		
Near Nantillois	October 1918		
Fléville (NW of Exermont)	October 1918		
Chaudron	October 1918		

abandoned enemy communication lines and testing every wire, cable, and tramway rail to try to collect transmission. He commended them for their work "in woods and gas and often ahead of the Infantry outposts, with never a grumble as to food, clothing, or rest, but always showing a spirit of initiative and utter disregard of self, but a strong desire to further the common cause." After October 18, the effort to establish listening stations on this front was abandoned.[172]

Intercept Stations

Field intercept stations are most familiar to us today as radio intercept stations. These facilities were designed to collect coded intelligence transmitted by radio stations. Nothing more than prefabricated wooden huts, they could be easily disassembled and moved.[174] They were relocated specifically to support American operations, and often various components would be deployed to new locations (see table 5). Each station had a designator, and when the station moved, the equipment and portable shed, as well as the group of men attached to that station, also moved. As the Radio Section grew, new men were assigned to existing stations, and others were moved to operate new stations. See photo of the intercept station at Souilly.

These stations had varying capabilities as to mode of transmission and wavelength. Damped and undamped waves were the modes. Damped wave was an early method of radio transmission produced by spark gap transmitters that consisted of a series of damped electromagnetic waves. Information was carried on this signal by telegraphy, turning the transmitter on and off to send messages in Morse code. Damped waves were the first practical means of radio communication, used during the wireless telegraphy era, which ended around 1920. Such transmissions have a wide bandwidth and generate electrical noise (electromagnetic interference) that interferes with other radio transmissions. Undamped wave is better known as continuous wave, a more advanced method of radio transmission where a carrier wave is switched on and off. Information is carried in the varying duration of the on-and-off periods of the signal, for example, by Morse code. Both types of transmission were used at the time of World War I.

Stations had shortwave, medium wave, or long wave receivers, or some combination of the three. See table 6, which matches wavelength to frequency range.

The first radio intercept site was established on November 14, 1917, at Souilly by Lieutenant Richard M. Richbourg, who had been commissioned while en route to France but who, because of an administrative mix-up, did not receive word of his rank until March 1918. The station was manned 24 hours a day by eight men and Richbourg. By the end of November, it had copied 393 messages and 1,173 call-ups (a call-up could consist of one station calling for another to respond or two stations making contact without passing message traffic). At first their traffic was forwarded to AEF headquar-

Table 5. Field (radio) intercept station[173]

Designator	Radio wavelength	Start date	End date	Location
Intercept #1	Long wave and shortwave	November 17, 1917	January 19, 1918	Souilly
	Long wave and shortwave	January 19, 1918	June 5, 1918	Froidos
	Long wave and shortwave	June 6, 1918	November 1918	Souilly
	Shortwave	Possibly October 1918	November 1918	Verdun
	Undamped wave	Possibly October 1918	November 1918	Euvezin
Intercept #2	Long wave and shortwave	January 19, 1918	June 5, 1918	Landrecourt
	Long wave and shortwave	June 6, 1918	November 1918	Souilly
	Long wave	November 1918	November 1918	Verdun
Intercept #3	Shortwave	February 1918	March 29, 1918	Ansauville
	Shortwave	March 29, 1918	April 13, 1918	Ménil-la-Tour
	Long wave, short-wave, and intermediate wave	April 13, 1918	November 1918	Toul
	Intermediate wave	November 1918	November 1918	Verdun
	Shortwave	November 1918	November 1918	Euvezin
Intercept #3A	Long wave	March 6, 1918	March 29, 1918	Ansauville
	Long wave	March 29, 1918	April 13, 1918	Ménil-la-Tour
	Long wave	April 13, 1918	End of May 1918	Toul
Intercept #4	Long wave and shortwave	March 1918	November 1918	Toul
	Long wave	November 1918	November 1918	Euvezin
Intercept #5		July 25, 1918	August 6, 1918	Lunéville
		November 1918	November 1918	Verdun
Training station		June 19, 1918		Toul
School station				Gondrecourt

Radio Intercept Station #1, Souilly, France, June 18, 1918. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-32589

Table 6. Wavelength and frequency equivalents

Type of receiver	Wavelength (approximate, in meters)	Frequency range (approximate)
Shortwave	10–100	3–300 kHz
Medium wave	100–1,000	300–3,000 kHz
Long wave	>1,000	>3,000 kHz

ters in Chaumont by regular French military mail, which took two or three days to arrive. As the effort advanced, intercept was forwarded by telegraph. While work at the radio intercept stations was not as "exciting or spectacular" as that of the listening stations, the radio intercept stations provided the bulk of the coded and ciphered traffic essential to the work of the G2A6. A postwar report noted that while the work was "not specially thrilling, from a combat standpoint," the operators suffered many "hardships and privations."[175] By the end of the war about 73,000 radio messages had been intercepted by these stations.[176]

But some of the intercept stations "had their share of thrills." One of the stations, paired with a direction-finding station, was located at Landrecourt, about 10 miles from the front line and about a mile from an ammunition dump. German forces spent 10 weeks trying to destroy the dump. Several shells lobbed at the dump landed close to the station. The six operators manned the station without interruption despite the fact that "no protection was afforded them whatever, the station itself being of but thin boards." When the dump was finally hit, the explosion broke the cloth windows of the station and a large storage battery fell on the head of one unnamed operator. He "showed his fortitude by calmly replacing it and continuing work."[177]

There was a need for these operators to be exceptionally precise, as the intercept was largely coded messages and a mistake in copying just a single letter hindered the codebreaking effort. Feedback from the G2A6 noted that Frank Wade Ballard (see photo), the man in charge of Intercept Station #2 when it was at Landrecourt, had "formed the habit of writing his messages so clearly and filling in all blank spaces, that all our code men are now trying to have his messages given to them for decoding."[178] The message preambles were important, as was alerting the nearby direction-finding team to the need for a bearing. Operators at both radio intercept and listening stations were quick to notice the individual characteristics of those sending messages, including their *fist*—that is, how they uniquely transmitted in Morse. It was here, Krumm felt, that the enthusiastic amateur was greatly beneficial to the Radio Section, for they were able to keep their interest in the signaling process at a high level of intensity.[179]

Frank Wade Ballard, taken December 1919. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-40373

Goniometric Stations

Goniometric stations changed considerably over the course of the war. Initially, there were two sorts of direction-finding stations: radio goniometric stations (often just called goniometric stations), which worked radio traffic sent by ground forces, and airplane compass, or aero (or air) gonio stations,

which took bearings on hostile aircraft. Over the course of the summer of 1918 many radio and aero goniometric stations merged to cover both ground and air targets (using the designators Air-Ground and then ARG—presumed to be Air-Radio Gonio). The merged stations had the same characteristics as their predecessors; while they are delineated in table 7, they are not discussed below. Mobile gonio tractors (which worked ground radio traffic) were developed in the summer of 1918 and deployed in September.[183]

Radio Goniometric Stations

The French had pioneered direction finding on the Western Front, but the Americans learned quickly and built on the knowledge and equipment provided by their partners. Goniometric operators not only could locate a transmitting radio station with a great deal of accuracy "if a considerable number of readings are taken by several stations" but could also determine the enemy's order of battle by practicing what would become known as traffic analysis. Goniometric stations were most often co-located with radio intercept stations. At first the stations were operated jointly by American and French operators, but as the Radio Section gained experience, the French moved out to establish additional stations. The bearings were transmitted by radio, encoded by a system that was used by the French and the British.[184]

Stations were located in portable wooded huts, with a roof-mounted loop antenna that was about 10 square feet (see photo). This antenna could receive wavelengths between 250 and 1,400 meters (1,200 kHz and 214 kHz). The antenna was rotated by a handwheel attached to a shaft inside the hut. When a signal was detected, the antenna was rotated until the signal became inaudible and then rotated in the opposite direction to determine an "average position of minimum audibility," which determined the direction from which the signal emanated.[185]

The US direction-finding effort rapidly outpaced that of the French, and by September 1918, there was some dissatisfaction with the lack of precision of the French maps. This problem was nipped in the bud before it could damage the exchange by developing a way to overlay the more precise US map on to the French map, and both the technique and the more accurate locational information was then shared with the French.[186]

Ballard, a native of New Jersey, was one of the first members of the Radio Section to arrive in France, in late November 1917, and he became an expert at running goniometric stations. He helped establish the first American practice radio intercept station at Souilly, and by January 1918, he was in charge of the radio intercept and goniometric stations at Landrecourt. Ballard also established the intercept station at Toul in March 1918 and was promoted to sergeant that same month. On the same day as his promotion, he established a goniometric station at Ansauville and "showed what could be accomplished by specializing in this work, for from obtaining 35 or 40 bearings per day of 12 hours we rapidly increased this number until we were averaging 150 per day." The Ansauville station was soon moved to Ménil-la-Tour (which was slightly further back from the front line and thought to be safer) and sometimes processed as many as 200 bearings per day. It set a sector record of 670 bearings, recorded by three operators working around-the-clock during an attack in their sector. Ballard then moved on, with master signal electricians Nathanial Foot and Herbert T. Schaefer, to open the aero gonio stations at Royaumeix, Corniéville, and Saizerais.[187]

The May 27, 1918, Ménil-la-Tour one-day record, not "equaled or beaten" during the war, was so remarkable that it was included in the chief signal officer's report at the end of the war.[188]

Aero Goniometric Stations

The aero gonio stations were sometimes also referred to as airplane compass stations and were used to locate hostile aircraft. Stations were co-located with aero intercept stations and were substantially

Table 7. Goniometric (ground) stations, fixed and mobile, air compass (also referred to as air- or aero-gonio), and combined gonio stations (air and ground)

Designator	Type of station	Start date	End date	Location
Gonio #1	Radio (ground)	January 19, 1918	June 5, 1918	Froidos
Gonio #2	Radio (ground)	January 19, 1918	June 5, 1918	Landrecourt
Gonio #3	Radio (ground)	March 14, 1918	March 31, 1918	Ansauville
	Radio (ground)	March 31, 1918	June 5, 1918	Ménil-la-Tour
Gonio #4	Practice and experimental	By May 1918		Toul
Gonio Control		June 14, 1918		Royaumeix
Training Gonio	Training	June 19, 1918		Toul
Gonio #22	Radio (ground)	Unknown		Clermont (French II Army)
Gonio #23	Radio (ground)	Unknown		Sivry (French II Army)
Gonio #25				Unlocated, in First Army area
ARG 25 (formed from Gonio #25)	Combined	Mid-October 1918		Unlocated, in First Army area
Gonio #27 (became ARG, presumed to be Air- or Aero-Radio Gonio, 11)[180]	Radio (ground)	Unknown		Woimbey (French II Army)
ARG 11 (seen also as Gonio #11) (formed from Gonio #27)	Combined	September 1, 1918 (taken over from French)	September 23, 1918	Woimbey (French II Army)
Gonio #29 (became ARG 12)	Radio (ground)	Unknown	August 21, 1918	Boncourt (French II Army)
ARG 12 (seen also as Gonio #12) (formed from Gonio #29)	Combined	August 27, 1918 (taken over from French)	September 22, 1918	Boncourt (French II Army)
Air-Ground #81 (became ARG 13)	Combined	June 8, 1918	September 20, 1918	Corniéville
ARG 13 (formed from #81) (seen also as Gonio #13)	Combined	September 20, 1918	November 1918	Hattonville (coordinates 246.2–352.2)[181]
Air-Ground #82 (became ARG 14)	Combined	June 8, 1918	September 23, 1918	Royaumeix (control station for net)

Note: Start date reflects American presence. Many of these sites had been used by the French Army before the AEF Radio Section arrived.[182] Table continued on next page.

Table 7 (con't.)

Designator	Type of station	Start date	End date	Location
ARG 14 (formed from #82) (seen also as Gonio #14)	Combined	September 23, 1918	November 1918	Euvezin (coordinates 237.0–360.9)
Air-Ground #83 (became ARG 15)	Combined	June 8, 1918	September 1918	Saizerais
ARG 15 (formed from #83) (seen also as Gonio #15)	Combined	September 1918	November 1918	Saizerais (coordinates 376.8–223.1)
Air-Ground #84 (became ARG 16)	Combined	August 1918	September 1918	Bratte
ARG 16 (formed from #84) (seen also as Gonio #16)	Combined	September 1918 (taken over from French)	November 1918	Bratte (coordinates 388.4–224.8)
Air-Ground #85 (became ARG 17)	Airplane compass	July 22, 1918	September 1918	Tomblaine
ARG 17 (formed from #85) (seen also as Gonio #17)	Combined	September 1918	November 1918	Tomblaine/Nancy (coordinates 288.0–211.2)
Air-Ground #86	Airplane compass	July 18, 1918	August 6, 1918	Lunéville
Air-Ground #87	Airplane compass	July 18, 1918	August 6, 1918	Brouville
Gonio Tractor 121	Mobile tractor	Early September 1918	September 13, 1918	Corniéville (co-located with Air-Ground #81)
		Mid-September 1918	October 1918	Hattonville
		October 1918	October 1918	Ville-sur-Tourbe
		November 6, 1918	November 13, 1918	Saint-Morel
Gonio Tractor 122	Mobile tractor	July 25, 1918	September 13, 1918	Royaumeix (co-located with Air-Ground #82)
		Mid-September 1918	Early October 1918	Verdun
		October 1918	October 1918	Avocourt
		November 8, 1918	November 13, 1918	Montfaucon
Gonio Tractor 123	Mobile tractor	Early September 1918	September 13, 1918	Saizerais (co-located with Air-Ground #83)
		Mid-September 1918	Early November 1918	Verdun
		November 9, 1918	November 13, 1918	Saint-Juvin

Radio Section Aero Ground Gonio Station #81, Corniéville, France. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-32594

smaller. The first American-operated stations were established in early June 1918 at Corniéville, Royaumeix, and Saizerais.[189] Royaumeix served as control and was connected by telephone to Toul and to the headquarters of the French VIII Army.[190]

The techniques for airplane compass work were first developed by the French Army's radiogoniometry bureaus.[191] Stations were connected to other stations of the same type and would take bearings at the same time on the same target. When the location of the enemy plane, usually observation aircraft, was determined, the stations reported this information to a chase, or pursuit, squadron by a direct telephone line. US or French aircraft would be launched to "take immediate steps to combat" the aircraft.[192] Some of the operations logs of the 94th Aero

Squadron for May 1918 document the fact that the pursuit groups were indeed being alerted by wireless intercept, probably by stations operated jointly by the French and Americans, but these sparse records do not provide a great deal of detail.[193] The bearings were also sent to Charles Matz's outpost of the G2A6 in Toul, where they were further analyzed.[194]

At first the pursuit squadrons were slow to appreciate the utility of these warnings. On July 5, 1918, Matz documented multiple alerts reported to the 2nd Pursuit Group at 1257 and 1320. Although the station operators followed the aircraft and saw the shells falling, and then heard the aircraft reporting a dozen direct hits on target, no American or French aircraft launched in response to the alert.[195]

Eventually the AEF Air Service came to appreciate the warning provided by these stations. Ballard, in charge of the three air compass stations, explained that "it was somewhat like turning in a fire alarm, for very soon after giving the alert the chase planes would pass over" the station.[196]

With the establishment of the First Army in September 1918 and the move to more mobile operations, the seven aero gonio stations merged with radio gonio operations, and their equipment and personnel assigned to combined air and ground direction-finding efforts at five fixed stations and three mobile stations. Over the course of the war about 177,000 bearings were taken on enemy radio stations.[197]

Goniometric Tractors

The first gonio tractor, devised and assembled by the Signal Corps Research Laboratory in Paris, was co-located with the gonio control station at Royaumeix on July 25, 1918. It was a standard Signal Corps radio tractor fitted with goniometric apparatus. The vehicles also had radio transmitters (undamped wave) so they could radio in their reports. By September, two more tractors were equipped and ready to deploy. A decision was made in late September that no more tractors would be built, but the equipment would be installed on a two-wheel trailer instead[198] (see photo).

The tractors were first co-located with three air-ground gonio stations (Royauxmeix, Sazerais, and Corniéville) with the intent to deploy during the St. Mihiel battle, but only one was needed as the American line advanced. All three tractors were later sent to the Verdun Sector to support the Meuse-Argonne offensive. At one point, all three tractors had problems at the same time—one with a faulty magneto, another with a broken clutch, and the third with a smashed steering gear. However, the operators managed to get all three trucks on the road when the order was given to advance.[199]

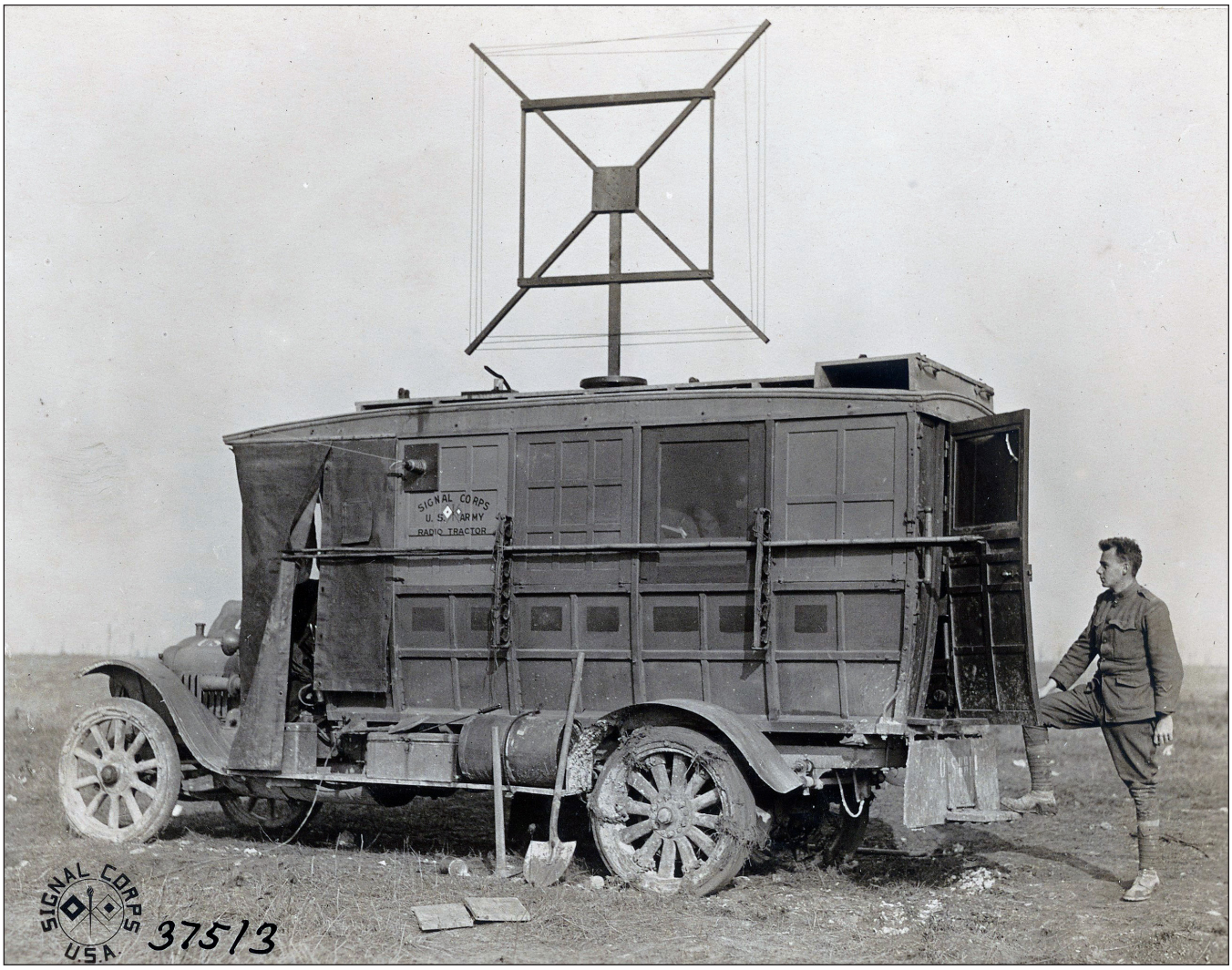
The goniometric tractors were an American innovation and well-adapted to serve the Radio Section at a time when the war was changing from one of fixed front lines to a front line continually in motion. As with the fixed intercept and goniometic stations, their placement was determined in consultation with the G2A6.[200]

Lieutenant Richard Richbourg was key to getting the three tractors set up during the Meuse-Argonne campaign. The stations moved forward as the Americans advanced, with final locations at Montfaucon, Saint-Juvin, and Saint-Morel.[201]

Aero Intercept

In January 1918, Moorman, in consultation with Loghry, had declined to install aero intercept (or air compass) stations on the then quiet Verdun front since the French were furnishing their data to the G2A6. The lack of activity in that sector, at that time, would not give the Radio Section men much practice (see table 8).[203] So it was not until July 1918 that the Radio Section took over two French aero intercept stations and soon added a third. Aero intercept stations collected messages sent by enemy airplanes; they passed alerts to the AEF Air Service in Toul and sometimes were directly connected with French air pursuit squadrons. Photo following table 8 shows the station at Royaumeix.

These stations were larger and more substantial



Radio Section Gonio Tractor (probably 122), October 22, 1918. While the photograph's caption says this was taken "near" Montfaucon, France, the tractor was located in Avocourt on October 22 and did not arrive at Montfaucon until November 8, 1918. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-37513

Table 8. Aero intercept stations

Designator	Start date	End date	Location
Aero Intercept #1	June 14, 1918	September 1918	Royaumeix
Aero Intercept #2	July 22, 1918	September 1918	Tomblaine
Aero Intercept #3	July 25, 1918	August 6, 1918	Lunéville
Aero Intercept #11	November 1918	November 1918	Verdun

Note: Start date reflects American presence. Many of these sites had been used by the French Army before the AEF Radio Section arrived.[202]

Radio Section Aero Intercept Station #1, Royaumeix, France, June 18, 1918. NARA CP, RG 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-032588

facilities than the radio intercept stations. There is no evidence that the facilities themselves moved, although the equipment within moved when a station was discontinued. The first American aero intercept station opened at Royaumeix on June 14, 1918, and was co-located with an air-ground gonio station. The location of this and other such stations was a collaborative decision between the AEF and the radio officer of the French VIII Army. In July 1918, the Radio Section took over two French aero intercept stations: one at Tomblaine and one at Lunéville.

Just two days after the Royaumeix station opened, those operating the station faced what would be the most dramatic incident of their three-month operation. On the morning of June 16, the village of Royaumeix was under steady fire, with 12-inch, high explosive shells falling all around the station. Shell fragments came through the walls of the station and the barracks. Despite the constant threat, Master Signal Electrician (later Second Lieutenant) Ballard, in charge of the new station, stayed at the telephone, where he was calling in the day's report. His commander, Captain George Henyan, reported

that shell fragments went through Ballard's cap, hanging on the wall beside him, and under the telephone in front of him. Ballard remembered that his hat was on his cot, and that it and the blankets were cut up by the shell fragments "as though they were tissue paper." A picture taken on June 18 shows station personnel gathered around (and in) a shell hole near the station.[204]

Alerts from Royaumeix were passed by telephone to the AEF Air Service in Toul. Tomblaine was directly connected with French air pursuit squadrons. The intercept often contained intelligence on areas that were to be shelled and were used to provide warnings to Allied troops. It was also sometimes possible to determine, using the call signs transmitted and the location of the plane, which batteries were about to fire; operators would notify the appropriate counterbattery officer. If the operator could determine the target for attack from the communications, they would notify the troops about to be shelled.[205] This technique worked very well in the quieter Toul Sector; however, in the Verdun Sector, it was impossible to maintain the wire connection between the intercept sites and direction-finding stations due to the continual, intense shell fire. Work of this type was of value on the British front, when there were only small changes in the front line, but it was assessed to be of less value to American forces in sectors that were very quiet or very mobile.[206]

These stations kept track of individual planes; if a plane was known to consistently get results despite interference, it would be marked in red. A plane with an "easily frightened" pilot or excitable observer who failed to call shots was indicated by yellow. There were other colors used, but no records of their meanings survive. The chart showing the planes and their tendencies was hung where the intercept operator could see it, and when a plane became active, he could immediately determine whether it was worthy of attention.[207]

Control Stations

Control stations (see table 9) performed a mission that today we would call communications security (COMSEC) monitoring since they listened to American radio traffic for "insecurity." The first control station was established at Toul on July 11, 1918, after it was found that the radio intercept sites, listening for German traffic, were hearing many American radio messages that were not encoded. This intercept went to the G2A6, which had an officer dedicated to recording and reporting communications security issues (see chapter 8). The first station at Toul copied damped wave messages and was soon joined by another station copying undamped wave messages. The stations reported messages sent in the clear and "on several occasions succeeded in nullifying slips which might otherwise have been disastrous, if continued."[209]

Additional stations were set up in Toul and Souilly as the AEF moved into active operations in September 1918.

Press Intercept

The press intercept station at Chaumont was part of the Radio Section (see table 10); collection was analyzed by the G2A6 (where any coded messages were deciphered) and then shared with the other intelligence departments in the G2. This station monitored high-power radio stations; these stations transmitted not only press but diplomatic traffic, naval traffic, and official government communiqués. The operators performing this work did not face the same challenges as the radio intercept operators closer to the front since they largely monitored stations that used known call signs, frequencies, and scheduled broadcasts; however, it required experienced operators who could provide fast and accurate copy.[211]

The station at Chaumont opened in September 1917 and remained operational until the AEF left in 1919; at its peak it had a staff of 13 people. It was initially set up in Building A but moved to another

Table 9. Control stations[208]

Designator	Radio wave type	Start date	End date	Location
American Control #1	Damped wave	July 11, 1918	Probably October 1918	Toul
American Control #2	Undamped wave	September 1918	November 1918	Souilly
Toul Control #1	Undamped wave	Late July or early August 1918	November 1918	Toul
Toul Control #2		September 1918	November 1918	Toul
		November 1918	November 1918	Euvezin
Souilly Control #1			August 1918	Souilly
First Army HQ Control		September 20, 1918	November 1918	Souilly

Table 10. Press intercept stations[210]

Designator	Start date	End date	Location
HQ press intercept station	July 1917	Early 1919	Chaumont
Press #1	Probably mid-1918	September 17, 1918	Toul
Press #2	September 20, 1918	November 1918	Souilly

site north of the main complex due to interference.[212] But by the end of October 1918, electrical interference from telephone wires began to interfere with the quality of the intercept at the second location. Plans were made to move this station to a building some distance away, but they were canceled after the Armistice.[213] Press intercept stations were also established in Toul in mid-1918 (but discontinued on September 17) and at Souilly on September 20, 1918.[214]

Among the more important messages intercepted by the station at Chaumont were the early August 1918 messages in General Kress von Kressenstein's homemade cipher and the messages from General von Mackensen sent from Bucharest, Romania, in early November. See chapter 11 for details on these incidents.

After the Armistice

After the Armistice, the Radio Section was quickly dismantled; all stations were closed by November 25, 1918. The detachments of men serving the First and Second Armies left the field and came to Toul. Fifty emergency operators were retained to handle the proposed intercept stations for the Third Army. Men not transferred to the Third Army field battalion were assigned to the 12th Service Company. The original plan had been to establish three stations—intercept and press—for the Third Army, under the command of Ernest Thompson; while Thompson and 10 men are known to have gone to Coblenz, Germany, no details are known about their operations. Some of the men were moved to other Signal Corps jobs.[215]

Conclusion

Despite the steep learning curve imposed by the subject matter and the lack of practical experience of the soldiers arriving for duty, the Radio Section managed to establish a surprisingly complex and well-thought-out system of collection in little more than a year of operation. The section was just gearing up when the Armistice took effect; 214 men (43 percent of the men listed as assigned to the unit) had arrived in October and November 1918 and were still in training. About 280 men did the work discussed in this chapter.[216]

Without these men operating the signal collection facilities, the G2A6 would have had no messages to break. First named the Radio Intelligence Section (until that caused confusion with the G2A6's name), Radio Section personnel were closer to the front than most cryptologists. Their headquarters in the Marceaux Barracks in Toul was well placed to support collection efforts for both the Baccarat Sector and the southern St. Mihiel salient. The location of intercept and goniometric (direction-finding) stations was determined collaboratively by the AEF and the French II and VIII Armies. The Americans were at first dependent on the guidance of the French but were keen on the job and rapidly developed skills and techniques.

Moorman, on November 26, 1918, commended the work of the Radio Section, noting "the assistance given by Colonel Krumm and Major Loghry has been so much beyond what could reasonably have been demanded of them that it seems proper they should be specially mentioned." Krumm had "made a careful study of the needs of our section and done everything he could to help us on all occasions." Loghry "worked without regard to hours or personal comfort, and by his energy and enthusiasm has inspired all his men to the greatest effort. He has been able to work with the French without friction, has secured their help and cordial co-operations, and has shown the greatest ingenuity in meeting emergencies and overcoming unforeseen difficulties. During the war he advanced from grade of master signal electrician to that of major, and has conducted himself at all times in a manner which is a credit to himself and to our service."[217]

Krumm later declared that "every move the enemy made after January 1918 was observed and followed by American radio intercept, radio goniometric (compass stations) or ground listening stations" and that radio intelligence was "one of the most trustworthy aids to the operations of the American army. Information was obtained by these means which could not have been secured in any other manner and the stations also continually served to check information received from other sources."[218]

The effort was unprecedented and could not have been accomplished without the work done by the French Army. The procedures and techniques developed by the Radio Section during World War I provided the foundation for signal collection work for the remainder of the twentieth century.

Notes

1. Paul W. Clark and Laurence A. Lyons, *George Owen Squier: U.S. Army Major General, Inventor, Aviation Pioneer, Founder of Muzak* (Jefferson, NC: McFarland, 2014), 54.
2. Rebecca Robbins Raines, *Getting the Message Through: A Branch History of the US Army Signal Corps* (Washington, DC: Government Printing Office, 1996), 105-108, 120, 137-138. Squier was the first head of the school; Wildman would be its commander in the years just prior to US entry into World War I.
3. B. A. Austin, "Wireless in the Boer War," *IEEE Electromagnetic Compatibility Magazine* 6, quarter 1 (2017): 30-35.
4. Not only did both combatants employ radio during this war, but both sides conducted signals intelligence using radio collection. Raines, *Getting the Message Through*, 136. G. H. G. Mockler and H. C. Holman, "The Russo-Japanese War: Joint Report, Part I," 1906, 167, National Archives, Kew (UK), WO 106/6357. Julian S. Corbett, *Maritime Operations in the Russo-Japanese War, 1904-1905* (Annapolis, MD: The Naval Institute Press, 1994) discusses the use of wireless communication and also, in vol. 1, 339, the interception of the same. Daniel R. Headrick, *The Invisible Weapon: Telecommunications and International Politics 1851-1945* (Oxford: Oxford University Press, 1991), 123, notes the use of Telefunken equipment by the Russians and Marconi radios by the Japanese.
5. Monthly Report of the Chief Signal Officer (CSO) of the American Expeditionary Forces (AEF), April 1918, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 120, Records of the American Expeditionary Forces, Entry 2042, Box 32. Robert Loghry memorandum, May 21, 1918, NARA CP, RG 120, Entry 105, Box 5767.
6. Louis R. Krumm, *History of the Activities of the Radio Division*, 1-2, NARA CP, RG 120, Entry 2040, Box 131. Copies of the blank forms can be found in NARA CP, RG 120, Entry 20240, Box 140.
7. Krumm, *History of the Activities of the Radio Division,* 1. Vital records on Ancestry.com accessed April 10, 2018; *New York in the Spanish-American War 1898: Part of the Report of the Adjutant General of the State for 1900*, vol. 3 (Albany, NY: James B. Lyon, State Printer, 1900), 499-500, accessed April 10, 2018, https://archive.org/details/newyorkinspanish01newya; "Loghry Will Finish Time in Fairbanks," Fairbanks *Daily Times*, June 11, 1915, accessed April 10, 2018, via newspapers.com.
8. Krumm, *History of the Activities of the Radio Division,* 1. October Report of AEF CSO to Army CSO, November 11, 1917, NARA CP, RG 120, Entry 2042, Box 31.
9. R. E. Priestly, *The Signal Service in the European War of 1914 to 1918 (France)* (Chatham, UK: W&J Mackay & Co. Ltd., 1921), 165. Published for the Institution of Royal Engineers and by the Signal Association.
10. *Annual Report of the Chief Signal Officer to the Secretary of War 1919* (Washington, DC: Government Printing Office, 1919), 305.
11. Note that there were also radio stations used for training radio intelligence students at the AEF schools at Langres and Gondrecourt. On at least one occasion, the station at Gondrecourt intercepted what it believed to be German traffic, but that turned out to be practice messages sent by the station at Langres. Neither station was intended to be part of the official system of radio intercept, and they did not receive station numbers. *Annual Report of the Chief Signal Officer*, 304. November Report of AEF CSO to Army CSO, n.d., NARA CP, RG 120, Entry 2042, Box 31.
12. Radio Intelligence Division, Report for November 1917, NARA CP, RG 120, Entry 2042, Box 31.
13. Krumm, *History of the Activities of the Radio Division*, 3. Dennis Nolan to AEF Chief of Staff regarding orders for Moorman to meet with AEF Signal Corps officers "in reference to apparatus to be used in Radio Intelligence work," NARA CP, RG 120, Entry 105, Box 5767.
14. Frank Moorman to A. L. Conger, February 16, 1918, NARA CP, RG 120, Entry 105, Box 5767.
15. Francis W. Halsey, *The Literary Digest History*

of the World War: Compiled from Original and Contemporary Sources (New York: Cosimo, Inc., January 1, 2009), 1: 275, accessed September 9, 2018, https://www.google.com/books/edition/The_Literary_Digest_History_of_the_World/zYAVfkBcP-AC?hl=en&gbpv=1.

16. Krumm, *History of the Activities of the Radio Division*, 46.
17. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, June 1918. NARA CP, RG 120, Entry 2042, Box 33.
18. Logbook, NARA CP, RG 120, Entry 2942, Box 1.
19. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, February 1918, NARA CP, RG 120, Entry 2042, Box 32.
20. See discussion in chapter 8 and later in this chapter. Also Moorman to Arthur Conger, May 18, 1918, NARA CP, RG 120, Entry 105, Box 5769; Ernest H. Hinrichs, *Listening In: Intercepting German Trench Communications in World War I,* ed. Ernest H. Hinrichs, Jr. (Shippensburg, PA: White Mane Publishing, 1996), 36.
21. Krumm, *History of the Activities of the Radio Division*, 46.
22. Loghry, memo to AEF Signal Corps, March 31, 1918, NARA CP, RG 120, Entry 2040, Box 181. Peter Lambert Schauble, *The First Battalion: The Story of the 406th Telegraph Battalion Signal Corps, U.S. Army* (Philadelphia: The Bell Telephone Company of Pennsylvania, 1921), 129, 133.
23. *Chronology of the Signal Corps*, NARA CP, RG 120, Entry 2040, Box 131.
24. It is the author's belief that this lieutenant colonel was Louis Krumm, head of the Radio Division. Hinrichs, *Listening In*, 36.
25. Hinrichs, *Listening In,* 36.
26. Hinrichs, *Listening In*, 41. Analysis of traffic in NARA CP, RG 120, Entry 105, multiple boxes.
27. Horace E. Hull, Narrative 59, n.d., NARA CP, RG 120, Entry 2040, Box 130.
28. "U.S., World War I Draft Registration Cards, 1917-1918," [database] accessed November 16, 2016, www.ancestry.com. "U.S., World War II Draft Cards Young Men, 1940-1947" [database] accessed November 16, 2016, www.ancestry.com.
29. Hinrichs, *Listening In,* 49-52.
30. Krumm, *History of the Activities of the Radio Division*, 46-47.
31. Krumm and Captain Willis H. Taylor, "Wireless in the AEF," *The Wireless Age* 7, no. 1 (October 1919): 21.
32. Lieutenant Colonel Moorman, lecture delivered to the officers of the Military Intelligence Division February 13, 1920, copy courtesy of US Army Intelligence and Security Command (INSCOM) History Office.
33. Krumm and Taylor, "Wireless in the AEF," *The Wireless Age* 6, no. 12 (September 1919): 15.
34. Krumm and Taylor (September 1919): 15.
35. The author has yet to find the names of the eight men working with Claypool. Radio Division monthly report, November 1917, NARA CP, RG 120, Entry 2042, Box 31.
36. Men frequently were brought in and found unsuitable for the work; they would be moved to other Signal Corps assignments. The count is likely incomplete and does not include men from other units who assisted the Radio Section. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, July 1918, NARA CP, RG 120, Entry 2042, Box 33; Weekly Report of the Radio Division, September 27, 1918, NARA CP, RG 120, Entry 2040, Box 164; *Annual Report of the Chief Signal Officer,* 316, puts the official number at the close of hostilities as 402 men and 12 officers.
37. Krumm to Executive Officer, AEF Signal Corps, memorandum, September 2, 1918, NARA CP, RG 120, Entry 2040, Box 47.
38. Krumm to Executive Officer, September 2, 1918.
39. See the discussion of G2A6 staffing in chapter 8. Moorman to Loghry, December 17, 1917, NARA CP, RG 120, Entry 105, Box 5768.
40. Moorman (for Nolan's signature) to Edgar Russel, January 10, 1918, NARA CP, RG 120, Entry 105, Box 5767.
41. Russel to Nolan, January 14, 1918, NARA CP, RG 120, Entry 105, Box 6688.
42. Moorman to Russel, January 17, 1918, NARA CP, RG 120, Entry 105, Box 5767.
43. Schedule for the radio intelligence operator

training at Langres, n.d., NARA CP, RG 120, Entry 105, Box 6688.
44. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, June 1918.
45. Krumm, *History of the Activities of the Radio Division,* 21.
46. A wide variety of blank forms and logs can be found in NARA CP, RG 120, Entry 105, Box 5761.
47. Moorman Lecture, February 13, 1920.
48. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, April 1918.
49. Moorman to Russel, January 28, 1918, NARA CP, RG 120, Entry 105, Box 5767.
50. A sample of feedback comments, March 9, 1918 ("report is more intelligible than any yet received," but Operator at goniometric station No 2 "evidently does not clearly understand the instrument") and February 27, 1918 ("use more care in formation of his letters"), NARA CP, RG 120, Entry 105, Box 5767.
51. Op signs were first used by commercial telegraph operators. Loghry report of May 6, 1918, containing feedback from the G2A6 dated April 26, 1918; *Radio Intelligence Circular No. 1,* March 9, 1918. Both in NARA CP, RG 120, Entry 105, Box 5767.
52. Loghry, *Radio Intelligence Circular No. 2*, March 16, 1918, NARA CP, RG 120, Entry 105, Box 5767.
53. Edward O. Hulburt (1890-1982), a member of the AEF Signal Corps Division of Research and Inspection in Paris, did a great deal of work with the equipment for listening stations. He earned a PhD from Johns Hopkins University and had a long career with the Naval Research Laboratory after the war. He was senior scientist on the US National Committee for the International Geophysical Year (1956-1958). In 1965, the Naval Research Laboratory named its new space center after him.
54. Correspondence of February 23-27, 1918, NARA CP, RG 120, Entry 105, Box 5767.
55. Nolan to Russel, May 14, 1918, NARA CP, RG 120, Entry 105, Box 5767.
56. The plan had been for 10 corps, but the tenth was not formed. There were 43 divisions, but not all were deployed to areas of combat operations. Center of Military History, *Order of Battle of the United States Land Forces in the World War* (Washington, DC: US Army, 1931-1949).
57. Moorman to Conger, May 20, 1918, NARA CP, RG 120, Entry 105, Box 5761.
58. Moorman to Loghry, June 25, 1918, NARA CP, RG 120, Entry 105, Box 5767.
59. Moorman to Willey Howell, June 25, 1918, NARA CP, RG 120, Entry 105, Box 5767.
60. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, containing Report of the Chief Signal Officer of the First Army, October 1918, NARA CP, RG 120, Entry 2042, Box 35.
61. Radio Section Report for August, August 29, 1918, NARA CP, RG 120, Entry 2040, Box 164.
62. *History of the Activities of the Radio Division*, 9; *Annual Report of the Chief Signal Officer*, 308.
63. Radio Section Report for the Chief Signal Officer of the First Army, September 29, 1918, NARA CP, RG 120, Entry 2040, Box 164.
64. Loghry to Parker Hitt, September 18, 1918, NARA CP, RG 120, Entry 2040, Box 164.
65. John B. Foulke, Narrative 69, November 27, 1918, NARA CP, RG 120, Entry 2040, Box 130.
66. Hinrichs, *Listening In,* 55.
67. Frank B. Fairbanks to Radio Officer, First Army (Loghry) through George A. Benjamin, and subsequent indorsements, October 6, 1918, NARA CP, RG 120, Entry 2040, Box 164.
68. Krumm and Taylor (September 1919): 15.
69. Nolan to Russel, November 25, 1918, NARA CP, RG 120, Entry 105, Box 5761.
70. Examination of Radio Station records in RG 120 shows no evidence of Radio Section assets going to the areas occupied by the 2nd or 26th Division.
71. *The United States Army in The World War 1917-1919*, vol. 16 (Washington, DC: Center for Military History, 1948), 214.
72. Schauble, *The First Battalion,* 127-128.
73. Not to mention the fact that there were not enough operators or radio sets to set up a station at every division. Moorman to G2, June 17 and

July 2, 1918, NARA CP, RG 120, Entry 105, Box 5768.

74. Moorman to Nolan, June 17, 1918, NARA CP, RG 120, Entry 105, Box 5768.
75. Ronald W. Vandiver, *The Waving of Flags and Torches: A Study of Tactical Communications in the Signal Corps During World War I* (Fort Leavenworth, KS: US Army, 1987), accessed May 18, 2018, https://cgsc.contentdm.oclc.org/digital/collection/p4013coll2/id/1548/rec/1.
76. The author has only identified a few instances in the files of the G2A6 within NARA CP, RG 120, Entry 105.
77. Listening for the radio signals of others was commonly done by early radio operators in the United States and elsewhere, whether by direction or on their own initiative, and predates formal signals intelligence systems. See David A. Hatch, *The Dawn of American Cryptology, 1900-1917* (Fort George G. Meade, MD: Center for Cryptologic History, 2019), 8, who notes army signalers were directed to compile logs of broadcasting stations. CSO to AG, "Radio Stations on Mexican Border," March 23, 1916, NARA CP, RG 111, Records of the Chief Signal Officer, Entry 45, Box 1759. German signalers in early August 1914 listened to Russian radio traffic on their own initiative as well. See Andrew H. Smoot, "A Battle Lost: Re-examining the Role of German Radio Intelligence in the Battle of Gumbinnen," *Intelligence and National Security* 32, no. 3 (April 2017): 286-299. Smoot cites Reichsarchiv, *Der Weltkriege Operationen zu Lande: Die Befreiung Ostpreussens* (Berlin: E. S. Mittler & Sohn, 1925), 59; Oberstlt Eltester, "Nachtrichtentruppen in der Schlacht bei Tannenberg: Funkstationen," *Deutsche Nachtrichtentruppen* 14, no. 6 (1938): 103; and Kunibert Randewig, "German Radio Intelligence in the Battle of Tannenberg," *Wissen und Wehr* 13, no. 3 (1932): 2-3. Unknown translator, item 375 in the William F. Friedman Collection at the George C. Marshall Foundation Research Library and Archive.
78. PYRAMID was a poorly chosen codeword for the Pyramid Farm west of Lucy-le-Bocage. *The United States Army in The World War 1917-1919*, vol. 4, 451-452.
79. *The United States Army in The World War 1917-1919,* vol. 12, 22-23.
80. *History of the MID*, July 21, 1919, NARA CP, RG 319, Records of the Army Staff, Entry EUD1071, Box 21, 6-7, provides a very dramatic if unattributed and unverifiable account. "Into the front held by one of our divisions in Lorraine in June 1918 a 'traveling circus' or shock battalion of the enemy was thrown, in an effort to terrorize our 'amateur soldiers' and bag prisoners in large numbers. Its operations were assisted by gas projector attacks, liquid fire, and other forms of terrorizing warfare dear to Boche [a derogatory term for German] frightfulness. Late one evening, intelligence men on duty in a front line post picked up some suspicious phrases by means of a 'listening in' set. On analysis, and in the light of other information gained by patrols and observers, the Regimental Intelligence Officer decided that it meant an attack at midnight and warned not only the commanders of the units in the line of his own regiment, but through Brigade and Division Headquarters the units in line to right and left. Warning orders were immediately issued and as midnight approached every man in the first line on the entire divisional front was on the alert, ready for any eventuality. Promptly at twelve midnight a terrific explosion was heard, and the brilliant flash that illumined the enemy front warned that scores of huge shells filled with gas were speeding toward the subsector picked for the raid. Instantly every man within range slapped on his gas mask and prepared for the attack, while outposts, discerning the enemy advancing, gave the alarm. Machine gunners, riflemen, and automatic riflemen, many with their weapons already laid in anticipation, immediately opened fire with terrible effect. The front ranks of the raiding party were literally cut in two; the others broke and fled. Casualties among our men from gas, though scores of big shells exploded within a small area and in the midst of hundreds of men, were comparatively few. A great many lives had been saved and a raid

stopped with heavy losses to the enemy chiefly as the result of one officer's knowing his business."

81. W. E. Selbie, G2 6th Division, to the G2, August 13, 1918, NARA CP, RG 120, Entry 105, Box 5761.
82. Moorman to Selbie, August 19, 1918, NARA CP, RG 120, Entry 105, Box 5761.
83. Multiple messages involving Moorman, Selbie, and others, September 10-16, 1918, NARA CP, RG 120, Entry 105, Box 5761.
84. "The Radio Section, Radio Division" within *History of the Radio Division, Signal Corps, American Expeditionary Forces,* n.d., 316, NARA CP, RG 120, Entry 2041, Box 43.
85. Moorman, "Code and Cipher in France," *Infantry Journal* XVI, no. 12 (June 1920): 1043-1044.
86. H. Barrès, "Le Lieutenant Delavie et ses postes d'écoute, 1915-1916" (unpublished manuscript, n.d.), accessed May 13, 2018, http://faure.roger.free.fr/documents/delavie_par_barres.pdf.
87. Priestly, *The Signal Service in the European War of 1914 to 1918,* 100-101.
88. Krumm and Taylor (September 1919), 13
89. Krumm and Taylor (September 1919), 13.
90. Moorman, "Code and Cipher in France."
91. Krumm and Taylor (September 1919): 14.
92. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, July 1918.
93. American Expeditionary Forces Signal Corps History, NARA CP, RG 120, Entry 2041, Box 42A.
94. Evidence is scant, but I believe there is a possibility that the sites in the Baccarat Sector (where the facilities were well protected by a hillside and long occupied by the French) may have had a typewriter available. Flimsy stations on flatter ground (such as on the south side of the St. Mihiel salient) would probably not have had typewriters as the sound might have carried.
95. General Orders for Listening Posts, February 22, 1918, within item 342 of the William F. Friedman Papers at the George C. Marshall Research Library and Archives. This document suggests that material be telegraphed daily via military channels.
96. Charles Matz to noncommissioned officers in charge of listening stations, September 8, 1918, NARA CP, RG 120, Entry 105, Box 5767. A detailed set of instructions for listening stations was initially issued on February 22, 1918; this document can be found within item 342 of the William F. Friedman Papers at the George C. Marshall Research Library and Archives.
97. Nolan citing paragraph 98(e) of the Intelligence regulations for the proper procedure for listening station reports, July 25, 1918, NARA CP, RG 120, Entry 105, Box 5767.
98. This author has yet to locate any such logbooks in the voluminous AEF records and suspects that they may have been destroyed.
99. Matz to noncommissioned officers.
100. Matz to noncommissioned officers.
101. A trench map of the area shows an "Éléphant" near Fey-en-Haye, NARA CP, RG 120, Entry 404.
102. Locations, dates, and designators reconstructed from NARA CP, RG 120 records and other sources.
103. Schauble, *The First Battalion*, 127-137; Monthly Reports of the Chief Signal Officer of the American Expeditionary Forces, NARA CP, RG 120, Entry 2042, Boxes 31-40; Frank B. Fairbanks, Narrative 123, December 2, 1918, NARA CP, RG 120, Entry 2040, Box 131.
104. Fairbanks, Narrative.
105. Schauble, *The First Battalion*, 127-128, 137; Monthly Reports of the Chief Signal Officer of the American Expeditionary Forces; Fairbanks, Narrative.
106. Loghry, memo to AEF Signal Corps, March 31, 1918.
107. Schauble, *The First Battalion*, 131.
108. Bernard H. Rafferty, Narrative 134, November 24, 1918, NARA CP, RG 120, Entry 2040, Box 130.
109. Rafferty, Narrative.
110. Rafferty, Narrative.
111. There is no date for this story, and the source of the quote contained within the cited report has not been located by this author. But the date was probably late January or early February, near to the time the site began operations. *Annual Report of the Chief Signal Officer*, 318.

112. *Annual Report of the Chief Signal Officer*, 319.
113. Hulburt also visited listening stations in the Baccarat Sector and later spent time at Le Renard and La Cigogne. In July, he visited the French inventor of the listening station, Lieutenant Delavie, at his laboratory at Flavigny at French VIII Army headquarters. Hulburt, Narrative 197, November 22, 1918, NARA CP, RG 120, Entry 2040, Box 130.
114. Fairbanks, Narrative; Hulburt, Narrative.
115. Moorman, "Code and Cipher in France."
116. Fairbanks, Narrative.
117. Fairbanks, Narrative.
118. Herbert R. Smith, Narrative 107, n.d., NARA CP, RG 120, Entry 2040, Box 130; Schauble, *The First Battalion*, 129-130.
119. *Annual Report of the Chief Signal Officer*, 317.
120. Schauble, *The First Battalion*, 133-134.
121. Schauble, *The First Battalion*, 129-131.
122. Schauble, *The First Battalion*, 129; Smith, Narrative.
123. These seem to be the only reported casualties suffered by cryptologists during the war. Report of Radio Section, March 31, 1918, NARA CP, RG 120, Entry 2040, Box 181.
124. Schauble, *The First Battalion*, 131-133.
125. McQuown, a 30-year old telegraph operator for a railroad in Minnesota, later worked as a Prohibition agent and then as a special investigator for the US Treasury Department.
126. *Annual Report of the Chief Signal Officer*, 320.
127. First Army G2 Willey Howell issued two Special Orders on September 9, 1918, to the listening stations named Obligado, Baudelaire, and Lamartine in the Forest of Apremont. The stations were to withdraw six hours after receipt of the telephonic order "Envoyez pieces matricules" (roughly, "send registered items"), which presumably was going to be sent at or near the time of the first barrage of the offensive. The men and their equipment, but not their wires, were to be taken to Lérouville. It seems unlikely these orders would be issued by the First Army if there were no American personnel in these stations. NARA CP, RG 120, Entry 765, Box 19.
128. Fairbanks, Narrative.
129. Hinrichs, *Listening In*, 55, notes that there were only three of them on duty at Le Renard in late August.
130. George H. English, *History of the 89th Division, U.S.A.* (Denver: The War Society of the 89th Division, 1920), 71, accessed August 19, 2018, https://ia800500.us.archive.org/9/items/historyof89thdiv00engl/historyof89thdiv00engl.pdf.
131. Trench Maps, NARA CP, RG 120, Entry 404.
132. It is possible that there were American operators in L'Épervier, Le Canard, and Le Chat, training with the French, as early as April 1918. "History of the Radio Section, Radio Division, Signal Corps, American Expeditionary Forces," NARA CP, RG 120, Entry 2041, Box 43, 322 references Americans going to three listening stations, established by the French in 1915, in the vicinity of Pont-à-Mousson and near the Bois-le-Prêtre.
133. George A. Benjamin, Narrative 869, n.d., NARA CP, RG 120, Entry 2040, Box 132.
134. Hinrichs, *Listening In*, 65.
135. Hinrichs, *Listening In*, 65-67.
136. Hinrichs, *Listening In*, 67-69. Hinrichs's timeline is a bit confusing as he implies the team was reunited in Toul the day after the attack (September 13, 1918) but then notes they went to services at the cathedral that morning as it was Sunday, which would have been September 15, 1918.
137. Loghry to Moorman, September 12, 1918, NARA CP, RG 120, Entry 105, Box 5657.
138. Analysis of traffic in NARA CP, RG 120, Entry 105, multiple boxes.
139. Dragoon is probably correct as a dragoon is a mounted soldier and thus represents a role as do Hussar and Hunter. The French often named battlefield features (trenches, listening stations) using sets of related nouns.
140. Locations, dates, and designators reconstructed from RG 120 records and other sources.
141. Hinrichs, *Listening In*, 10. This author has not accessed documents regarding the many French Army postes d'écoutes listed in *Inventaire Sommaire des Archives de la Guerre 1914-1918* by Jean Nicote, Conservateur au Service Historique de l'Armee (22 N 558-559), but this

material would surely shed light on the location of the French listening stations and therefore the sites used by the AEF Radio Section in the Baccarat and Toul Sectors. Finding aid at https://francearchives.fr/fr/file/eeded1c3bfcd1f1b7b7695a03856f6d32a45430a/FRSHD_PUB_00000008_0004.pdf.

142. Hinrichs, *Listening In*.
143. H. Barrès, *Le Lieutenant Delavie et ses postes d' écoute 1915-1918*, accessed October 28, 2018, http://faure.roger.free.fr/documents/Chronique_107_La_guerre_du_telephone.mp4, for a short clip (in French) about Delavie and the first French listening station in the Bois Brûlé.
144. Hinrichs, *Listening In*, 13.
145. Hinrichs, *Listening In*, 37.
146. Friedman was delighted in November 1918 when a bath facility opened at headquarters, enabling him to bathe two or more times a week. Friedman to Elizebeth S. Friedman, August 10, 1918, ESF Box 2 File 15, and November 22, 1918, ESF Box 2 File 18, both in Elizebeth S. Friedman (ESF) Collection at the George C. Marshall Research Library and Archive, Lexington, Virginia.
147. "History of the Radio Section, Radio Division," 322; *Annual Report of the Chief Signal Officer*, 319.
148. Vital records of William G. Greubel accessed May 13, 2016 via Ancestry.com.
149. Ernest A. Thompson to Loghry, memo, June 17, 1918, NARA Lee's Summit Federal Record Center, RG 120, Entry 2942, Box 1. Moorman to Loghry, memo, June 24, 1918, NARA CP, RG 120, Entry 105, Box 5767. William G. Greubel, New York, "Abstracts of World War I Military Service, 1917-1919," accessed May 13, 2016, Ancestry.com; this record shows Greubel served overseas with the Signal Corps through August 3, 1919 and he was honorably discharged.
150. Hinrichs, *Listening In*, 24-32.
151. See Hinrichs, *Listening In*, 25, 32 for the incident and Hinrichs's later thoughts on the matter.
152. Moorman to AEF CSO, memo re: Private 1st Class G. L. Potgeter, July 6, 1918; Moorman to AEF CSO, memo re: Corporal H. E. Kahle. Both in NARA CP, RG 120, Entry 105, Box 5767.
153. Hinrichs, *Listening In*, 40-41.
154. Hinrichs, *Listening In*, 13; Barrès, *Le Lieutenant Delavie et ses postes d'écoute 1915-1918*.
155. Locations, dates, and designators reconstructed from RG 120 records and other sources.
156. Fairbanks, Narrative.
157. The only date given for the incident at Fresnes is "about October 20." "History of the Radio Section, Radio Division," 324.
158. George Sterling, interview by Louis Benson and Jerry Coates, NSA-OH-1975-01 (December 17, 1975). Sterling believes this took place the day after the St. Mihiel offensive, but it is more likely to have been a week later, in "The Collected Works of George E. Sterling," accessed September 24, 2021, http://users.isp.com/danflan/sterling/df_hist2.pdf.
159. This probably took place in October 1918. "History of the Radio Section," 325.
160. Fairbanks to Loghry, October 6, 1918.
161. Fairbanks to Loghry, October 6, 1918.
162. Hulburt had noted the officers were "very gentlemanly and congenial" and Hinrichs missed their cooking skills when the French departed Le Renard. Hulburt, Narrative; Hinrichs, *Listening In*, 55.
163. Fairbanks to Loghry, October 6, 1918.
164. Fairbanks to Loghry, October 6, 1918.
165. Fairbanks to Loghry, October 6, 1918.
166. Fairbanks to Loghry, October 6, 1918; Benjamin indorsement, October 7, 1918, and Hitt indorsement, October 10, 1918, NARA CP, RG 120, Entry 2040, Box 164.
167. Fairbanks to Loghry, October 6, 1918; George Gibbs endorsement, October 15, 1918, NARA CP, RG 120, Entry 2040, Box 164.
168. Enemy Radio Service Report from G2A6 of First Army, October 28-29, 1918, NARA CP, RG 120, Entry 105, Box 5755.
169. Locations, dates, and designators reconstructed from RG 120 records and other sources.
170. Report from Radio Section First Army to Chief Signal Officer First Army, September 29, 1918, NARA CP, RG 120, Entry 2040, Box 164.
171. These men were possibly attached to the 1st Division, which had taken over in this area from

the 35th Division at the beginning of October 1918.
172. Benjamin, Narrative; "History of the Radio Section," 325.
173. Locations, dates, and designators reconstructed from RG 120 records and other sources.
174. Sterling, interview.
175. Krumm and Taylor (January 1920): 14.
176. Loghry, "Military Radio," *Radio* 4, no. 8 (August 1922): 10-12. A detailed set of instructions for listening stations was initially issued on February 22, 1918; this document can be found within item 342 of the William F. Friedman Papers at the George C. Marshall Research Library and Archives.
177. Krumm and Taylor (January 1920): 14.
178. Moorman to Loghry, March 8, 1918, NARA CP, RG 120, Entry 105, Box 5767.
179. Krumm and Taylor (September 1919): 15.
180. Air-ground and aero-ground are often used interchangeably in Radio Section documentation.
181. These coordinates correspond to the series of maps printed by the 29th Engineer Regiment, a topographic unit that adopted and updated the French plans directeurs trench maps. This is the same coordinate system used on the maps found in the book series *Summary of Operations in the World War* published by the American Battlefield Monuments Commission in 1944. Digital copies of the maps and books can be found here: https://maps.lib.utexas.edu/maps/historical/ww1/index.html (accessed September 10, 2021).
182. Locations, dates, and designators reconstructed from RG 120 records and other sources.
183. The numbering leads one to believe that some of these are missing in the records.
184. No further information has been found on this code, but it could be a French service code. A detailed set of instructions for listening stations was initially issued on February 22, 1918; this document can be found within item 342 of the William F. Friedman Papers at the George C. Marshall Research Library and Archives. Krumm, *History of the Activities of the Radio Division*, 30.
185. Krumm and Taylor (January 1920), 18.
186. Multiple letters to and from Moorman, September 18–October 5, 1918, NARA CP, RG 120, Entry 105, Box 5767.
187. George Henyan, Narrative 125; Frank Ballard, Narrative 15, November 26, 1918. Both in NARA CP, RG 120, Entry 2040, Box 130.
188. *Annual Report of the Chief Signal Officer*, 324.
189. Loghry to Russel, June 3, 1918, NARA CP, RG 120, Entry 2040, Box 189.
190. Monthly Report of the AEF CSO, September 1918, NARA CP, RG 120 Entry 2042, Box 34. Loghry to Moorman, June 9, 1918, NARA CP, RG 120, Entry 105, Box 5767.
191. Memo from the Second and Third Bureaus Radiogoniometry of the French Army, September 30, 1917, NARA CP, RG 120, Entry 105, Box 5761.
192. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, May 1918, NARA CP, RG 120, Entry 2042, Box 33.
193. Records of the 1st-3rd Pursuit Squadrons, NARA CP, RG 120, Entry 808, particularly box 3295 ; Records of the 4th and 5th Pursuit Groups are in NARA CP, RG 120, Entry 906.
194. Moorman to Loghry, August 1, 1918, NARA CP, RG 120, Entry 105, Box 5768.
195. Matz to unknown parties, memorandum, July 5, 1918, NARA CP, RG 120, Entry 105, Box 5755.
196. Ballard, Narrative.
197. Loghry, "Military Radio," 12.
198. Monthly Report of the Chief Signal Officer of the American Expeditionary Forces, September 1918, NARA CP, RG 120, Entry 2042, Box 34.
199. *Annual Report of the Chief Signal Officer*, 323.
200. *Annual Report of the Chief Signal Officer*, 322; Loghry to Moorman, September 12, 1918.
201. Richard M. Richbourg, Narrative 13, November 27, 1918, NARA CP, RG 120, Entry 2040, Box 130.
202. Locations, dates, and designators reconstructed from RG 120 records and other sources.
203. Moorman to Conger, January 16, 1918, NARA CP, RG 120, Entry 105, Box 5768.
204. Henyan, Narrative; Ballard, Narrative.
205. Moorman, "Code and Cipher in France."

206. Moorman, "Code and Cipher in France."
207. Moorman, "Code and Cipher in France."
208. Locations, dates, and designators reconstructed from RG 120 records and other sources.
209. R. B. Moran, "Powers and Limitations of Radio communication within a Modern Field Army," *Signal Corps Bulletin* No. 92 (Sept.-Oct. 1936): 121.
210. Locations, dates, and designators reconstructed from RG 120 records and other sources.
211. "History of the Radio Section," 337; *Annual Report of the Chief Signal Officer*, 326.
212. Loghry, memo to AEF Signal Corps, March 31, 1918.
213. Krumm, *History of the Activities of the Radio Division*, 55.
214. Loghry to Hitt, memo, September 29, 1918, RG 120, Entry 2040, Box 164.
215. Krumm, *History of the Activities of the Radio Division*, 58; "History of the Radio Section," 342.
216. Sometimes supplemented with men from regular Signal Corps units; a precise count has been difficult.
217. Moorman to G2, memorandum, November 26, 1918, NARA CP, RG 120, Entry 105, Box 5671.
218. Krumm and Taylor (January 1920): 12.

Conclusion to Part Three

The matrix-managed system of the American Expeditionary Force's (AEF's) Radio Intelligence Section (G2A6), Radio Section, and Code Compilation Section worked well. Whether this was due to good design and good communication between the parties or just fortuitous can be debated. It is more likely that the joint success of the G2A6, the Radio Section, and the Code Compilation Section can be attributed to a combination of the obscure nature of the work and the personal connections between the men running the three organizations. Frank Moorman, while technically an officer of the Coast Artillery branch of the army, was a graduate of the Army Signal School and had deep connections with the two other army cryptologic talents of that era, Parker Hitt and Joseph Mauborgne. Robert Loghry, a Signal Corps veteran, almost certainly was known to both Moorman and Hitt from their shared time at Fort Leavenworth; it is hard to believe that the men had never interacted or discussed Loghry's Alaskan adventures.[1] Major Howard Barnes was an outsider to this army world but appears to have fit in and sought out the advice and guidance of Moorman and Hitt. Though not an official part of any of the three cryptologic organizations, Hitt, the most famous cryptologist of that era, was always willing to contribute where he could.[2]

Perhaps the cryptologic functions of the AEF succeeded because their leaders recognized that they were starting from scratch, from the ground up, and they did not resent taking British and French advice. It is likely that few in the AEF hierarchy understood the role of cryptology; there was no sense of ownership by any of the branches of the military (except, of course, the Signal Corps), and they were given freedom to do what was best.

Radio intelligence faced challenges and obstacles in providing direct combat support, and it was often difficult to ensure the intelligence made it to those who needed it in a timely manner. Certainly, the level of support to operations was not that of the extensive communications intelligence work accomplished during World War II. It was not real time—although turnaround times of one to three hours for warning was not bad at all for that time. From the relative comfort of Chaumont and Toul, where there was time for some relaxation, to the slightly less comfortable quarters at Souilly, the analysts learned (or developed) their craft to make the best possible use of the intercept they received.

There was immediate recognition that the United States was unprepared cryptographically to protect their military secrets, and there was a valiant effort to minimize damage from insecure communications. The variety of codes prepared possibly caused

some confusion at some levels, but the trench code effort enabled compromised codes to be replaced rapidly. Communications security, despite the best efforts of the codemakers, was always a problem, resulting in many communication compromises. No one expected perfection, and the best efforts of the codemakers and those monitoring American communication could not, in just 11 months, effect the changes in procedure and mindset required to secure the system. It was a valiant effort all the same.

Collection efforts involved acquisition and deployment of technology, as well as training of men, on an unprecedented scale for the US Army. The majority of the Radio Section's officer corps had little or no prior military service but had practical experience with telephones, telegraph, and radio. The enlisted men were chosen, when possible, for their abilities in German. The men of the organization maintained a high sense of adventure, displayed coolness under pressure, and were able to fend for themselves when they had to do so.

The wise selection of personnel, unstinting support from the French and British services, and the dedication and hard work of all involved made the American cryptologic effort on the Western Front a decided success.

Notes

1. Hitt had also spent time in Alaska, although not with the Signal Corps, and undoubtedly would have been interested in Loghry's work.
2. The role of Hitt in the cryptologic work of the AEF is explored in greater depth in a book written after this monograph was complete. See Betsy Rohaly Smoot, *Parker Hitt: The Father of American Military Cryptology* (Lexington: University Press of Kentucky, 2022), 90-94.

Part Four

Cryptologic Challenges and Success

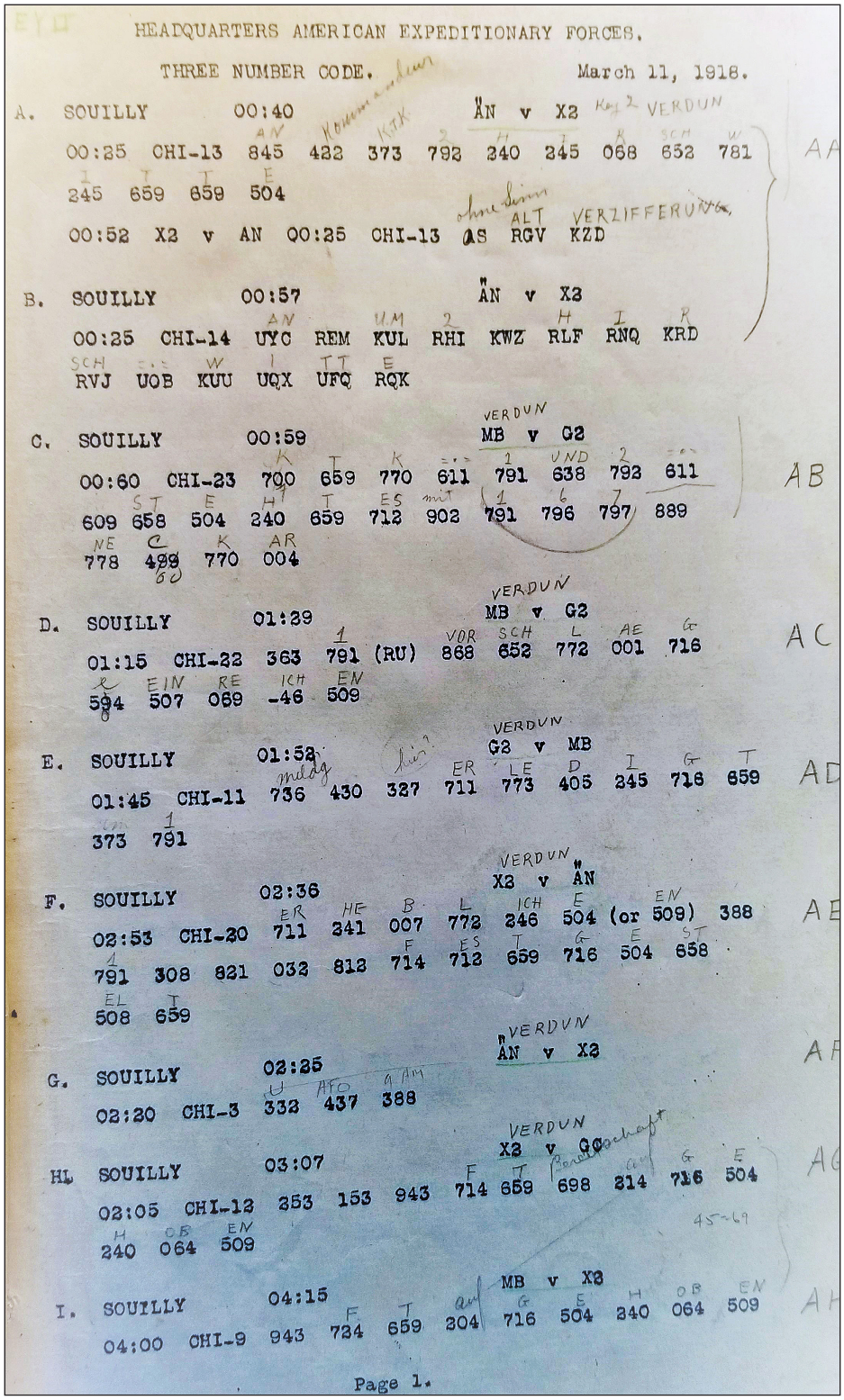
Introduction to Part Four

Cryptologic Challenges and Success

Few today can enumerate the significant and concrete successes of the US cryptologic organizations during the First World War—either in the United States or in France. There were a plethora of overlapping organizations, and many of the success stories were anecdotal. Establishing a complex cryptologic system from scratch was a grand accomplishment and an expensive effort, but can it be said that the work made a difference to the course of the war? How did the new discipline of radio intelligence effectively support the American Expeditionary Forces (AEF) combat operations and defend the homeland from threats? How did it provide information to decision makers?

When radio intelligence is written about in accounts of the war—and these stories rarely appear outside Signal Corps channels or later works focused on cryptology—there are typically five stories that are always recounted. First of these is the March 1918 recovery of the new German code. There are three stories about intercepted messages (two in April 1918 and one in June 1918), and finally the claim that direction finding and traffic analysis provided the deciding bit of intelligence that convinced General Pershing to proceed with the September 12, 1918, St. Mihiel offensive. On the home front, much is written about MI-8's (the Code and Cipher Section's) ability to uncover spies and saboteurs using codes and ciphers.

This section pulls the most significant of these stories out of the organizational records and journalistic accounts, links disparate tales together, analyzes their significance, and presents them in rough chronological order so that the reader can understand the breadth of cryptologic success across the entire system. Some of these stories are referenced in part two, but they are examined here as a standalone record of success—independent of organization—in three areas of cryptology during this era: radio intelligence, communications security, and the little-recognized work of radio deception.



HEADQUARTERS AMERICAN EXPEDITIONARY FORCES.

THREE NUMBER CODE. March 11, 1918.

A. SOUILLY 00:40 AN v X2

00:25 CHI-13 845 422 373 792 240 245 068 652 781

245 659 659 504

00:52 X2 v AN 00:25 CHI-13 AS RGV KZD

B. SOUILLY 00:57 AN v X3

00:25 CHI-14 UYC REM KUL RHI KWZ RLF RNQ KRD

RVJ UOB KUU UQX UFQ RQK

C. SOUILLY 00:59 MB v G2

00:60 CHI-23 700 659 770 611 791 638 792 611

609 658 504 240 659 712 902 791 796 797 889

778 498 770 004

D. SOUILLY 01:29 MB v G2

01:15 CHI-22 363 791 (RU) 868 652 772 001 716

594 507 069 -46 509

E. SOUILLY 01:58 G2 v MB

01:45 CHI-11 736 430 327 711 773 405 245 716 659

373 791

F. SOUILLY 02:36 X2 v AN

02:53 CHI-20 711 241 007 772 246 504 (or 509) 388

791 308 821 032 812 714 712 659 716 504 658

508 659

G. SOUILLY 02:25 AN v X2

02:20 CHI-3 332 437 388

HL SOUILLY 03:07 X2 v G2

02:05 CHI-12 353 153 943 714 659 698 814 716 504

240 064 509

I. SOUILLY 04:15 MB v X3

04:00 CHI-9 943 734 659 304 716 504 240 064 509

Page 1.

G2A6 listing of the first messages intercepted in the German three-number code (see ch. 11). National Archives and Records Administration, College Park, Record Group 120, Records of the American Expeditionary Forces, Entry 105, Box 5749D

Chapter 11

Radio Intelligence

This section explores, chronologically, the most significant accomplishments of the American effort in radio intelligence—what today is called signals intelligence—during the war. It does not extend to cryptologic breakthroughs after December 1918. Each event is attributed to the participating organization (whether in the United States or France) and the contributing subdiscipline of radio intelligence (cryptanalysis, traffic analysis, direction finding, collection). For each item I have listed both the organizations that participated in the effort and the analytics subdisciplines that made the most significant contribution. Organizations are listed in the order they appear in the narrative; subdisciplines are listed alphabetically, not in order of importance to the effort. Though in all cases communications had to be collected, collection is only listed as contributing if the work was of special note.

While existing postwar accounts have identified several of these accomplishments, my research discovered additional examples. There are other achievements that still require research. For example, I have not been able to correlate the identification of German airplanes and their communications with artillery units to successful American or French air pursuit missions or warning to units targeted by German artillery despite indications in the records that this intelligence provided warning and allowed for counterbattery work on the part of the American Expeditionary Forces (AEF). If relevant records can be located and analyzed, they will certainly provide additional data on the level of success of the AEF radio intelligence effort.

I found it possible to document actionable intelligence in the form of strategic and tactical warning based on analysis of radio, ground telegraph, and telephone intercept. The intelligence was extracted from German communications by breaking codes or ciphers, conducting traffic analysis, and using direction-finding technology. Analysis of the changing German use of code and cipher—such as the introduction of the ADFGX (later ADFGVX) cipher system in early March 1918 (not included here because it was a French breakthrough) and the appearance of the German three-number code a week later—provided a strategic indication of an imminent offensive, which came on March 21.[1] Attention to detail in the analysis of the radio traffic—looking for details of changing communication plans, call signs, and code and cipher systems—provided essential clues to the larger intelligence picture.

Radio intelligence was essential to the officers responsible for constructing the day-to-day German order of battle.[2] Unit identification and location provided by analysis of radio traffic, combined

with information collected through other forms of observation and interrogation of prisoners, provided the in-depth knowledge commanders needed to face the opposing force. These contributions are not enumerated in this section, for while it is conceivably possible to extract the information from radio intelligence reports and link it to the daily order of battle reporting, it would be a time-consuming effort to provide statistical evidence that supports an already acknowledged fact.

But radio intelligence and cryptanalysis were important not just in France. There were significant achievements by the army's Military Intelligence Division (MID) on the home front that are included in this examination of successes and challenges.

As is true in any war where signals intelligence plays a role, it is not the cryptologists who win the battle on the ground, on the sea, or in the air. But it is the timely information intelligence provides to the war fighter that influences the course of the action.

Zeppelin L-49 and German Codebooks, October 1917

AEF G2

Acquiring and analyzing collateral information. On October 20, 1917, French pilots from Escadrille 152 forced the German naval Zeppelin L-49 to slowly descend. It landed at Bourbonne-les-Bains, France, about 33 miles southeast of AEF headquarters at Chaumont (see photo). Dozens of officers and men from Chaumont came to the scene. Among them, Colonel Richard Williams, searched the ship for codebooks and then realized that the crew of the airship may have tossed material, including the codebook, overboard. A detail of men searched the path that L-49 had followed and collected approximately 20 sacks of torn paper.[3]

The material was brought back to Chaumont, and Williams and his men worked through the night to try to assemble the pieces. Captain Samuel T. Hubbard of the G2A1 (the Order of Battle Section) wandered in about midnight and recognized some of the paper as charts, including a code chart providing the key to the codes that gave submarine positions. At some point, one of the men turned in a small notebook that he had intended to keep as a souvenir. The team discovered it not only had photographs of every German surface ship and submarine, but the call letters for each and a key to how the call letters changed.[4]

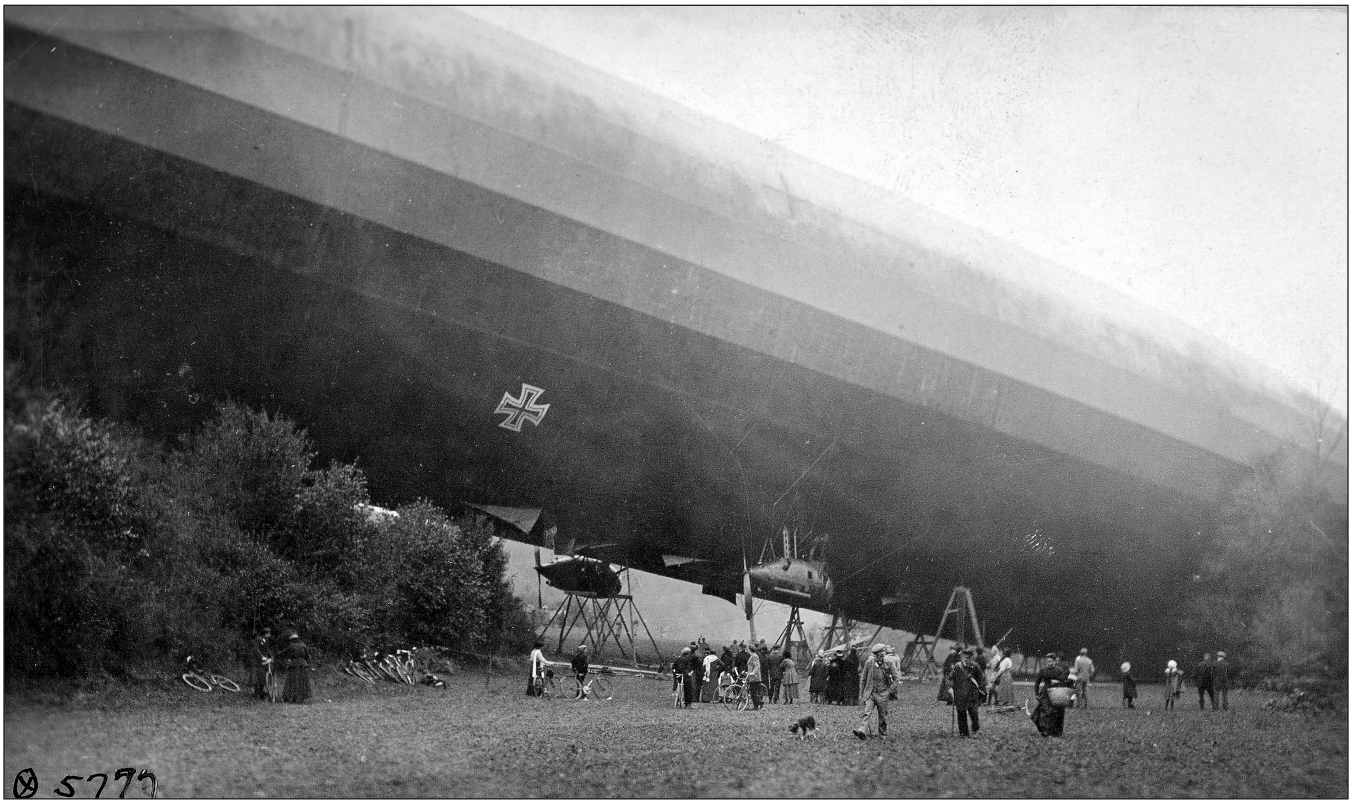
Hubbard, in his memoirs, recounts his trip to London to personally deliver the material to Admiral William Sims and Admiral Sir William Reginald Hall of the British Royal Navy. According to journalist Thomas M. Johnson, Hubbard's trove of cryptologic material was used by the British Admiralty to work against German submarines. Writer Fletcher Pratt called this event "one of the two greatest cipher coups of the war," the other one being an intercept purportedly made by the 42nd Division in June 1918.[5]

This dramatic story is frequently referenced in tales of US cryptology during World War I, although the incident in and of itself was not of a cryptologic nature. Whether or not the material recovered from L-49 actually did assist the British in tracking German submarines, the event is an important one. It shows that, even in the early days of the American experience in World War I, officers were alert to the fact that code keys and call signs were essential elements of information that would assist in the broader intelligence picture.

Messages from Nauen, January-February 1918

Navy, MI-8, AEF G2A6

Cryptanalysis. Two code messages, designated Message 1 G and Message 42 D, transmitted by the high-power Nauen radio station in Germany and intercepted by the US Navy station at Otter Cliffs, Maine, were intercepted more than 60 times in January and February 1918. They were sent without address or signature. Back in Washington, MI-8, the Military Intelligence Department Code and



German Zeppelin L-49, October 21, 1917. National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 111, Records of the Chief Signal Officer. Photographic Collection, 111-SC-005777

Cipher Section, diagnosed these messages as using a dictionary code based on the English-French half of Clifton's *Nouveau Dictionnaire Français* and suspected that they were sent by the German Foreign Office and intended for Mexico, possibly for German secret agents. Message 42 D, sent at least 64 times between January 23 and February 2, offered a bribe of 10 million Spanish pesetas to the Mexican government in exchange for that country's neutrality. Message 1 G discussed a loan, plans for arms sales, and negotiations with Japan. Nothing ever came of these plots. The messages stopped abruptly after the code was solved by MI-8. Herbert O. Yardley, when writing *The American Black Chamber,* suspected a German spy within his own organization as the cause for the sudden halt in messages, but no specific accusations appear to have been made.[6] Solution of these messages was, at the time, considered some of the most important work done by Yardley's organization.[7]

The AEF also intercepted these messages from Nauen. G2A6 analysts in France noted that Message 42 D had an October 1917 date but was repeated without change of dates on December 29, 1917. Message 1 G was dated January 4, 1918 and repeated with a change of date on January 5. Their conclusion was that the messages might be for a German secret agent in a hostile or neutral country or even in the United States. The G2 forwarded the messages and their analysis to MI-8, explaining that "due to lack of personnel and the necessity of putting most of our time on trench codes we have been unable to give this particular cipher much attention. The French are much interested in its solution, but I am told that neither they nor the British have made anything out of it up to the present time."[8]

Solution of the German Three-Number Code (Schluesselheft), March 1918

AEF G2A6 and Radio Section

> **Cryptanalysis, Collection.**
> March 13 – Solved first words in new number code. We found a telegram in new code which was answered by receiving station in old code: "Not understood … send in old code." The same message was then found among the three letter telegrams in old code. By comparing the two we solved 11 groups and sent first list to French the next morning. We also sent a telegram on the evening of the 13th calling attention to the three telegrams.[9]

The solution of the German three-number code is the most widely publicized American cryptologic success of World War I. The account given in the publicly disseminated 1919 "Report of the Chief Signal Officer" was repeated in magazines and newspapers for many years. Those who were there, including Frank Moorman (G2A6), Louis R. Krumm, and Robert Loghry, wrote about it for the public and lectured on the subject to army officers.[10]

Ten days before the beginning of the 1918 German spring offensive, on the evening of March 10 and then more widely on March 11, the German Army began using the *Schluesselheft*, a three-number enciphered code designed specifically to be used for communications within the danger zone of three kilometers from the front line. The code was also used for communications going into and leaving this zone.[11]

The codebook itself was a simple one where the code groups were listed in numerical order against a list of alphabetically arranged words, phrases, and numbers. The codebook did not change; the code groups were enciphered with a "Secret Key" (*geheimklappe*) on the last page of the book. The secret key had two 10x10 tables labeled 0-9 on both axes; the 100 squares were filled with two-digit numbers (from 00 to 99). These keys were produced at the division level and distributed as needed. To encipher the code, the sender took the first two of the three numbers of the code group, found the first of those digits on the vertical axis, and then located the second number on the horizontal axis. The number found in the box where the axes crossed replaced the first two digits of the code group. The third number in the code group remained unchanged. Although the code was designed to be enciphered, the instructions permitted its use without encipherment when it was determined that "special secrecy" was not needed.[12]

There were only 18 men assigned to the G2A6 on March 11—11 officers and seven clerks. But Hugo A. Berthold and J. Rives Childs had gone to London and then Paris on February 27. Childs would return late in the day, but Berthold would remain in Paris until the next week. Charles Matz had been sent to the hospital the day before.[13] Army Field Clerk Henri C. Jacques, who had arrived on February 24, had been in the hospital since February 27. Captain Herman E. Osann had arrived just two weeks before and was likely not fully up-to-speed.[14] Moorman was in Chaumont, but generally left direct supervision of operations to Berthold. Lieutenant Philip B. Whitehead was in charge of operations when Berthold was away.[15] The office did not yet have a fixed structure; assignment of individuals to specific problems shifted as new men arrived. Of the 11 officers, Berthold, Lee West Sellers, Matz, Whitehead, John A. Graham, Childs, and Robert Gilmore had all worked on various code problems, while Erwin Falk and Wesley J. Ladwig focused on intercept, direction finding, and traffic analysis.[16]

Radio intercept stations collected many messages on the morning of March 11 (see listing in part four introduction). The German code change led to the implementation of new procedures for forwarding intercept to the analysts. All messages intercepted from stations at Ansauville, co-located with the 1st Infantry Brigade of the 1st Division,

were telegraphed to the G2A6. Beginning on March 12, the American radio intercept sites in the Verdun Sector, then located at Froidos and Landrecourt, sent their traffic via the French Army telegraph service; they had exclusive use of the French line from Souilly (headquarters of the French II Army) to Chaumont each day between 1300 and 1400. Material from Landrecourt (about seven miles away) and Froidos (about 10 miles away) was probably delivered to Souilly by courier.[17] French intercept from the French site at Souilly might have been sent to Chaumont at the same time; traffic had been shared since December 1917.

The traffic from the American and French stations in the new code began to reach Chaumont on March 12. On March 13, three messages between two stations using calls signs ÄN and X2 collected at the French station at Souilly in the early morning hours of March 11 caught the attention of the analysts. The first message, sent at 0040 from X2 to ÄN, was in the new three number code. Just 12 minutes later, at 0052, ÄN replied to X2 using a different, three-letter, code. The three-letter code was immediately recognized as being what the Americans and French called Fritz 23, a code of the KRU type used in the G Sector of the front (see appendix C). The second message revealed that ÄN could not decode the initial message and asked that it be retransmitted in the old code. X2 quickly complied, and Souilly copied the message, sent in Fritz 23, at 0057. As William Friedman later declared, "it seemed almost too good to be true."[18] Moorman later used this story as a cautionary tale about following rules when coding messages—never transmit a message in both new and old code—and noted that the German who repeated the message in the old code "must certainly have cost the lives of thousands of Germans."[19] The first solutions were immediately telegraphed to the French Cipher Bureau and sent to the British by plane, providing the Americans with a "big scoop."[20]

Journalist William E. Moore's account of the solution of this code, "The Jerry Who Spoiled the War," appeared in *The American Legion Weekly* on September 1, 1922, and described the reaction in the G2A6 to the solution in a lively manner:

> With the same report of progress in his hand Major Moorman, chief of the section, left the building and proceeded across the parade ground facing General Pershing's office to the small building at the right of the entrance gate. Above this building flew the Union Jack. It housed the British military mission at American GHQ. 'I have here a partly deciphered message in the new German code,' Major Moorman told the chief of the British Mission. 'Right-o' cried the Englishman. 'Leftenant Smith is leaving for our GHQ by airplane at once. I shall send it along.' Within an hour from the time Major Moorman left the Glass House the British code experts were at work on the duplicate message with Captain Berthold's partial solution to guide them.[21]

But Moore's account of the entire story has so many inaccuracies that it must be used with care. Moore and others, including some official accounts, conflate the March 13 date of solution of the code with the day that the key messages were intercepted. However, the G2A6 report, written by Friedman, clearly dates the intercept to March 11, and the office's logbook reports the solution on March 13. While Friedman was not present when this system was solved, he had the input of those who were there.[22]

Records do not reveal who found the initial solution to the three-number code. Moore, the only postwar writer to name names, says it was Berthold, but he was in Paris, not Chaumont. Brigadier General Dennis Nolan later claimed it was the work of Matz; if so, he must have returned from the hospital after one day.[23] But Moore's description of the break as a group effort rings true, as does the methodical approach employed.[24] Krumm's account of "all available officers and men … were assigned to its solution" seems most likely.[25] Sellers might have had the

lead, as records show he had the most experience with the three-letter code series designated Fritz.

This is a well-known and often recounted American success. From the perspective of the modern cryptologic historian, there remains one problematic issue to be resolved. It is claimed that only American radio intercept personnel copied the three key messages with "sufficient accuracy to be useful."[26] Friedman's work provides partial copies of the intercepted traffic, and they are clearly marked as having come from Souilly.[27] While the Radio Section did have an intercept station at Souilly from November 1917 to January 19, 1918, the station was moved to Froidos on January 20 (as noted in chapter 10). There was no American radio intercept station in Souilly from January 20 until June 6, so any traffic marked from Souilly in March had to have come from the French intercept site there. Perhaps the attribution can be explained by supposing the Americans were the first to intercept this code (Moore says it was the British, but this cannot be verified). Conceivably, those writing the reports forgot that the station at Souilly had moved. Or maybe the station at Froidos persisted in labeling its material as Souilly, although that seems unlikely. It is a discrepancy that will likely never be resolved, but the recognition of the role of the Radio Section in this cryptologic success was probably a morale boost for the signal collectors.

Berthold, still in Paris on March 15, sent a telegram and a letter to Moorman about what a "fine impression" the American solution had made with the French Cipher Bureau and noted that the French were only able to start their solution work with the information provided by the G2A6.[28] It is possible, as Thomas M. Johnson said, that Allied ability to read the three-number code meant that when the German offensive began on March 21 "messages were being read all along the line." But while a great number of messages were sent in the six remaining months of the war, not many were of actual tactical importance, and those typically were sent in the early days of an advance or offensive. According to Friedman, the great majority of the messages were practice or of a "very trivial nature." They were also often lacking identification information, making them not particularly useful for order of battle updates.[29]

The lack of operational usefulness of this cryptologic breakthrough does not mean this is not a success story. The G2A6, in addition to rapidly solving a code problem, was able to quickly leverage the Radio Section to increase intercept. The teamwork needed to solve the problem undoubtedly helped to bond the men together and tested their mettle. On March 14, the office began working in three shifts to handle the press of work, which prepared them for the effort needed when the AEF began combat operations. This work helped the G2A6 define internal roles and responsibilities. The office doubled in size in the next month, and Moorman made organizational and reporting changes on April 1 that solidified the G2A6 as a functional cryptologic organization.[30]

Radio Section Personnel Overrun during April 20, 1918, Raid on Seicheprey

AEF Radio Section, 406th Telegraph Battalion

Collection. One of the earliest engagements of the AEF in World War I took place at Seicheprey, north of Toul, in the St. Mihiel salient. On the morning of April 20, 1918, the 26th Infantry Division (the Yankee Division) was surprised by a German attack.

In March 1918, the Radio Section had established a listening station in no-man's-land near Seicheprey, one of two stations the Americans took over from the French (the other was at Marvoisin). These stations "were very close to Heaven," not because they were wonderful places, but because station operators had a good chance of getting killed.[31] In early April, the post moved to a dugout in the corner of the village's cemetery.[32]

The Radio Section was short of personnel in the spring of 1918, and soldiers from the 406th Telegraph Battalion of the Signal Corps augmented the listening station effort. On the morning of April 20, Privates Tony Gallo, Almon D. McKay, and Joseph J. Grindell of the 406th as well as Corporal Paul D. Herrold and Sergeant Eugene Peterson of the Radio Section were trapped at their post during a German raid. Gallo later remembered:

> The barrages started at three o'clock in the morning and kept on advancing. About five-thirty or six o'clock the barrage passed over us. The Germans were soon all around us, past us and everywhere, but some way or other they missed our place. Our station was kept working until six in the morning but then the noise was so terrific, our lines were so shot up, and the Germans were so close, that we could do nothing. Our orders were to keep the station going as long as possible. The day before we had received a Western Electric amplifier and telephones and had specific orders, in case of an attack or of being cornered, to dismantle the station and destroy instruments before the Germans got hold of them. So we had everything in readiness to destroy all instruments. The station records I hid under some stones near our place. At seven o'clock our station was reconnected as the Germans were pushed back and imminent danger of their getting our equipment had passed.
>
> The day after the raid our Lieutenant had searched everywhere, all the field hospitals and bases as well, but could not locate us. They gave us up as either killed or captured but at last they found us and we were ordered out and dismantled the station entirely.[33]

The men of the listening station at Seicheprey were commended by the Chief Signal Officer General Edgar Russel for their "coolness, steadfastness and resourcefulness under trying conditions."[34] The AEF suffered 650 dead or wounded, and 100 men were taken prisoner as a result of the raid. However, the American press hailed the battle as a great victory because an American counterattack had recaptured the town. One hundred Germans were killed, and the village of Seicheprey was in ruins with not a tree or building left intact.

Postponed April 25, 1918, Raid

AEF Radio Section and G2A6

Cryptanalysis, Collection. At 0751 on Wednesday, April 24, 1918, the radio intercept site at Toul collected a coded message from station TK to station 7H, which, from direction finding, indicated the stations were in the St. Mihiel Sector. The G2A6 partially decoded this message, which read: "To … regiment on the left operation postponed because weather unfavorable. Regiment X."[35]

Charles Matz delivered the message, in German and English, to Lieutenant William Dearden in the G2A1 late on the afternoon of April 24. Matz shared his opinion that based on the code used, this message probably came from the west side of the St. Mihiel salient, likely near Lamorville. Dearden called Colonel Williams, liaison to the French II Army, about the postponement of German operations due to weather. He presumed that Williams would understand that the attack might happen when the weather got better and did not share all the details because he was trying to protect the source of the information. However, Dearden did tell Williams about Matz's guess of the location.[36]

When Captain Hubbard came into the G2A1 office before dinner, he learned of the situation and did some further checking on the location. Just before 1900, he discovered that the message likely came from the south side of the salient, rather than the west, for the goniometric bearings had finally arrived in Chaumont. Dearden telephoned Colonel Williams with an update on the location, although Dearden felt that the bearings were vague, but he did not want to use the word goniometric on the

phone.[37] Williams telephoned the French liaison officer and on the following morning sent the bearings in the original German to the I Corps.[38]

The next day, April 25, the stations at Toul and Toul-A respectively collected the following messages: at 1325, that the signal for the battery was "blue" and, at 1352, that "relief is coming tomorrow." Both provided information on the expected attack but not the location.[39] Reportedly, Allied forces were able to take "the necessary steps to meet the raid," which took place that night.[40]

The raid may have been both small and easily repulsed, as no account of it has been located. It is not known if it took place on the western edge of the St. Mihiel salient in the Toulon and Troyon areas, where elements of the French II Army were located along with elements of the AEF's 2nd Division, or on the southern part of the salient where the 26th Division had been dealing with frequent German raids.

Despite the fact that the warning appears to have been successful, problems related to these messages demonstrate the difficulties that the G2 was having in disseminating intelligence, undoubtedly due to the lack of a fixed procedure and reasonable security consciousness in using the telephone. The message caused some consternation with the French who were "all stirred up," according to what Colonel LeRoy Eltinge relayed to the chief of G3 (Operations Section), Colonel Fox Conner. The problem was the French had received from the AEF a paraphrased report that had inexact language. Eltinge stressed to the G2 the need for (his emphasis) "the EXACT MESSAGE THAT WAS INTERCEPTED." Apparently, what the G2 relayed to the French Corps headquarters, via a liaison officer, was along the lines of the following: "From intercepted radio it is learned that the enemy postponed an attack originally intended for morning April 24th which was to have been made under Verdun, on the Heights of the Meuse, or west of St. Mihiel."[41]

Eltinge was also upset because he could not reach by phone anyone who could clarify the exact wording of the intelligence, and he was frustrated because "everybody was stirred up but nothing has or could be done on the account of the lack of precise information."[42]

Nolan's deputy, Lieutenant Colonel Arthur L. Conger, who was the head of the G2A, immediately replied to this criticism. He explained that on April 25, Hubbard had told him that the French Corps headquarters now wanted messages furnished in the original German, and Conger ordered this done. But on April 26, it was discovered that what the French Army actually wanted was to have the messages sent directly from the radio intercept stations. Moorman ordered this to be done, but there had been a "hitch" about how to send them and how they were to be addressed.[43]

More detail was given in memos that Hubbard, Dearden, and Moorman provided to Conger, which accompanied Conger's reply to Conner. Hubbard explained that he had asked the G2A6 to provide at least a sector reference if no locations were given and, if not located at all, to make a statement to that effect. He also noted the liaison officer requested that the information be transmitted by phone directly to the French II and VIII Armies if it came in late at night.[44]

Moorman was notified on the evening of April 25 that the French thought it "rather extraordinary" that the Americans had obtained the information, while their own stations, so much closer to the source, had not. But they indicated they were very pleased to have the details.[45] It is perhaps this incident that prompted either a French court of inquiry or a board of officers; Moorman much later mentioned that the warning of the attack prompted the inquiry "to find out why they got that information from the Americans instead of from their own stations."[46] Conger mentioned the commander of the French II Army investigating "why it was their wireless information always had to come from the American GHQ instead of being furnished by their own wireless, which was considered very superior."[47]

Meanwhile, Moorman recounted that the French VIII Army liaison officer had called late on

April 26 to ask if the German text from the radio intercept stations at Toul and Mènil-la-Tour could be furnished on a routine basis to the French VIII Army cipher officer. Moorman agreed to this, passed the information to Conger, and asked if the French VIII Army would also be willing to send the G2A6 their messages.[48]

Despite the confusion, this sequence of messages was important enough to be included in a summary of G2A6 success at the end of the war.[49] The information on the postponement and the barrage signal was unique to radio intelligence.[50]

Warning Provided for April 29, 1918, Raid in the St. Mihiel Sector

AEF Radio Section and G2A6

Cryptanalysis, Collection. Just a few days later, at 2105 on April 28, 1918, the Toul intercept station copied a message transmitted from somewhere in sectors G-40 to G-50 (Beaumont to Bezonvaux).[51] The code was broken by Lee West Sellers by 2355. The message read: "To all stations. From One O'clock Attack, absolute attention (on part of) wireless stations."[52] Sellers hand carried the message to the G2A1 office, hoping to find Captain Hubbard. Dearden was on duty.[53]

Dearden, assuming that Conger was gone for the night and "appreciating the need of immediate transmission" to the French, went to the Battle Order Section to locate the sector on the map. He then tried to call the French II Army and the French VIII Army, as instructed. But the telephone operator did not have the numbers nor did he know how to locate the numbers. So Dearden called the operator at Neufchâteau, who was equally unhelpful, but who noted that Colonel Williams, the American liaison officer, had a phone in his room. Dearden did not immediately call Williams but tried to remember how to contact the French II Army. Failing that, he called the Neufchâteau operator again, who connected him to Williams. Dearden explained the situation, provided the location, and read Williams the message in German and in English. It was now about 0015 on April 29.[54] Williams called Major Budd, the intelligence officer of the 2nd Division, who passed the message to the French Corps headquarters at Dieu at 0030. The French were prepared for the German action, and while I have located no further details of the military action, the fact that the warning was documented as a success by the AEF suggests that the German raid was unsuccessful.

Regarding this incident, Nolan explained that without "a well-organized system for copying, transmitting, and decoding these messages, the information would have been too late to be useful" and remembered that the operator who intercepted the message had "no knowledge of the important nature of its contents."[55]

Moorman, too, used this successful warning to praise the collectors:

> We found in the work that the hardest job was that of the Signal Corps man. He sat in a cold station and received groups of letters quite meaningless to him, put them on the wire, and got back a code message which he could not understand and did not know anything about, so that his work was more or less mechanical. By lectures to the men who handled this we tried to impress on them the importance of the work, even though they could not see it themselves.
>
> The signal corps man handling it did not know the importance of the message. He was simply obeying orders. The signal corps men certainly deserve credit for staying with the work and seeing it through. It took a kind of skill that is hard to develop and hard to find. That is one important item when looking for operators for radio intelligence work, to get operators to do the mechanical work or copying and sending messages. At the Army Headquarters they maintained a 24 hour service in three reliefs, two men on each relief. The result was that those men were always busy and had to be

> familiar with all the different phases of the work.[56]

Hubbard would write of this incident 40 years later, getting much of the detail wrong (he claimed it happened in October and that Dearden first warned the 26th Division). Hubbard attributed the success not to the G2A6 or the collectors but to the well-organized work of the Order of Battle Section.[57] But it clearly was a collaborative effort.

Jäger Messages, March-April 1918

AEF G2A6

Cryptanalysis. Frank Moorman, in his 1920 lecture to the MID, was the first to tell the tale of a German officer named Jaeger (or properly, Jäger) who came to visit German units in an effort to improve their communications security. Unfortunately, in every report Jäger transmitted back to his headquarters, he signed his name using the spelling code section of the then-current code. Whether there were no alternate groups or nulls available in this code to help vary the signature, or if Jäger did not care to change the code groups used for his name, is unknown. But the fact that all these messages were signed in a distinctive manner was used as a crib each time the code's key was changed. The codebreakers at Chaumont knew to look for messages that might be signed by Jäger, for his spelling groups would help pry open the new key.[58] Friedman, writing much later, essentially repeated what Moorman said.[59]

On the evening of March 30, 1918, the radio intercept station at Landrecourt copied a message in code that, when decoded by the G2A6 on April 5, revealed that an officer named Jäger had summoned all station chiefs as well as one man from each wireless station to report to his location, with their intercepted messages, at 0900 the following morning. On April 9, the G2A6 "Daily Code Section Report" contained a comment on another message from Jäger that "it has been noted that Lieutenant Jäger frequently issues orders to field stations."[60] Jäger's messages all emanated from German stations in the G Sector. His communications security mission cannot be verified from intercept, but Jäger appears to have had contact with many radio and ground telegraphy (TPS, from the French *télégraphie par sol*) stations about procedures and staffing.

Jäger was not the only officer who signed messages, but he may have been the most prolific during March and April (though some of his messages were from May). The distinctive ä in his name, transmitted in the code's spelling system, stood out to codebreakers. The daily reports, frustratingly, do not identify which code had been broken for each message (nor do they provide the code text, only the German decryption and the English translation). Given the time frame and the sector in which he was operating, Jäger's messages were probably first sent in the three-letter KRU code Fritz 23 (in use from March 1 through April 4), and these were used to break Fritz 28, which came into effect on April 5. Probably more significantly, the Jäger messages provided a crib used to break the new KRUS code Jean 1 that came into use on May 5.

William Moore, in "The Jerry Who Spoiled the War," gave a dramatic rendition of the story. According to him, discipline among the German signal troops was growing lax, and Jäger was going to fix this. Calling Jäger a "live wire," Moore noted that when Jäger left the area, his absence was "seriously felt by the Yanks." Moore dated this work to sometime after the German code change of March 11, but also explained that the Americans were using listening stations along a line from Seicheprey to Flirey. However, Moore was incorrect on this point, as all the Jäger intercept came from radio collection, not from the TPS collected by listening stations.[61]

Moore is a problematic source for the modern historian. No one knows who supplied the information he used, and J. Rives Childs, when asked to evaluate the story, called it a curious mixture of truth and fiction.[62] Not one of these sources considers that Jäger was very unlikely to be coding his

own messages for transmission but likely wrote his report and handed the message over for coding and transmission. Perhaps it was not the communications security-conscious officer who was making the mistake, but a clerk who did not take Jäger's lessons to heart, did not care, or, possibly, was playing a joke on Jäger at the expense of security.

First Information of New Units in the Verdun Sector, May 7, 1918

AEF G2A6

Traffic Analysis. Almost nothing is known about this incident, a success credited to the G2A6 in a May 10, 1918, memorandum from Colonel F. L. Dengler of the G2A.[63] But the conclusion that German troops were being relieved by new units in the Verdun Sector almost certainly was drawn from traffic analysis. The "Field Radio Stations Report" for the week ending May 9, 1918, noted that radios in Sector G-20 in the Meuse West Sector had not been active during the week and may have been withdrawn.[64]

Decryption of Lothar Witzke Message, May 18, 1918

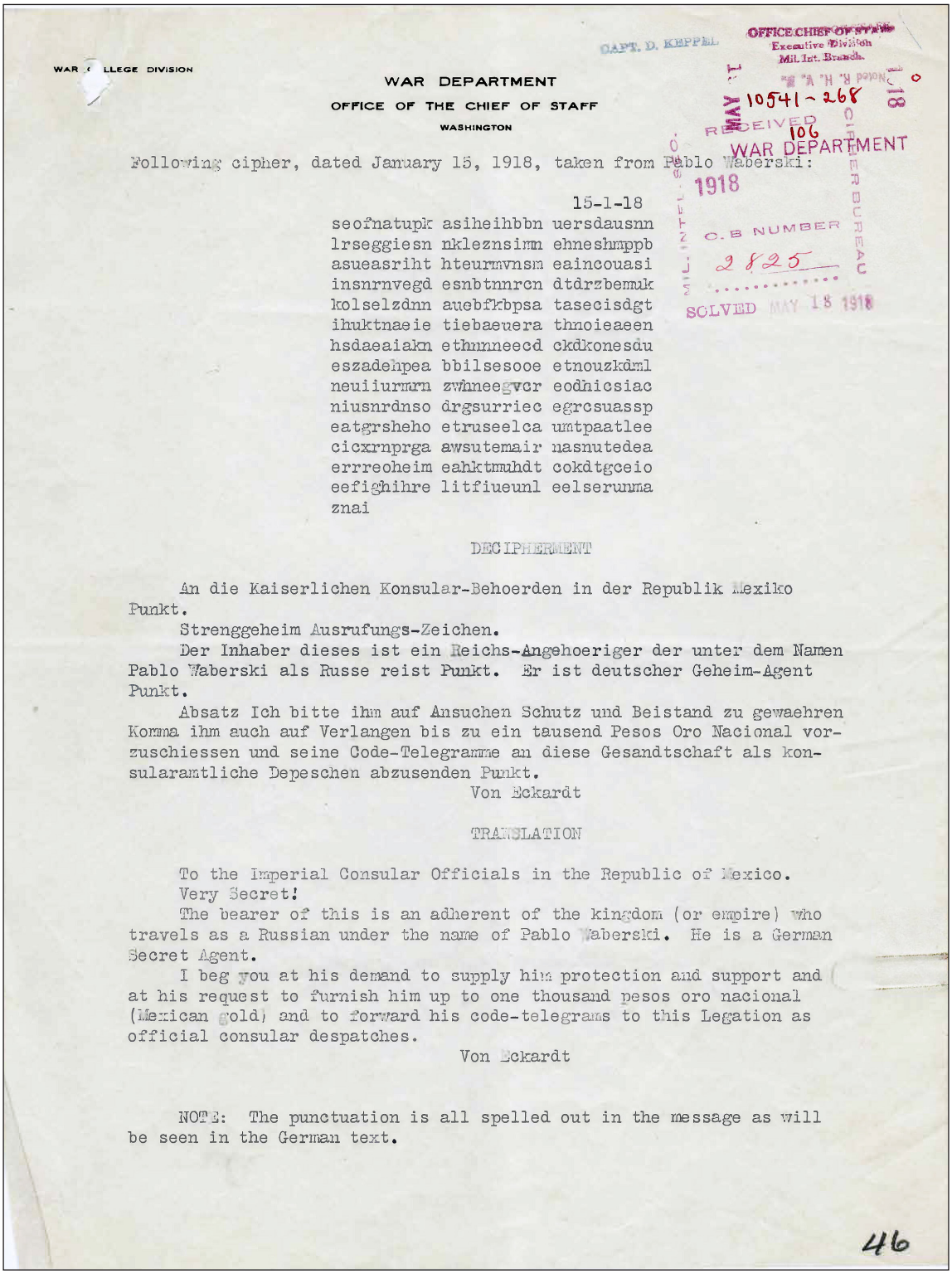
MI-8

Cryptanalysis. Everyone loves a tale of espionage and spies. On February 1, 1918, a German agent named Lothar Witzke, using the name Pablo Waberski (see photo), was arrested at the Mexican border near Nogales, Arizona. Witzke claimed to be a Russian-American returning to San Francisco. But investigators discovered a cryptogram sewn into the left sleeve of his jacket, dated January 15, 1918, which was 424 letters long (see photo). The message was delivered to MI-8 in Washington.[65]

Witzke was a German naval officer and a survivor of the SMS *Dresden* sinking, and had been interned in Chile. He escaped and came to San Francisco in May 1916. The German Consul General in San Francisco, Franz von Bopp, turned him into a spy and saboteur. Witzke implicated himself in the July 30, 1916, Black Tom Explosion in New York harbor, although his participation in the incident has never been proved. Military intelligence did link him to the July 9, 1917, Mare Island Naval Shipyard munitions explosion.[66]

German agent Lothar Witzke, aka Pablo Waberski. NARA CP, RG 165, Records of the War Department General and Special Staff, Entry 65, Box 3453

Ralph Van Deman later proclaimed the decryption of the Witzke cryptogram as "perhaps the most spectacular piece of work which the Code and Cipher Section accomplished, although it was by no means the most important."[67] Signed by Heinrich von Eckardt, the German minister in Mexico, the message was addressed to all German agencies in Mexico and directed that Witzke be given up to 1,000 pesos in gold and all needed assistance.[68]



WAR COLLEGE DIVISION

CAPT. D. KEPPEL

OFFICE CHIEF OF STAFF
Executive Division
Mil Int. Branch

WAR DEPARTMENT
OFFICE OF THE CHIEF OF STAFF
WASHINGTON

MAY 17 1918
RECEIVED
WAR DEPARTMENT
MILITARY INTELLIGENCE DIVISION
C.B NUMBER 2825
SOLVED MAY 18 1918

10541-268
106

Following cipher, dated January 15, 1918, taken from Pablo Waberski:

15-1-18

seofnatupk asiheihbbn uersdausnn
lrseggiesn nkleznsimm ehneshmppb
asueasriht hteurmvnsm eaincouasi
insnrnvegd esnbtnnrcn dtdrzbemuk
kolselzdnn auebfkbpsa tasecisdgt
ihuktnaeie tiebaeuera thnoieaeen
hsdaeaiakn ethnnneecd ckdkonesdu
eszadehpea bbilsesooe etnouzkdml
neuiiurmrn zwhneegvcr eodhicsiac
niusnrdnso drgsurriec egrcsuassp
eatgrsheho etruseelca umtpaatlee
cicxrnprga awsutemair nasnutedea
errreoheim eahktmuhdt cokdtgceio
eefighihre litfiueunl eelserunma
znai

DECIPHERMENT

An die Kaiserlichen Konsular-Behoerden in der Republik Mexiko Punkt.

Strenggeheim Ausrufungs-Zeichen.

Der Inhaber dieses ist ein Reichs-Angehoeriger der unter dem Namen Pablo Waberski als Russe reist Punkt. Er ist deutscher Geheim-Agent Punkt.

Absatz Ich bitte ihm auf Ansuchen Schutz und Beistand zu gewaehren Komma ihm auch auf Verlangen bis zu ein tausend Pesos Oro Nacional vorzuschiessen und seine Code-Telegramme an diese Gesandtschaft als konsularamtliche Depeschen abzusenden Punkt.

Von Eckardt

TRANSLATION

To the Imperial Consular Officials in the Republic of Mexico.

Very Secret!

The bearer of this is an adherent of the kingdom (or empire) who travels as a Russian under the name of Pablo Waberski. He is a German Secret Agent.

I beg you at his demand to supply him protection and support and at his request to furnish him up to one thousand pesos oro nacional (Mexican gold) and to forward his code-telegrams to this Legation as official consular despatches.

Von Eckardt

NOTE: The punctuation is all spelled out in the message as will be seen in the German text.

46

The enciphered message carried by German agent Lothar Witzke and its decipherment. NARA CP, RG 165, Entry 65, Box 3453

Van Deman claimed the message had been broken overnight. Yardley remembered Van Deman bringing the message to him on a Saturday, several days after it was found, and wrote that "on only one other occasion had I seen Van Deman, usually even-tempered, so exercised over a cipher message." Yardley had six copies made and distributed the copies to different clerks to do the preliminary work of frequency counts. He then went to gather more information on Witzke from other areas of MID. When he returned, he found "several cryptographers, under the direction of Captain [John] Manly," working the problem.[69]

But the version offered by John Manly, Yardley's deputy, differs quite a bit. Manly explained in his essay on the subject that while the message was promptly forwarded to MI-8, it did not get immediate attention because when Yardley received it, there was no information about its source or importance. The office was very busy, and the staff was not adequate for the volume of messages, so this unattributed document "was laid aside for attention at some more convenient season, and somehow in the press of routine business, it was sidetracked for a long time." At some point weeks later, the office was asked if they had deciphered it, and only then did work begin.[70] Manly agrees with Yardley that the work for the underlying system began on a Saturday and that there was pressure to complete the work that day as the War Department chief of staff and members of Congress were due to inspect the MID office on Sunday morning. Manly and Edith Rickert were the staff members who focused on the solution. When they were not finished by 1800 (the normal conclusion of the working day), they had dinner near the office and came back to keep working. They finished by late evening.[71]

On Monday, May 20, Van Deman telegraphed the Southern Department headquarters in San Antonio, Texas, that there was important new evidence. A full translation of the message was sent to San Antonio on Tuesday, May 21, more than three months after Witzke's capture, which places the solution as completed on the evening of Saturday, May 18.[72]

On July 3, Major Robert L. Barnes, the intelligence officer of the Southern Department, asked Brigadier General Marlborough Churchill, who had taken over from Van Deman, to provide the name of the person who broke the original message. He asked that these individuals be prepared to testify at the trial.[73] On July 13, Churchill apprised Barnes that the message had been decoded by Manly and that he could be sent to testify.[74] On August 8, Barnes learned that both Manly and Rickert "principal assistant to Capt. Manly in deciphering the message" were coming to the trial, and Barnes hastily telegraphed back that there was no need to send "Capt. Manley's (sic) assistant, Miss Edith Rickert."[75] Perhaps Barnes misunderstood the use of the term assistant. In a note on an earlier communication from Barnes, Yardley wrote that "Miss Edith Rickert assisted Capt. Manly in the decipherment of Waberski message more than anyone else. Others that helped some were Victor Weiskopf, Capt. [John] Powell, and myself."[76] Both Rickert and Manly traveled to San Antonio for the trial, but only Manly testified.[77]

Many years later, Mary Lue Hitt, daughter of Parker and Genevieve Hitt, told historian David Kahn that Rickert had met her mother during Genevieve Hitt's May 1918 trip to Washington, and that Rickert had explained to Genevieve that it was she, not Manly, who had actually broken the message.[78]

Witzke was tried in August 1918 at Fort Sam Houston in San Antonio and sentenced to death; the broken cipher was key evidence. He was never executed. His sentence was commuted by President Woodrow Wilson on May 27, 1920. He was pardoned by President Calvin Coolidge and released on September 26, 1923. Witzke was decorated with the Iron Cross upon his return to Germany. He later joined the Abwehr. After the Second World War, Witzke was for three years an elected representative to the Hamburg Parliament. He died in 1962 at the age of 66.[79]

Intercept of New Cipher by the 42nd Division, June 1918

The French

Cryptanalysis, Collection. Two decades after the war, Fletcher Pratt wrote of an American success that he claimed was "one of the two greatest code and cipher coups of the war." He explained that on a night in June 1918, the Germans were using "a brand-new cipher, evidently issued only a day or two before," that had not been solved by the Allies. Supposedly, a German-speaking radio operator with the 42nd Division intercepted a message saying the "rider with copies of new cipher has not reported. Feared killed. Please repeat last message in old cipher." The operator copied the message in the old cipher, sent it off to Chaumont, and it was deciphered "before dawn," revealing that the new German drive would fall east and west of Rheims in July.[80] This was the Second Battle of the Marne (July 15-August 6, 1918).

Pratt did not cite his sources, but most of his material can be traced back to verifiable records. It is entirely plausible that a radio operator within a division could have intercepted a message (see chapter 10). There was no established protocol for forwarding this sort of intercept to the G2A6 in Chaumont; however, if the operator took the message to the division's G2, they would have been able to make the connection. The 42nd Division, having spent time in the Baccarat Sector with active Radio Section operations, may have been more aware of the work of the G2A6 than other divisions.

But no account of this critical intercept, where a message in the old cipher was used to solve the new cipher, can be found in the records of the G2A6. Had the event been the big success that Pratt claimed, I have no doubt that it would have been recorded in some way.[81] The new cipher in question is certainly the ADFGVX cipher that was changed from the five-letter ADFGX to the six-letter ADFGVX on June 1, 1918, thus narrowing down the time frame for the supposed intercept. The Allies were unable to completely solve either the ADFGX or the ADFGVX system, but thanks to the work of French cryptologist Georges Painvin, they were often able to recover daily keys, which allowed solution of messages using that key.[82]

There are multiple possibilities here for what Pratt described as an American success. The first is that he, or his source, described and somehow conflated this event with the March solution of the three-number code. This seems unlikely as Pratt discussed the March solution and tied the June intercept firmly to the German attack near Rheims. The second is that there was a cipher that was broken, but the work was done by the French. In early June, the 42nd Division was working in the area of the French VIII Army, and intercept may have been passed by an American liaison officer to the French Cipher Bureau elements within one of the French armies. A third possibility is that Pratt heard the story of Painvin's solution of the new ADFGVX and the message solved by the French Cipher Bureau that provided the French indications of an approaching German assault in June 1918.[83] Or perhaps the event took place as Pratt described and there are records yet to be found by historians, potentially in the files of the 42nd Division.

The fact that there was an intercepted message that alerted the French to the German intentions in the area of Rheims before the Second Battle of the Marne is quite likely; General Ferdinand Foch is said to have commented on this fact.[84] It is possible that the key message was intercepted by the 42nd Division and then broken by the French. There is, however, no record of this event in extant G2A6 files, and Pratt's great coup should properly be attributed to the French.[85]

Warning, June 14, 1918

First Army G2A6

Cryptanalysis. On June 14, 1918, Charles Matz, newly deployed to Toul to set up the First Army's Radio Intelligence Section (also known as the G2A6) and to coordinate with the Radio Section, reported that at about 1450 his office in Toul decoded a message indicating that the Germans were expecting an attack by Allied troops. This likely was the message sent at 1425 from station GXT to station GFW that read "Strengthen by one brigade at the railroad emplacement. Expect enemy attack. 2 Battalion."[86] Matz passed this information by telephone to the AEF I Corps and the French XXXII Corps, and by telegraph to Chaumont. After he had done that, another message came in that stated this had been a practice message. Matz relayed this information to the same organizations.[87]

Later that afternoon, Captain d'Abboville, the chief of the Second Bureau of the French XXXII Corps, asked Matz to come to see him. Matz explained that he had just arrived in Toul and outlined his mission, remarking that he had tried to visit the captain earlier that day. D'Abboville thanked Matz and divulged to him that the message was authentic despite the practice message indicator Übung in its preamble. The French were planning an operation in front of the Thiacourt Sector (H-45) according to D'Abboville; D'Abboville, upon receipt of Matz's report, had notified the troops concerned. Matz agreed to send D'Abboville a daily report on all messages he was able to decode. Matz concluded that the Germans were prefixing messages with Übung to deceive the Radio Intelligence Section.[88]

Moorman sent Matz a note the next day congratulating him on his "first victory" and stating "that is what you were sent there for and we are all very pleased."[89]

Unable to Warn, July 16, 1918

First Army G2A6

Cryptanalysis. There were occasions when the analytic process did not move quickly enough to provide warning. On July 17, 1918, Matz noted a missed warning opportunity on the previous day. A message came on July 16, but it was not until the next morning the key was solved. The message indicated there would be heavy shelling at 2020 on July 16.[90] Also on July 17, Matz received a message about a US plane shot down in the St. Mihiel region, and that two officers had been captured. Matz provided this information to IV Corps.[91]

This incident is important because it reflects awareness on the part of the G2A6 of the shortfall in their message-solving process and shows attention to the cryptologists' mission of providing warning to Allied forces. The radio intelligence system had demonstrated its ability to provide quick turnaround of critical material in April, but the failure to warn in July reveals the ability to identify shortcomings in the interest of making improvements.

General Kress von Kressenstein Cipher, Early August 1918

AEF G2A6

Cryptanalysis. All the combatants—but particularly the Germans, the Ottomans, and the British—were interested in the region between the Black Sea and the Caspian Sea because the oil fields around Baku (the largest city on the Caspian Sea) had been supplying Europe since the early part of the century. Control of Baku by the Germans or their allies, the Ottomans, would enable the Germans to access resources denied to them by the British blockade of the North Sea. While this area, then known as the Russian Trans-Caucasus, was ostensibly controlled by Russia, that nation was in turmoil and unable to exert control. On May 28, 1918, the new Democratic Republic of Georgia, through

the Treaty of Poti, granted the Germans the right to protect their nation. General Friedrich Freiherr Kress von Kressenstein was sent to Tbilisi (then called Tiflis), the capital of Georgia, to manage German interests in the region.

The press intercept station at Chaumont began to see messages addressed to General Kress von Kressenstein in early July. These messages were of the Alachi ADFGVX cipher variety and used double transposition. They could be solved by Allied cryptanalysts with some effort, but not consistently. For a few days in early August, though, von Kressenstein used a simple substitution cipher, dubbed the 777 cipher by J. Rives Childs because of the 777 in the preamble of each message. The first message appeared on August 5 and revealed that the Ottomans had taken Baku without assistance from the Germans. It also revealed some of the steps von Kressenstein was taking to hinder his supposed allies. He did not use this system for long. By August 8, Chaumont intercepted a ciphered message (in the Richi ADFGVX cipher) from the chief intelligence officer in Berlin, telling von Kressenstein to stop using his homemade cipher.[92]

There was nothing extraordinary in the techniques used by the G2A6 and other Allied cryptanalysts to break these messages. Rather, the significance was that they revealed discord in the German-Ottoman relationship that could conceivably be exploited by the Allies. Similar observations of a rift between the two powers could be gleaned from other military and diplomatic intelligence, but those few days of messages unwisely transmitted in the simplest of ciphers revealed the insights that radio intelligence could provide in a crucial situation.

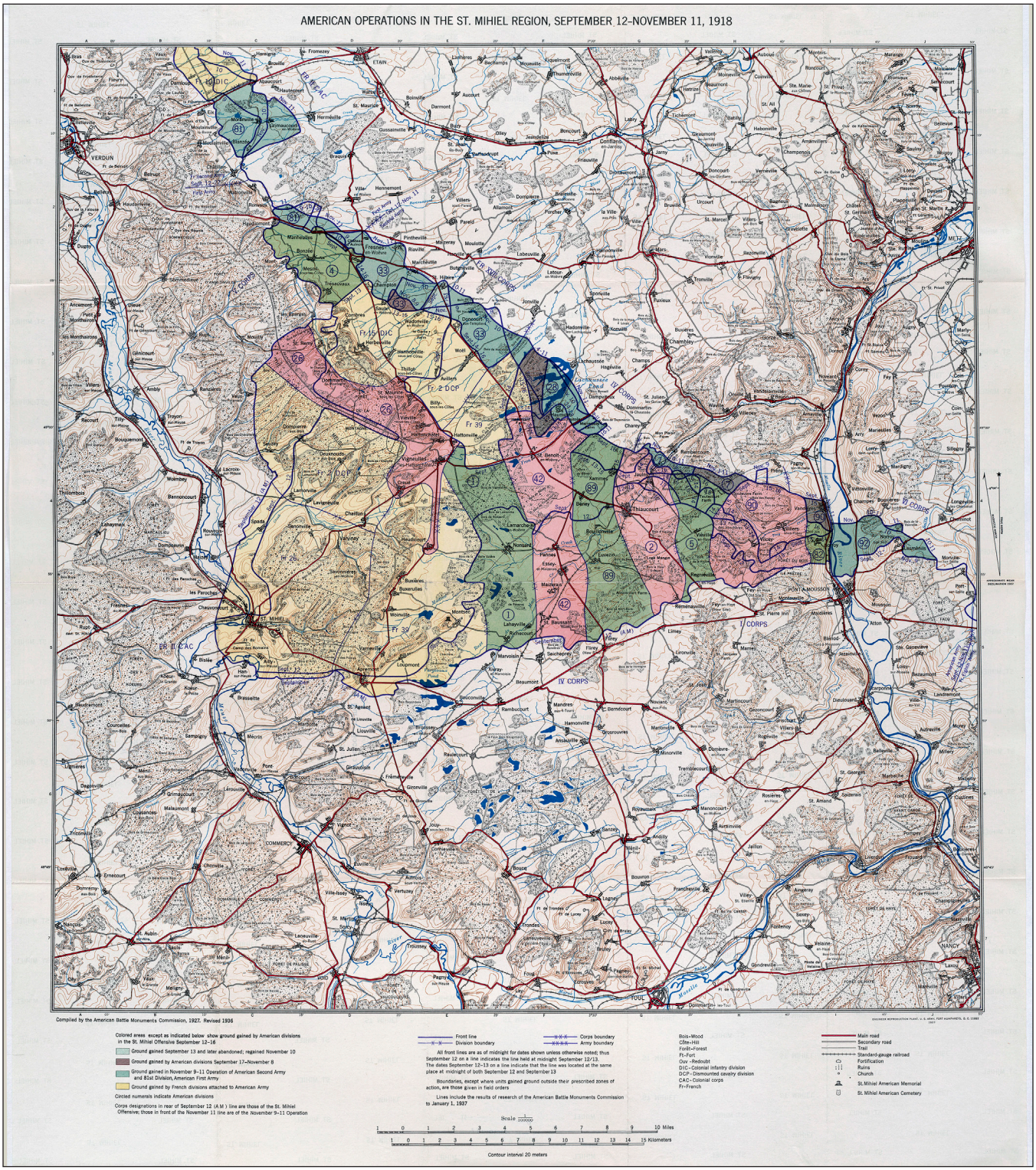
St. Mihiel Offensive, September 1918

AEF G2A6, First Army G2A6, AEF Radio Section

Collection, Traffic Analysis, Direction Finding, Cryptanalysis. It was in the weeks before the American offensive against the St. Mihiel salient (see map), and during the attack itself, that the AEF radio intelligence effort dramatically demonstrated its worth. The American attack was planned for September 12, 1918. A week before D day,[93] many sources of intelligence—particularly prisoner interrogations and aerial observation—indicated that the Germans would withdraw. The combined radio intelligence effort—the G2A6 at Chaumont, the First Army G2A6 at Ligny-en-Barrois, and the Radio Section collectors in their numerous stations—attempted to detect this withdrawal to confirm the general belief that the Germans were leaving the salient. General John J. Pershing had a decision to make about how, and if, the long-planned attack would occur. Radio intelligence was the key to that decision.

Starting in mid-August, German operating procedures had changed, and the volume of messages sent in the three-letter trench code increased considerably in the St. Mihiel Sector. The code for the H Sector changed on August 22, slightly earlier than expected, from Albert 16 (KRUSA type) to the newer KRUSÄ type, dubbed Albert 17.[94] The number of code groups per message had increased for several days as of August 27, and messages had identical groups as signature, which the analysts presumed to be the assumed names of military units. These changes were very pronounced in subsector H-25, the west side of the St. Mihiel salient. The weekly Code Section report for September 10 remarked that the use of the three-number code had fallen off in both the Verdun and St. Mihiel Sectors and that the messages were hard to decode—they appeared to be fake messages. Meanwhile, the volume of three-letter code messages was still at a high level.[95]

The AEF Radio Section goniometric collectors and G2A6 goniometric and traffic analysts were consistently making procedural improvements. In April, delays in transmitting station positions had made it difficult for the G2A6 to provide useful warning messages. But by early September, the Radio Section, thanks to the work of Lieutenants



American operations, St. Mihiel region, September 12-November 11, 1918. Courtesy of the American Battle Monuments Commission and the Virginia Tech Libraries; digitized by Digitized by Technology-enhanced Learning and Online Strategies (TLOS), Virginia Tech, Blacksburg. https://www.abmc.gov/sites/default/files/galleries/AABEvol01_map01.jpg

George Benjamin, Frank Ballard, and Fred E. Johnston, and Master Signal Electricians Virgil L. Long and Myron Tong, was able to deliver every report and message within an hour of intercept.[96]

Radio Section men occupied six American-run listening stations on the south side of the St. Mihiel salient and probably worked in several more sites run by the French Army and located in the Bois d'Apremont, in the southwest corner of the salient (see chapter 10). They were busy, for while the volume of ground telegraphy was down, the number of telephone conversations increased in the early days of September. The voices were new, they had different accents, and the speakers seemed unfamiliar with the area.[97]

Further deviation from the norm was observed on September 8, when the Radio Section reported unmistakable "signs of nervousness" along the southern side of the salient, with increasing activity (or chatter in modern terms) between September 8 and 11. The German radio station at the observation post on the Butte de Montsec was reported to be exceedingly active during that period, attributed by the G2 to the Germans reporting on US movements.[98]

Several of the listening stations, including Bois d'Apremont and Limey on September 9 and Flirey on September 10, noted abnormal conversations and reported that enemy ground telegraphy stations had moved back; the analytic interpretation was fear of surprise attack. Conditions remained normal on the western side of the salient; the analysts took this to mean that the Germans expected the United States to attack between St. Mihiel and the Moselle River.[99]

Corporal Ellis C. VanderPyl submitted a particularly comprehensive report on September 9 from his post at listening station Le Renard (near Flirey), noting that there were many new stations and commenting that he had "never received as large a number of calls as today." Some stations had drawn back, with one very close to the front testing communications with other stations. VanderPyl suggested "it may be that they know of what is coming here and this drawing back is done as a precaution."[100]

On the afternoon of September 11, analysis of the day's goniometric information revealed that all enemy radio stations were still in their normal positions and in operation—then judged to be an impossibility if the Germans had actually withdrawn, for they had never kept radio stations in operation as late as one day before a withdrawal (and would not have left the radio stations behind). The First Army Radio Intelligence Section, led by Matz, prepared a map showing that all the German radio stations were in their usual places and had been very active. Matz knew that the preponderance of the other intelligence indicated a withdrawal had taken place or was underway. Observation airplanes flying just before dark at a height of 100 meters had circled the German position at Montsec—not only had they not seen any enemy units, but the planes took no fire. The map, which Matz took to Colonel Willey Howell, the chief of the First Army G2, was the only direct evidence the Intelligence Section had that the Germans were still in place.[101]

Howell took the map to the staff meeting.[102] In his office at Ligny, Pershing was "urged by almost everyone present to call off the attack, as the terrific artillery barrages which were scheduled were likely to result in only a needless waste of ammunition. He was advised that it would be better to wait and occupy the salient later when all German forces had been withdrawn."[103] But Howell convinced the group that the barrage should be used as planned, based on the overwhelming evidence provided by radio intelligence showing that three lines of stations were in place.[104]

The barrage began at 0100 and the attack commenced at 0500. The Germans were still in the salient, although some units had indeed begun preparations for withdrawal. Had US forces attacked without the preparatory artillery fire, many more American lives may have been lost. The value of radio intelligence as a battlefield tool was proved on September 12, 1918. Matz expressed his pleasure to

Moorman, writing, "I think that shows that even if we never solve another code message we still have a right to live."[105]

There are many reasons why this clear-cut contribution of radio intelligence to success at St. Mihiel has been forgotten in the history of this pivotal American engagement. The St. Mihiel offensive itself quickly began to slip from memory followed, as it was, by the massive, bloody, seven-week Meuse-Argonne offensive that culminated in the Armistice. St. Mihiel has been greatly neglected by historians except as an example of things that went wrong and for the exploits of George Patton's tank unit.[106] The contributions of radio intelligence at St. Mihiel appear in many articles and lectures during the 1920s, but they start to disappear from accounts of the battle, and the war, in the 1930s. Even Nolan, who seems to have been impressed by the G2A6 effort at the time, by 1933 placed emphasis on the role of captured documents rather than radio intelligence. The decline in discussion of radio intelligence success is perhaps attributable to the chilling effect of the government reaction, in the form of changes to the Espionage Act in 1933, which resulted from the revelations of Herbert O. Yardley's *The American Black Chamber* (see chapter 15).

Radio intelligence continued to provide operational support once the offensive began. Although German radio stations showed great disorganization on September 13, the next day Matz's team was able to reconstruct new divisional networks and provide the G2 Order of Battle Section with valid divisional boundaries and locations of command posts.[107]

Another success during the St. Mihiel offensive was the warning of US troops three hours prior to a German counterattack. At 2115 on September 14, the site at Toul intercepted a message that was probably in the three-number code.[108] When broken, the message revealed Germans would counterattack in the area of the Souleuvre Farm, outside of Rembercourt. This attack was expected near midnight, and American forces were warned.[109]

This intercept was a critical piece of information in First Army Field Orders No. 12: "The enemy has made a considerable aeroplane [sic] concentration near Conflans. There has been considerable railroad activity today on the lines leading south through Mars-la-Tour, Conflans, and Chambley, indicating a possible enemy concentration. **An intercepted message stated he will counterattack tonight near Rembercourt.** Our patrols have crossed the Hindenburg Line in numerous places. The French II Army has occupied the towns of Wadronville, Saulx, Fresnes, Manheulles, Avillers, Riaville, Pintheville, and St-Hilaire. The army corps report further capture of enemy officers, soldiers, guns and materiel."[110]

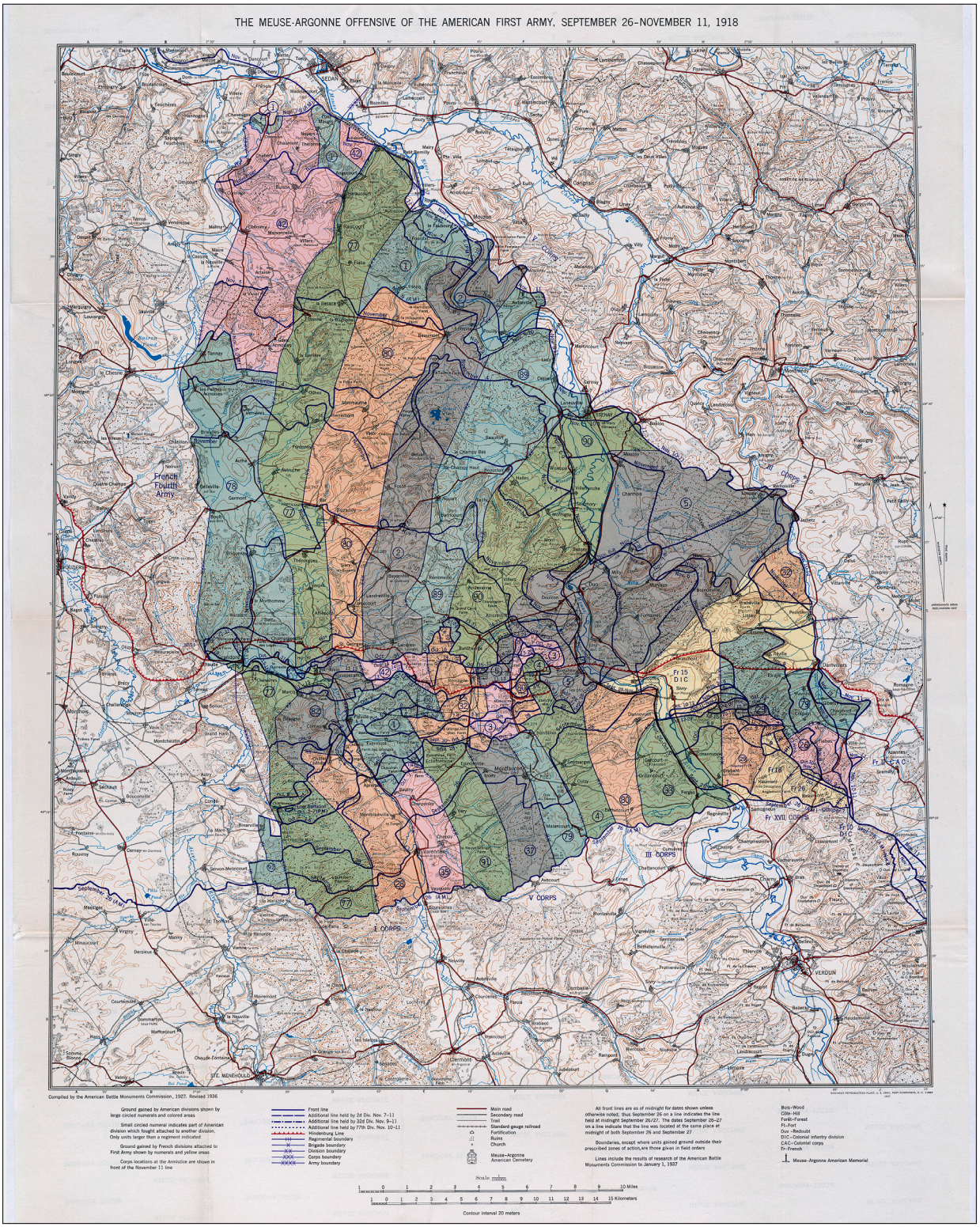
Although the attack appears not to have materialized,[111] the First Army Radio Intelligence Section continued to monitor the situation as the AEF worked to consolidate operations in the salient. The First Army would soon move on toward the Verdun Sector to prepare for their next offensive. The First Army Radio Intelligence Section did the same, confident that their work was making a difference in the fight.

Meuse-Argonne Offensive, September 26-November 11, 1918

AEF Radio Section and G2A6, First Army G2A6

Direction Finding, Traffic Analysis. Looking specifically at the mobile direction-finding effort, it seems unlikely that the AEF Radio Section would have spent all the time and effort on the gonio tractors if there had not been an expectation of success. The tractors were a wholly American innovation, and their movement was determined by the Americans alone, marking the first time that radio intelligence site locations were not influenced by the French.

The Germans did not make great use of radio in the initial stage of the battle in the Argonne Forest, but in the days prior to September 26, 1918, radio intelligence personnel noted the same opera-



The Meuse-Argonne Offensive of the American First Army, September 26-November 11, 1918. Courtesy of the American Battle Monuments Commission and the Virginia Tech Libraries; digitized by Technology-enhanced Learning and Online Strategies (TLOS) Virginia Tech, Blacksburg, VA. https://www.abmc.gov/sites/default/files/galleries/AABEvol01_map03.jpg

tor behaviors and signs of nervousness that they had seen prior to St. Mihiel.[112]

After the first phase of the Meuse-Argonne operation, one tractor was moved to the far west of the front while the others remained in Verdun. In early November as the front line advanced, the tractors did, too, and were put on high ground in newly gained territory.[113]

The November report of the Radio Division remarked: "The importance of having the goniometric stations mounted on tractors was fully demonstrated during the first part of the month, as otherwise, it would have been impracticable to keep the Radio Intelligence, General Staff, informed of the locations of the enemy stations due to the rapid progress made by the American forces and the rapid withdrawal of the enemy. These tractors being provided with undamped wave transmitter sets were able to send in bearings by radio direct to G-2."[114] Equipping the tractors with transmitters was an innovation that meant the G2 could then pass the intelligence to the commanders in the field.[115]

The report later noted there were excellent results from the radio intercept stations that had been moved to Verdun. Additionally, just prior to November 11, the Radio Section had been able to test a new system for communication between the Verdun area intercept and the aero gonio stations and the sound-ranging aviation and artillery, which seemed to have great potential.[116]

A G2 memo from late November agreed that the goniometric service had done excellent work for "despite daily changes in call letters of enemy stations your goniometric stations have made daily locations of nearly all enemy stations. The care and accuracy shown by operators has enabled us to follow the movements of enemy stations with precision and certainty. From such movements it has been possible to get much valuable information, obtainable from no other source in regard to enemy intentions."[117]

Robert Loghry was relieved as First Army chief radio officer on October 22 so that he might combine the radio activities of the First Army with those of the newly formed Second Army. Two intercept stations were moved from Souilly to Verdun on October 15 and 25, and two others, including one for aerial use, were established there on October 21. Three goniometric stations were placed in the Meuse-Argonne, at Ville-sur-Tourbe, Avocourt, and Verdun. A special telegraph wire sent intercept back to the G2A6 at AEF headquarters in Chaumont. A gonio net formed at Souilly with three secondary stations, one of which was held in reserve for the telegraph lines. After unsuccessful attempts to establish listening stations in the fast-changing front lines of the region, these stations were discontinued except on the extreme right of the American front in the Woëvre plain.[118]

During the period between the second and third phases of the Meuse-Argonne offensive, radio intelligence was on watch for changes in German posture. On October 17, Matz noticed a general withdrawal of radio stations west of the Meuse River. In the next week, almost every station between the Meuse and the Aisne Rivers—17 of them—disappeared. Stations began to reappear west of the Meuse but farther to the rear.[119]

Colonel Howell, First Army G2, credited radio intelligence as being "the most positive evidence thus far that the enemy is actually arranging a withdrawal," which "clearly shows that the enemy is organizing a zone of resistance back of the present lines…he may organize his zone of resistance in the Freya Stelling."[120] On about October 29, however, the German reorganization ceased, and, taken in combination with other information, it was decided that the enemy's plans for a withdrawal had been changed and that the current line would be held.[121]

After 10 days of monitoring "an extremely nervous attitude" on the part of German ground stations, a marked decrease of station activity was noticed on October 27. Operators reported that German radio stations in the sectors of the 13th Landwehr Division and the 94th Division appeared to have drawn back to positions between Fresnes

and Port-sur-Seille, much as had happened prior to the St. Mihiel offensive. Matz warned of a potential attack in this region.[122]

By watching the traffic and movements of German weather stations, analysts were able to report that by October 23 the Germans did not consider their line east of the Moselle River secure. By October 29, the fact that the German meteorological stations near Étain were twice put on alert and were sending an increased number of tactical messages strengthened an analytic conclusion that the Germans intended resistance in the area between Étain and the Moselle River.[123] Another indicator that an attack was feared between Étain and Pont-à-Mousson was a "markedly disproportionate" amount of artillery adjustment for 10 days at the end of October. Ten or more planes were monitored on each of seven days; on October 30, signals were intercepted from 33 different planes.[124] It seems highly likely that some of this activity was in response to radio deception efforts underway east of Verdun (see chapter 13).

While no single warning or intercept can be pinpointed as significant during the 47-day battle, there is little doubt that radio intelligence was now fully accepted as a valid form of battlefield intelligence in this last significant American battle of the war.

Mackensen Message, November 3, 1918

AEF G2A6

Cryptanalysis. Called the "most important message we have deciphered yet," most of a 13-part message from General August von Mackensen to the German High Command was intercepted by the press radio intercept station at Chaumont on November 3, 1918.[125] When broken, the message provided Mackensen's proposed retreat from Romania, where he had been the high commander of the army of occupation. Mackensen commanded an army group bearing his name, consisting of Bulgarians, Ottomans, Austro-Hungarians, and Germans, which had advanced into southern Romania in 1916 and taken Bucharest. Because of Allied success in Salonika and Bulgaria, the German High Command ordered Mackensen to prepare to withdraw on October 26. The Treaty of Mudros (between the Allies and the Ottoman Empire) on October 30 and the Armistice of Villa Giusti (between Italy and Austria-Hungary) on November 4 required all German troops to be out of Austria-Hungary within 15 days, making retreat a necessity.[126]

J. Rives Childs was the G2A6 expert on the ADFGVX cipher. The keys for the cipher changed daily on the Western Front but late in the war were often used for multiple days on the Eastern Front. On November 2, Childs solved, in just 90 minutes, the Eastern Front key used on November 1 and 2. When the Mackensen message was received on November 3, it was easily read, for it used the identical key.[127]

The message of November 3 read in part: "In case a general armistice cannot be expected in the immediate future, it is proposed that the army of occupation be withdrawn from Rumania (sic) at once and to start the march to Upper Silesia through Hungary, together with the German units of the [garble] Army. Approval is requested." As soon as the message was deciphered and translated, it was dispatched to the Supreme War Council in Versailles. It reached the decision makers there less than 48 hours after it was read by the German High Command.[128]

On November 5, a clear text German message intercepted at Chaumont from General von Weber to the Austrian High Command explained that von Weber had been trying to get the timeline for German troop withdrawal extended but had been unsuccessful, so that any German troops in Austria-Hungary after 15 days would be considered prisoners of war.[129] German forces began to leave Romania on November 7, and Mackensen left Bucharest on November 11, but travel was difficult. Multiple negotiations took place along the way; eventually all German troops were out of Austria-Hungary on

January 1, 1919. Mackensen and his staff were on a train that was halted in Budapest on December 16, 1918. They were interned first in that city and then taken into French custody and moved several times, finally ending up in Salonika, Greece. Mackensen was allowed to return to Germany on December 1, 1919.[130]

These pieces of intercept from high-power long-distance radio links showed the ability of radio intelligence to provide strategic information to decision makers in a timely fashion. While a French-Serbian army was already moving from Bulgaria toward Hungary and did not necessarily need to know Mackensen's intentions to complete their mission, the G2A6 clearly understood the importance of supplying current intelligence to the decision makers at Versailles.

False Armistice, Early November 1918

Navy

Collection. Harold Castner, an operator at Otter Cliffs, Maine, remembered that the German radio station at Nauen was "strangely silent" during the first week of November 1918. Then one day, "out of a clear sky," Nauen called out to Otter Cliffs. Castner recollected:

> This electrified everyone. It caused considerable excitement, as in cases of this kind, if you are attached to the military forces in time of war, you should be sure you know that only three people are permitted to communicate with the enemy in time of war. They are the President of the United States, the Secretary of the Army, and the Secretary of the Navy. The great question was what to do. It was settled by quick action. It was apparent that the Bar Harbor naval radio station was about to make history.
>
> Realizing that if one hint of this got out to the public, there would be a national upheaval, so, we immediately "put the ship to sea." This is a Naval custom of complete isolation, originating from prevailing conditions of a ship at sea. You cannot telephone, no one can leave, and no liberty of any kind.
>
> This practice is resorted to at times in case of theft or the disappearance of someone. Having made sure that we were isolated, we immediately forwarded the information to the Director of Naval Communications in Washington over our private wires and requested instructions.[131]

The station was ordered by Washington, under the signature of the secretary of the navy, to answer Nauen. The operators called the Nauen call sign, POZ, and sent a "QRU," meaning "Have you anything for me?" Nauen answered instantly, saying they had an urgent message for President Wilson that asked for an armistice.[132]

According to Castner, when the information leaked out on November 8, 1918, Washington denied it as a rumor.[133]

It is impossible to assess the validity of this story written decades after the fact. Widespread celebration of a false armistice happened in many places around the world on November 7—in France, the United States, Britain, and places as far-flung as New Zealand and Argentina. The celebration appears to have been triggered by a radio transmission, heard by many on November 7, declaring a temporary ceasefire so German delegates to the Armistice meeting in Compiègne could safely cross the lines.[134] This story does not match up with Castner's version in any way except the timing of the message.

Multiple messages from Nauen, reported as collected by "United States naval radio" on November 9 and 10, were published in *The Official U.S. Bulletin* of Monday, November 11, 1918.[135] These messages probably were sent once German anti-government forces took over the Nauen station just before the Armistice; their content is concerned with the abdication of the Kaiser and general unrest in Germany. As Castner does not specify the date of the false

Armistice message, it is possible that it was sent by the anti-government forces who had taken over the radio transmitter. Castner's tale remains an unsolved cryptologic mystery.

Berlin-Madrid Communications, Autumn 1918

Allied Cryptologic Agencies

Collection, Cryptanalysis. Communications between Germany's radio transmitter at Nauen and the radio station of the neutral but German-leaning government in Spain were of interest to all parties, and technological developments used on this link challenged Allied intelligence personnel. The communications remained of interest after the Armistice; however, exchange of information gleaned from this link was complicated by the fact that, once the war was over, political and military interests in Britain, France, and the United States diverged and there was no interest in sharing intercepted diplomatic communications.[136]

Transmissions between Nauen (the high-power radio station serving Berlin) and Madrid were first heard by the British and French in May 1916. They were unusual in character, described as a "rustle" or a "buzz" in the radio signal. Allied operators thought it an unusual sound and tried to figure out if it was a communication. Most often the noise was diagnosed simply as an odd form of static.[137]

An operator, believed to be in France, recorded the signal on a phonograph record. Reports say that the spring in the recording machine wound down, and as the operator went to wind it again, he realized that when the cylinder revolved slowly, he could hear identifiable Morse traffic. A machine was rigged to speed up the recording, so that when the buzz appeared it could then be re-run at a moderate rate of speed. Nauen and Madrid had been transmitting messages that were cut into a perforated roll, which was then run through the transmitter at a rate of 400 words per minute. This created the buzzing sound heard by intercept operators.[138] By recording and slowing down the transmission, code and cipher messages could be transcribed and decoded.

The Berlin-Madrid radio link was active and attracted attention throughout the war. The international agreement in September 1918, mandating exchange of intercepted radio messages going to and from the Western Hemisphere, did not include the Berlin-Madrid link, but that did not keep the Americans from collecting the traffic and trying to obtain information from Britain and France. On December 12, 1918, the MID's station at Houlton, Maine, collected 14 cipher messages sent between Berlin and Madrid. Seven messages (720 code groups) were deciphered by MI-8 and "proved of exceptional value."[139]

In his history of the French cipher bureau, Marcel Givierge discussed a series of letters he consulted and implied that after the Armistice, US Army Major Barclay H. Warburton approached the French to discuss ciphers being used on the Berlin-Madrid link. Givierge stressed that the interallied relationship had been limited to field radios rather than diplomatic traffic, although Warburton might have been provided some information.[140]

The lack of cooperation between the parties on this subject after the Armistice presages the next era of cryptology, where each country focused on diplomatic communications and did not find it in their political interests to exchange information.

Conclusion

Standard histories of the First World War largely overlook the success of the radio intelligence effort likely because the supporting details are buried in the archived records, although the superficial facts are present in many postwar accounts. Even with the details, it may be difficult for a researcher unfamiliar with radio intelligence to assess their accuracy and importance. While these contributions may not change our modern understanding of American offensives and engagements, they should be considered in future analyses of the role of intel-

ligence in preparation and warning and, in the case of St. Mihiel, in shaping the direction of American actions.

Radio intelligence, although a new discipline in 1918, had substance both in Washington and in France. While obscure to most, its accomplishments had proved the worth of the efforts to both commanders and decision makers.

Notes

1. David Kahn, *The Codebreakers* (New York: Scribner, 1967), 340-341.
2. According to John Ferris, "The British Army and Signals Intelligence in the Field During the First World War," *Intelligence and National Security* vol. 3/4 (1988): 45, signals intelligence was "the single best source on the enemy's order of battle, the fundamental aspect of Army intelligence."
3. Fletcher Pratt, *Secret and Urgent* (New York: Bobbs-Merrill, 1939), 247. Thomas M. Johnson, "Secrets of the Master Spies: Code and Cipher Stories of Statecraft and Battle," *Popular Mechanics Magazine* 57, no. 4 (April 1932): 636-637. Samuel T. Hubbard, *Memoirs of a Staff officer 1917-1919* (Tuckahoe, NY: Cardinal Associates, 1959), 105-133.
4. Pratt, *Secret and Urgent*, confirms Williams's role and particularly the call letters in the book; Johnson, "Secrets of the Master Spies," confirms Hubbard's role. Hubbard, *Memoirs of a Staff officer*, 105-133.
5. Pratt, *Secret and Urgent;* Johnson, "Secrets of the Master Spies"; Johnson, *Our Secret War: True American Spy Stories 1917-1919* (Indianapolis: Bobbs-Merrill, 1929), 41-42, for the use of the information by the British; Hubbard, *Memoirs of a Staff officer*, 105-133, particularly for the delivery of the information to London; Pratt, "G-2 Stuff," *The American Legion Magazine* 26, no. 1 (January 1939): 8-9, 46-47, calls it "one of the two greatest code and cipher coups of the war." The second great coup (the intercept of a message by the 42nd Division) cannot be verified and is discussed later in this chapter.
6. Herbert O. Yardley, *The American Black Chamber* (New York: Ballantine Books, 1931), chapter 6, "Two German Wireless Intercepts," 69-83; David Kahn, "Charles J. Mendelsohn and Why I Envy Him," *Cryptologia* 28, no. 1 (2004).
7. Marlborough Churchill to Chief of Staff, "Permanent Organization for Code and Cipher Investigation and Attack," May 16, 1919, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 165,

Records of the War Department General and Special Staff, Entry 65, Box 3862.

8. Dennis Nolan to Ralph Van Deman, "Enemy Cipher," January 10, 1918, NARA CP, RG 120, Records of the American Expeditionary Forces, Entry 105, Box 5761.
9. G2A6 Logbook, NARA CP, RG 120, Entry 105, Box 5769.
10. For example, public references in the decade after the war include *Youth's Companion* of July 3, 1919, 358; newspapers (such as "A Wireless Beat," Louisville *Courier-Journal,* September 7, 1919); William Moore, "The Jerry Who Spoiled the War," *The American Legion Weekly* 4, no. 35 (September 1, 1922): 7-8, 26-28; and Johnson, *Our Secret War* (and other works). Accounts by those who were there include Louis Krumm and Willis H. Taylor, "Wireless in the AEF," *The Wireless Age* (four parts) 6, no. 12 (September 1919): 12-18; 7, no. 1 (October 1919): 9-21; 7, no. 4 (January 1920): 12-19; and 7, no. 7 (April 1920): 10-14; Frank Moorman, "Code and Cipher in France," *Infantry Journal* XVI, no. 12 (June 1920): 1039-1044; and Robert Loghry, "Military Radio," *Radio* 4, no. 8 (August 1922): 10-12.
11. William Friedman, *Field Codes Used by the German Army During the World War* (Washington, DC: Office of the Chief Signal Officer, 1934), 8, accessed October 27, 2018, https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_437/41751269079046.pdf. First issued as an official G2A6 brochure on February 5, 1919, it was then published as a technical paper of the Signal Corps in 1934, and finally as Special Research History SRMA-012 by the National Security Agency, declassified in September 1972. This work can be found in many places but is most easily accessed online.
12. Friedman, *Field Codes Used by the German Army During the World War,* 8.
13. *Williams College in the World War* (New York: Schilling Press, 1926), 395, shows Matz was hospitalized March 10-24, 1918.
14. Osann either was not suited to cryptologic work or had skills needed elsewhere; he was transferred to another section in the G2 on April 30, 1918. G2A6 Logbook.
15. Friedman, *Field Codes Used by the German Army During the World War,* 66, credits Whitehead with making valuable suggestions for his account of the three-number code.
16. G2A6 Logbook; *Final Report of the Radio Intelligence Section, General Staff, General Headquarters American Expeditionary Forces 1918-1919,* Special Research History 014, NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 9.
17. "History of the Activities of the Radio Division," NARA CP, RG 120, Entry 2040, Box 131, 14. Sharing of traffic see Loghry, *History of the Radio Section*; Nolan to Major Hue (rendered as Hugh), December 17, 1917, NARA CP, RG 120, Entry 105, Box 5768.
18. Friedman, *Field Codes Used by the German Army During the World War,* 71.
19. Moorman, "Code and Cipher in France," 1039-1044. Moorman appears to be quoting Nolan, chapter on codes and ciphers, first draft of proposed history of World War I (unpublished manuscript, n.d.), 7, US Army Military History Institute, Carlisle Barracks, Dennis E. Nolan Papers.
20. Friedman, *Field Codes Used by the German Army During the World War.* "Big scoop" noted in Loghry, "Military Radio," 10-12.
21. Moore, "The Jerry Who Spoiled the War," 27.
22. Friedman, *Field Codes Used by the German Army During the World War,* 66-85; G2A6 Logbook.
23. Nolan, chapter on codes and ciphers, 7.
24. G2A6 Logbook for location of Berthold. Attribution to Berthold comes from Moore, "The Jerry Who Spoiled the War," 26: "Captain Hugo A. Berthold, Coast Artillery, a New York lawyer in civil life, was assigned to the job. He was assisted by other officers in his group. He set to work in the methodical way employed by code experts, checking off each figure and group in the new code and in the old."
25. Krumm and Taylor, "Wireless in the AEF" (January 1920), 13.
26. Krumm and Taylor, "Wireless in the AEF" (September 1919), 13; Krumm takes the quote

from a memo written by Nolan to AEF Chief Signal Officer (CSO) Edgar Russel, November, 25, 1918, NARA CP, RG 120, Entry 2040, Box 172. Nolan's statement was used in his final report, "Final Report of Assistant Chief of Staff, G2," June 15, 1919, *The United States Army in The World War 1917-1919*, vol. 13 (Washington, DC: Center for Military History, 1948), 20.

27. Friedman, *Field Codes Used by the German Army During the World War,* 71.
28. G2A6 Logbook.
29. Johnson, *Our Secret War*, 40; Friedman*, Field Codes Used by the German Army During the World War,* 82.
30. G2A6 Logbook; Memorandum on duties and assignments, April 1, 1918, Randolph-Macon College Flavia Reed Owen Special Collections and Archives (RMC), J. Rives Childs Collection (JRC), Folder 2.
31. AEF Signal Corps history, NARA CP, RG 120, Entry 2041, Box 42.
32. Peter Lambert Schauble, *The First Battalion: The Story of the 406th Telegraph Battalion Signal Corps, U.S. Army* (Philadelphia: The Bell Telephone Company of Pennsylvania, 1921), 132.
33. Schauble, *The First Battalion*, 136-137.
34. Chief Signal Officer to Radio Section, April 26, 1918, NARA CP, RG 120, Entry 2942, Box 1.
35. Daily Code Section Report, April 24, 1918, NARA CP, RG 120, Entry 105, Box 5754.
36. William Dearden to A. L. Conger, April 29, 1918, NARA CP, RG 120, Entry 105, Box 5760A. Note this material is tucked in the back of a folder of intercept from the Chaumont radio station and is not logically placed in the collection.
37. Dearden to Conger, April 29, 1918.
38. Memos from Hubbard and Dearden, April 29, 1918, NARA CP, RG 120, Entry 129, Box 5875.
39. Daily Code Section Report for April 26, 1918, NARA CP, RG 120, Entry 105, Box 5754.
40. Nolan to Edgar Russel, November 25, 1918, NARA CP, RG 120, Entry 105, Box 5761.
41. Fox Conner (AEF G3) to Nolan, April 29, 1918, NARA CP, RG 120, Entry 129, Box 5875.
42. Conner to Nolan, April 29, 1918.
43. Conger to Conner, April 29, 1918, NARA CP, RG 120, Entry 129, Box 5875.
44. Memos from Hubbard and Dearden, April 29, 1918.
45. Transcript of telephone message from Lieutenant Colonel Williams for Major Moorman, 1845 on April 25, 1918, NARA CP, RG 120, Entry 105, Box 5761.
46. Lieutenant Colonel Moorman, Lecture Delivered to the Officers of the Military Intelligence Division, February 13, 1920, copy courtesy of US Army Intelligence and Security Command (INSCOM) History Office.
47. Major Conger, "G-2-A at General Headquarters, AEF," lecture given to the Military Intelligence Division, March 1, 1920, NARA CP, RG 319, Records of the Army Staff, Entry 1218, Box 1.
48. Moorman, April 29, 1918, NARA CP, RG 120, Entry 129, Box 5875.
49. Nolan, chapter on codes and ciphers, 8; Krumm and Taylor, "Wireless in the AEF" (January 1920), 13.
50. Moorman to Colonel Dengler, May 10, 1918, summarizing information provided by the Radio Intelligence Section that was not obtained from any other source, NARA CP, RG 120, Entry 105, Box 5761.
51. Draft memorandum for the Chief of Staff, April 29, 1918, Center for Cryptologic History File Series II.F.2.20, copy held by author.
52. Decrypted message dated April 28, 1918, signed by Lee West Sellers with Dearden's annotations, NARA CP, RG 120, Entry 105, Box 5760A. Note this material is tucked in the back of a folder of intercept from the Chaumont radio station and is not logically placed in the collection.
53. Dearden to Conger, April 29, 1918.
54. Dearden to Conger, April 29, 1918. One source says the information was passed by 0010. Draft memorandum for the Chief of Staff, April 29, 1918.
55. Nolan to Russel, November 25, 1918.
56. Moorman Lecture, February 13, 1920.
57. Hubbard, *Memoirs of a Staff officer,* 57-63.
58. Moorman, "Code and Cipher in France," 1039-1044.

59. Friedman, "World War I Codes and Ciphers," Lecture at SCAMP 1958, William F. Friedman Collection, accessed October 21, 2021, https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/lectures-speeches/FOLDER_019/41700509073984.pdf.
60. Daily Code Section Reports, April 5 and April 9, 1918, NARA CP, RG 120, Entry 105, Box 5754.
61. Moore, "The Jerry Who Spoiled the War," 8.
62. J. Rives Childs, in a 1977 letter to Center for Cryptologic History historian Hank Schorreck, called the article "a curious compound of truth and non-truth." Childs to Hank Schorreck, December 9, 1977, NARA CP, RG 457, Entry P11, Box 85.
63. Moorman to Colonel Dengler, May 10, 1918.
64. German Field Radio Stations Report for the week ending May 9, 1918 and May 15, 1918, NARA CP, RG 120, Entry 105, Box 5753.
65. Multiple MID files relating to the Waberski case found in NARA CP, RG 165, Entry 65, Box 3453. Details of the case also discussed in Yardley, *The American Black Chamber*, 84-107. Also see John F. Dooley, *Codes, Ciphers and Spies: Tales of Military Intelligence in World War I* (New York: Springer, 2016), 194.
66. Office of Military Intelligence, Seattle, Washington to MID Washington, May 8, 1918, NARA CP, RG 165, Entry 65, Box 3453. Dooley, *Codes, Ciphers and Spies*, 193-194.
67. Van Deman, "Memorandum," April 8, 1949, 62-63, in "FOIA: Van Deman, Ralph H. HQ_2," Internet Archive, accessed February 22, 2018, https://archive.org/details/foia_Van_Deman_Ralph_H.-HQ-2, 86-87.
68. Van Deman to Intelligence Officer, Southern Department, May 21, 1918, NARA CP, RG 165, Entry 65, Box 3453. Trial documents, NARA CP, RG 165, Entry 65, Box 3453.
69. Yardley, *The American Black Chamber,* 85, 94.
70. John Matthews Manly, "Waberski," in Dooley, *Codes, Ciphers and Spies*, 195.
71. Manly, "Waberski," 203-205.
72. Van Deman to Robert L. Barnes, detailing the contents of the Witzke message, May 21, 1918, RG 165, Entry 65, Box 3453.
73. Barnes to Churchill, July 3, 1918, NARA CP, RG 165, Entry 65, Box 3453.
74. Churchill to Barnes, July 13, 1918, NARA CP, RG 165, Entry 65, Box 3453.
75. Churchill to Barnes, telegram, August 8, 1918; Barnes to MILSTAFF, telegram, August 10, 1918. Both in NARA CP, RG 165, Entry 65, Box 3453.
76. Typed note on telegram received from Barnes, August 7, 1918, NARA CP, RG 165, Entry 65, Box 3453.
77. Telegram from MID to Barnes, August 9, 1918, NARA CP, RG 165, Entry 65, Box 3453.
78. Mary Lue Hitt to David Kahn, n.d., Parker Hitt Collection within the David Kahn Collection of the National Cryptologic Museum Library, folder "Miscellaneous Items."
79. Dooley, *Codes, Ciphers and Spies*, 206.
80. Pratt, "G-2 Stuff," 46-47. Pratt mentions the same event in far less detail in his book *Secret and Urgent,* 243.
81. Weekly Reports of the G2A6 for June and July 1918 were examined by the author in detail; they are found in NARA CP, RG 120, Entry 105, Box 5754. No account of this success appears in any of the G2A6 final reports written after the war, and it is not mentioned by Moorman in his later article and lecture.
82. Kahn, *The Codebreakers*, 340-347.
83. This is discussed at length in Kahn, *The Codebreakers*, 346-347.
84. Michael S. Neiberg (PhD, chair of War Studies, School of Strategic Landpower, US Army War College) in discussion with the author, September 25 and 30, 2018. In Neiberg's talk at the April 2018 Virginia Military Institute symposium on World War I he said Foch referenced an intercepted message revealing German intentions regarding what became the Second Battle of the Marne. Neiberg came across this information while researching his 2008 book *The Second Battle of the Marne*.
85. The G2A6 records in NARA appear to be largely complete; the only noticeable missing items

are logs and other records that should have been received from listening stations as well as many of the large maps used to plot direction finding. It seems unlikely that records for such a significant success story would not be in the files or later reports, even if the original intercept did not survive.

86. Daily Code Section Report for June 14, 1918, NARA CP, RG 120, Entry 105, Box 5754.
87. Charles Matz to Moorman, June 15, 1918, NARA CP, RG 120, Entry 105, Box 5768.
88. Matz to Moorman, June 15, 1918. This successful warning is also discussed in Nolan, chapter on codes and ciphers, 9; Krumm and Taylor, "Wireless in the AEF" (January 1920), 13; and in Nolan to Russel, November 25, 1918.
89. Moorman to Matz, June 15, 1918, NARA CP, RG 120, Entry 105, Box 5767.
90. Matz to Moorman, July 17, 1918, NARA CP, RG 120, Entry 105, Box 5755.
91. Matz to Moorman, July 17, 1918.
92. Childs, "The History and Principles of German Military Ciphers 1914-1918" (unpublished manuscript, n.d.), 7-35, National Cryptologic Museum Library; this source goes into exhaustive detail about breaking both cipher systems.
93. The St. Mihiel attack was the first time that the terms D day and H hour were used by the American Army.
94. Weekly Code Section report, August 27, 1918, NARA CP, RG 120, Entry 105, Box 6696.
95. Weekly Code Section report, September 10, 1918, NARA CP, RG 120, Entry 105, Box 6696.
96. G. W. Henyan, Narrative 125, December 1, 1918, NARA CP, RG 120, Entry 2040, Box 130.
97. First Army, Summary of Intelligence No. 8, September 6, 1918, NARA CP, RG 120, Entry 765, Box 11.
98. Listening Station Report for week ending September 12, 1918, September 14, 1918, NARA CP, RG 120, Entry 24, Box 3367.
99. Listening Station Report for week ending September 12, 1918, September 14, 1918.
100. Within a memo from Moorman to Matz commending VanderPyl's work, September 16, 1918, NARA CP, RG 120, Entry 105, Box 5765.
101. Matz to Moorman, September 16, 1918, NARA CP, RG 120, Entry 105, Box 5767.
102. While a few postwar accounts of the meeting imply that Matz was there, Matz's own account does not.
103. L. W. Comstock, Lecture to Post-Graduate Students, June 22, 1926, NARA CP, RG 38, Records of the Office of the Chief of Naval Operations, Entry 1029, Box 32.
104. Matz to Moorman, September 16, 1918. The same conclusion is drawn by many others, including Comstock, Lecture, June 22, 1926; Krumm and Taylor, "Wireless in the AEF" (January 1920), 12; Moore, "The Crisis of St. Mihiel," *The American Legion Weekly* 4, No. 23 (June 9, 1922): 7-8, 26; and Johnson, *Our Secret War*, 15-16.
105. Matz to Moorman, September 16, 1918.
106. This is changing; see Mark E. Groteluesch en, "The Doughboys Make Good: American Victories at St. Mihiel and Blanc Mont Ridge," *Army History*, no. 87 (Spring 2013): 7-16; as well as that author's forthcoming book on the St. Mihiel offensive.
107. Matz to Moorman, September 16, 1918.
108. Daily Code Section Report, September 17, 1918, NARA CP, RG 120, Entry 105, Box 5754.
109. "Functioning of the Radio Intelligence Section During the St. Mihiel Operation, August 10-September 16, 1918," G2 Report, n.d., NARA CP, RG 120, Entry 105, Box 5761.
110. *The United States Army in The World War 1917-1919*, vol. 8, 262.
111. James H. Hallas, *Squandered Victory: The American First Army at St. Mihiel* (Westport, CT: Praeger, 1995), 202.
112. Some examples can be found in the late September 1918 reports on German radio stations, NARA CP, RG 120, Entry 24, Box 3367.
113. See chapter 10 for the location of the tractors over the course of the offensive.
114. *Monthly Report of the Radio Division,* November 1918, NARA CP, RG 120, Entry 2042, Box 36.
115. *Monthly Report of the Radio Division,* November 1918.

116. *Monthly Report of the Radio Division,* November 1918.
117. *Annual Report of the Chief Signal Officer to the Secretary of War 1919* (Washington, DC: Government Printing Office, 1919), 467.
118. *Monthly Report of the Radio Division*, November 1918.
119. *Final Report of the Radio Intelligence Section, General Staff, General Headquarters American Expeditionary Forces 1918-1919,* Special Research History 014, NARA CP, RG 457, Entry 9002, Box 9.
120. Willey Howell to First Army Chief of Staff, "Indications, pro and con, of enemy withdrawal plan," October 28, 1919, NARA CP, RG 120, Entry 765, Box 19.
121. Matz, "Final Report of First Army," November 15, 1918, in *Final Report of the Radio Intelligence Section,* Enclosure C, 26-29.
122. Matz, "Final Report of First Army"; *The German and American Combined Daily Order of Battle, 25 September 1918-11 November 1918* (Chaumont, France: The General Staff Intelligence Section, 1919), 19.
123. *Final Report of the Radio Intelligence Section,* Enclosure A, 23-25.
124. *Final Report of the Radio Intelligence Section,* Enclosure A, 23-25.
125. Parts 3 and 9 were not intercepted, and part 13 was only partially intercepted. G2A6 Logbook; Special Code Section Report, November 5, 1918, RMC, JRC.
126. Glenn R. Torrey, *The Romanian Battlefront in World War I* (Lawrence: University Press of Kansas, 2011), 299-318.
127. Childs, "My Recollections of G.2 A.6," *Cryptologia* 2, no. 3 (1978): 212. Details of Childs's solution can be found in his unpublished manuscript, "The History and Principles of German Military Ciphers, 1914-1918."
128. Nolan, chapter on codes and ciphers, 9.
129. Special Code Section Report, November 5, 1918.
130. Torrey, *The Romanian Battlefront in World War I*, 299-318.
131. Harold Castner, "Human Interest Stories Concerning Personalities, Events, and Experiences at the United States Naval Radio Station Bar Harbor, Maine, World War I," 188, National Archives and Records Administration, Boston, RG 181, Records of Naval Districts and Shore Establishments, Naval Security Group Activity Winter Harbor, ME (NSGA WH), Box P, 232-234.
132. Castner, "Human Interest Stories," 232-234.
133. Castner, "Human Interest Stories," 232-234.
134. The False Armistice, accessed September 8, 2018, http://www.centnarynews.com/article/the-false-armistice---7-november-1918.
135. *The Official US Bulletin* was published every weekday by the Committee on Public Information, the US government's press and propaganda service.
136. Betsy Rohaly Smoot, "Impermanent Alliances: Cryptologic Cooperation between the United States, Britain, and France on the Western Front, 1917–1918," *Intelligence and National Security* 32, no. 3 (2017): 365–77.
137. "Freaks of War Wireless: How the Phonograph Turned Detective and Solved a Wireless Mystery," *Scientific American* 63, no. 2 (October 11, 1919): 365; also appears as "The Phonograph as a Wireless Detective," *Literary Digest* 63, no. 8 (November 22, 1919): 29.
138. "Freaks of War Wireless," 365; "The Phonograph as a Wireless Detective," 29.
139. Carl Kinsley, memorandum for the record, "The Houlton, Maine Radio Station," March 8, 1919, NARA CP, RG 165, Entry 65, Box 69.
140. Marcel Givierge, "Étude historique sur la Section du chiffre au Ministère de la Guerre (1889-1919)," vols. V and VI (unpublished manuscript, n.d.), National Cryptologic Museum Library.

Chapter 12

Communications Security

The US Navy, with a long history of practicing communications security and using codes and ciphers, was best prepared for the challenges of wartime operation, and the American Expeditionary Forces (AEF) was the least prepared. The vulnerability of radio to interception was well known to both services and all the combatant forces. The United States made serious, centralized efforts to secure critical information from enemy exploitation despite beginning the war with limited experience and tools.

This chapter will look at specific examples of communications security practices and interesting stories on the subject. It focuses on the massive effort confronted by the AEF in France. See the appendices for brief descriptions of code and cipher systems, official and unofficial, used by the US Navy and by the US Army, specifically the AEF and the Military Intelligence Division (MID) Code and Cipher Section (MI-8).

AEF Communications Security Practices

The AEF senior commanders, intelligence staff, and members of the Signal Corps were extremely conscious of the criticality of good communications security—protecting the secrecy of operational information from an enemy who was always listening. Then as now, agreement on the importance of secrecy and the urgent press of operations sometimes conflicted; as a result personnel often made the choice to transmit material quickly and easily rather than securely. Despite the attempt to centralize cryptographic operations, some commanders and individuals chose to develop their own codes and ciphers, which were usually insecure and frequently caused confusion.

In the void between the arrival of American troops and the promulgation of code and cipher guidelines in March 1918 (and the dissemination of unit codewords in September 1918), American forces employed an undisciplined mishmash of coded language and homemade call words. The AEF did not have a preplanned set of call signs, frequencies, and codes and ciphers ready when they arrived in France; all these things had to be created once on the ground. Understandably, local commanders, with varying degrees of security awareness, created their own plans.

Despite the fact that these practices were explicitly forbidden in the AEF's March 1918 "Instructions for Use of Code and Cipher in the Armies and Lower Units," the four most prevalent violations committed by radio operators of the AEF were the following:[1]

1. Use of plain language in the same message with code or cipher

2. Repetition of a message in any code or cipher other than that in which first sent

3. Repetition of a code or cipher message in plain language

4. Repetition of a plain language message in code or cipher.

The instructions were prepared by Frank Moorman following a careful study of the Signal Corps system of communications established for the 1st Division in February 1918.[2] Moorman recommended that the Signal Corps prepare a general order about the use of code and cipher; he believed that this responsibility fell under the Signal Corps's duty to establish operating regulations.[3] Edgar Russel, the chief signal officer of the AEF, demurred and suggested that the G2A6 was better placed to issue such regulations.[4] The very respectful attempts to assign responsibility for communications security reflect underlying tension in the split of cryptologic duties between the intelligence organization and the Signal Corps. Moorman took on the work, with some guidance from Parker Hitt, and followed these instructions with a memorandum on the "Use of Code and Cipher by the A.E.F." in the summer of 1918, which discussed the encryption methods then put in place by the AEF; recommendations for handling, disseminating, and reissuing codebooks; and guidance on the use of ciphers. This became AEF General Order 103 dated June 26, 1918.[5] (See appendix E.)

In March 1918, Moorman suggested that army corps schools add a short course in the use of codes and ciphers to their curriculum—suggesting a day broken into five periods of 45 minutes each. The course would cover the AEF code system, the importance of following instructions, terminology, and practice, as well as time for discussion. Moorman noted that "at least 75% of our success in solving German code and cipher messages is due to carelessness and easily avoidable mistakes on the part of German operators. Unless our troops are impressed with the absolute necessity of following, and do follow, instructions in use of codes and ciphers, the Germans will read our messages almost as soon as the person to whom addressed."[6]

Moorman was relentless in finding methods to get officers to take communications security seriously. On June 20, 1918, he recommended to the G2 that officers, in groups of 12, be sent to G2A6 to get instruction in the use of American codes. He reminded the G2 of that recommendation on September 26, noting that the experience of the First Army showed the importance of such training. The army had, since its formation, "kept the enemy informed of its battle order and given much valuable information as to location and intention of troops in reserve. Our code has been used in such way as to make its solution by the enemy certain." Moorman blamed this situation on the officers' lack of appreciation of the care needed using the radio, telephone, and code, hoping that training would cause them to make a greater effort to comply. "If they could see how very far from simple the German codes now are, and the methods used by our code men to solve them, they would be able to prepare messages so as to give the German code section some very interesting work."[7]

Lamenting the fact that, as far as American use of codes at the time, there was "little need for a German code section," Moorman claimed that "two or three officers with a stenographer could, and probably do, give commanders fairly complete information as to our battle order and probably intentions." The situation had become so bad that the First Army had demanded that one of Moorman's codebreakers, "a highly trained specialist," be sent to the army message center to code and decode operational messages, leaving a vacancy in the G2A6 that was difficult to fill as well as putting a specialist in a job he was not trained to do. Moorman recognized it was "too late to do much in the way of reform in our use of code this Fall," but suggested that before March 1919 he could train about 60 officers who would be able to spread the word. Dennis Nolan

forwarded a shortened version of Moorman's proposal to the AEF chief of staff the same day.[8]

Perhaps as a result of Moorman's memo, on September 30, 1918, the G2 appointed a board on the use of code by the AEF, consisting of Brigadier General George S. Gibbs (representing the Signal Corps and the G4 [Logistics]), Colonel S. R. Gleaves (representing G3 [Operations]), Moorman (representing G2 [Intelligence]), and Major L. T. Walker (representing G1 [Personnel]). After several meetings, on October 11, they recommended the publication of a general order on the use of codes. This became AEF General Order 190 issued on October 29, 1918. (See appendix E.[9])

As the Meuse-Argonne offensive raged on in mid-October, Lieutenant Erwin Falk of the G2A6 sent a memorandum to Moorman concerning the negative impact the scheme of training officers on the use of code might have on the office. Falk was concerned that having large numbers of people rotating through the office for training would be disruptive and suggested that someone should instead be sent to the headquarters for each army corps to provide training. He also suggested that perhaps if personal contact were made by one-on-one instruction, an officer with a question about using codes would not hesitate to call on an instructor in the future. Falk was also concerned about keeping the work of the office secret and felt the constant flow of officers would lead to a betrayal at some point.[10]

Even in the midst of battle, commanders spent time pushing back against communications security violation notices they had received. Major General Edward F. McGlachlin, commanding artillery for the First Army, protested a violation received by his organization. McGlachlin acknowledged that the enemy may listen in on telephone lines as much as five kilometers from the front line, but that this was no reason "why all use of telephone should be prohibited, nor is it any reason that if the telephone be used all messages should necessarily be first coded. Consideration must be given as to whether the intended conversation would be of any value to the enemy." First Army G2 Colonel Willey Howell's reply hedges on the matter a bit:

> It should be remembered that the enemy has listening-in sets and wireless intercept stations which enable him to pick up a great many of our front line messages. He has also, doubtless, a set of code experts who spend their time trying to discover our code and decoding our messages. Under these conditions it is practically impossible to keep the enemy from getting hold of the information sent by telephone, telegraph and wireless within about five kilometers of the front. The best that can be done in any event is to give him so much trouble in connection with the securing of the information that it will be valueless by the time he is in position to use it. If the information or order would afford him no assistance in the beginning there is no apparent reason for not sending it in the clear by any of the available means of communication. I think that this principle probably should be published to the command and that restrictions on the use of the available means of communication should be removed with the general understanding that disciplinary action will be visited in all cases where poor judgement is used in the connection referred to.[11]

In his final report, Moorman suggested that each headquarters should have an officer who understood the use of codes and the importance of communications security. When William Friedman republished the report, he added that "it took twenty years for this recommendation to be put into practice for it was only in 1938 that the War Department directed that at each headquarters a security officer be designated to insure the observance of the rules of cryptographic security."[12]

Testing Pletts's Cipher Device

British cryptologist John St. Vincent Pletts, who worked in MI1(b) in the British War Office, invent-

ed a cipher wheel that used two mixed alphabets. John Powell saw the device in operation during his trip to London in February 1918 and made a favorable report to Colonel Ralph Van Deman when he returned to Washington. On April 20, Van Deman approached Colonel Charles French of MI1(b) and asked if it would be possible for the United States to use the device, and, if so, should Pletts be compensated; the British responded that they did not mind if the United States wanted to use the device and that "some small sum" might be appropriate for Pletts.[13]

When Major Malcolm Hay of MI1(b) and Captain Oswald Hitchings visited Chaumont in early May 1918, they demonstrated the device to Moorman and others at headquarters. Moorman described the device as "very ingenious" and noted that neither he nor Hitt (then serving as assistant to AEF Chief Signal Officer Edgar Russel) had yet found a quick solution for messages enciphered by Pletts's device. Mulling over the pros and cons of using it, he hoped to have some of the men of the G2A6 test it out and asked that it be sent to Washington.[14] Moorman was cautious in general about using cipher and on May 28 recommended that the device not be adopted until there were more tests.[15]

By late May, the device had found its way to Herbert O. Yardley in MI-8, via Joseph O. Mauborgne in the office of the army's chief signal officer.[16] It seems likely that Mauborgne would have examined the device, though no record of his thoughts has been found to date. The MI-8 examination in early June pronounced it superior to the Wheatstone cryptograph (of which it was a modification). According to the initial report, "our study of it has brought to light several important characteristics of its operation but none as yet which indicates that there is any possibility of solving a single message when the alphabets are unknown. It seems possible, however, to solve several messages enciphered with the same unknown alphabets and keys."[17] But within a couple of weeks, the MID reported that "the attention of the British War Office has been called to the vulnerability of the Pletts Cipher machine."[18]

The device was also sent to Riverbank Laboratories for evaluation where William Friedman, working with his wife, cryptologist Elizebeth Friedman, in the days before he left for France, was able to exploit a weakness after studying just six messages, each of only 40 letters, and all enciphered using the same key word.[19] Elizebeth remembered there being five messages and she disclosed how the two had discovered the key word for the device's inner disc. William had determined that the key word for the outer disc was "cipher" and he had Elizebeth stop her work, lean back in the chair, close her eyes, and make her mind blank; he then asked her what was the first word she thought of when he said "cipher." Elizebeth replied "machine," and that was the right key word. The messages were solved in three hours.[20]

On June 11, 1918, the MID notified Major Stephen L'Hommedieu Slocum, the military attaché in London, that the "system is considered dangerous in presence of enemy."[21] The Pletts device was rejected by the AEF on June 19, as it had been by the MID. Moorman reported that he had "personally made a careful study of this cipher, and find solution less difficult than at first appeared. In my opinion, this cipher should not be used by our services."[22]

William Friedman later had cause for amusement in August 1918 when he asked J. Rives Childs, just back from a trip to London, whether the British were doing anything with devices. Childs told him that on his last trip to London he mentioned the Pletts cipher to Malcolm Hay who exclaimed to Childs, "Oh we've dropped that. Your people got into it" before immediately changing the subject. In a letter to Elizebeth, William wondered who might be "getting the credit" for their solution.[23]

The Insecure Trench Code and Childs's Test

Many stories have been written about the discovery that the first American trench code was insecure, and the most widely known version, provided

by Yardley in *The American Black Chamber*, is incorrect. Yardley tells of a young officer in France (Lieutenant Childs), trained by Yardley's office in Washington, who "induced" his superiors to intercept American radio codes. In Yardley's version, Childs, a novice cryptologist, solves the codes with no knowledge of how they are constructed in a matter of hours and finds that the messages have given away the disposition of troops in the St. Mihiel salient and the start time for the American operation in September 1918.[24] This version of events outraged William Friedman, who was not even present in Chaumont at the time the code was examined, to the point that he went to great lengths to track down the accounts of all involved and thus preserved documentation of the real story.[25]

As discussed previously (see chapter 9), this trench code was a relatively simple one-part code that included encipherment tables and put a great deal of work onto the individual charged with coding the message. The code did not have to be completely secure; it just had to protect information for tactical purposes. The encipherment may have accomplished that job; however, if the codebook itself was captured by the Germans, the whole system would be vulnerable.

On May 17, 1918,[26] Hitt paid a visit to Howard Barnes in the Code Compilation Section office; according to Childs, Hitt was "appalled" by the simplicity of the trench code. He left the Code Compilation Section in Building A and rushed across the headquarters courtyard to Building C, "very hot and bothered" to discuss the matter with Moorman.[27]

Moorman and Hitt devised a test and picked Childs, who had little experience with codes using superencipherment, as the cryptologist who would try to break the code. Childs was given the codebook, since Hitt wanted to know if the encipherment could be solved if the codebook was captured. Moorman and Hitt provided 44 enciphered messages to Childs but did not tell Childs anything about the encipherment system. Childs also had one of the army field clerks to assist him (it is not known which clerk assisted).[28]

The clerk spent the first three-and-a-half hours making letter frequency counts; at the 90-minute mark, the first letters of the cipher were identified, and, at the end of the third hour, the word *killed* was solved. By the end of the fifth hour, the pair recovered the entire cipher alphabet and, five hours later, had all 44 messages decoded and typed up. Childs found that there were several weaknesses in the code: the group TKG was always preceded by BCN and appeared as a doublet five times, indicating that it was a single letter and that the spelling section of the codebook had been used.[29] The system was solved reportedly "to the consternation of the code section and the great satisfaction of Colonel Moorman and Captain Hitt."[30]

While this test was underway, Barnes and his team, likely alarmed by Hitt's reaction to their work, were reexamining the code and decided that the system was too difficult to use at the front, whatever the outcome of the test. From this experience, the section developed the first of the River trench codes, the Potomac, which was issued in late June 1918.[31]

Communications Security Monitoring Gives Away Plans for St. Mihiel Offensive

Not only did Yardley twist the story of the trench code test, but he claimed that this inadequate code resulted in the Germans learning of the American plan for the St. Mihiel offensive in September 1918.[32] But Yardley's convoluted story, though often cited as fact, is incorrect, for he seems to have mixed up two incidents that he learned about in a lecture by Moorman to the MID in 1920. This confusion was the subject of multiple letters between William Friedman, who was frustrated by Yardley's inaccuracy, and Yardley, who was amused by Friedman's insistence on precision.[33]

The G2A6 and the Signal Corps Radio Section teamed up to form a communications security monitoring effort. Listening stations had always been

assigned the duty of monitoring any American (or French) communications that could be heard (telephone and ground telegraphy), and in July 1918 the Radio Section added four control stations that targeted American radio communications. The G2A6 Security Section (see chapter 8) examined the control station intercept and issued violation letters. But material collected by the control stations was also given to section member Edwin Woellner so that he could analyze it as if he were his German codebreaking counterpart.[34]

On the morning of September 13, 1918, the day after the St. Mihiel offensive began, Woellner reported to Moorman the American order of battle and the designations of the troops engaged in the attack, and noted that the attack was to have taken place 48 hours before the time of his report. He was off by 24 hours due to, according to Moorman, "the misinformation of a telephone operator who reported by telephone that certain wires from his switchboard had been broken by the passage of tanks and heavy artillery, which had been moving into a small wood near him all night, and that the attack would take place next morning." Woellner's analysis documented significant communications insecurity in the American organization, but it is not known if the Germans intercepted the same material and came to the same conclusions.[35] Many years later, Thomas M. Johnson declared Woellner had "out-Germaned the Germans, for General Fuch's report shows that although they expected trouble, they too had guessed the date wrong—by about six days, not just one."[36]

AEF Codes and Ciphers

As discussed in chapter 9, the AEF's Code Compilation Section produced a wide variety of cryptographic material in a very short time. But other organizations and individuals produced their own codes and ciphers that were not developed by the Code Compilation Section or tested by the cryptologists of the G2A6. Some of these systems are examined further below. The known codes, official and unofficial, are listed in appendix B.

No one, not even the Code Compilation Section, could determine the number of codes in actual use, when they were used, or who had issued some of them.[37] Units using call words that had been used by other units at some other time created unintended confusion for the AEF Historic Section when they tried to write a postwar operational history. And unwise selection of call words, such as the unit that used the codeword LONDON, delayed communications when messages were forwarded to England rather than the proper unit.[38] And, of course, randomly selected call words and homemade codes were vulnerable to enemy exploitation.

Playfair

Although it was known that the Playfair cipher was insecure, General Order 103 allowed its use in case of emergency, and the AEF adjutant general issued a monthly memo providing key words to be used for the cipher over the course of the month.[39] Childs later told William Friedman that he had encountered an official communication enciphered with Playfair in 1918; he took it to Moorman "and requested his permission to decipher it in order to illustrate its ineffectuality. Colonel Moorman demurred; I concluded he feared to disturb the brass hats." Both Childs and Friedman agreed that Playfair was probably rarely used by the AEF.[40]

Use of Code in Personal Correspondence

In this era, it was not unheard of for private individuals to communicate in code, particularly to save money when sending telegrams. Standard codebooks were available for general use, and sometimes people devised their own codes. But the AEF needed to control the use of code in personal messages to make sure that correspondents were not evading censorship guidelines.

General Order 3, issued on June 28, 1917 (and revised as General Order 13 on July 13, 1917), was a regulation about censorship. It mandated that plain English or French be used in communications with-

in France. But it also specified the allowable use of code for communications to the United States. Seven codebooks were permissible: *The A B C Universal Commercial Electric Telegraphic Code* (5th Edition), *Scott's Code: The Ship Owners' Telegraphic Code* (10th Edition), Western Union (except for five-letter), *Lieber's Standard Telegraphic Code* (except for five-letter), Riverside (5th Edition), Bentley's *Complete Phrase Code* (not including mining and oil supplements), and Broomhall's *The Imperial Combination Code*. Censors had the ability to force the sender to change the wording (whether plaintext or code) if it was thought the message had a hidden meaning.[41]

Unit-devised Codes and Ciphers

There are many examples of organizations within the AEF devising their own codes and ciphers, particularly in the first half of 1918 when troops were beginning to move into frontline positions and before the distribution of many of the official cryptographic measures. These attempts at secure communication, while well-intentioned, were most often used for telephone conversations and provided little to no security. Colonel John L. Hines of the 16th Infantry created his Cauliflower Code in the spring of 1918; other units substituted words such as *horses* for *guns* in an attempt to counter German radio intelligence.[42] These bad practices could not withstand even minimal efforts by a German analyst fluent in English.

Aristides Moreno of the G2B3 (counterespionage) approached Moorman in March 1918 about his need for a code to support his organization's espionage work. Moorman told him that for general correspondence between AEF headquarters and the rest of the AEF, the War Department Code had to be used until the new codebook was finished by the Code Compilation Section. However, Moorman suggested for "correspondence between particular offices, a special code or cipher may be desirable." Suggesting that Moreno's need for a code required something to "disguise the appearance of the message that telegraph operators and others through whose hands the message passes could not readily become acquainted with its contents," Moorman recommended a simple transposition cipher for "it has the advantages of being easy to handle, not liable to become unintelligible through small mistakes of operators and quite difficult of solution by one not having the key." Moorman cautioned that it was not necessarily secure "against the systematic study of trained cipher men." He then gave Moreno some basic instructions on how to prepare such a cipher and stressed that the key should be frequently changed.[43]

While serving part-time with the G3 staff, Hitt commented on a cipher submitted to the AEF adjutant general by the commander of the 9th Infantry. Quickly realizing the system was a simple substitution system using a single mixed alphabet, Hitt reported that the cipher was "worse than useless because it takes time to use and gives an entirely false idea of security to the user. Its use should be disapproved at once before something serious happens. Any messages sent in a cipher of this general character must be classed as DANGEROUS ENGLISH."[44]

Despite his disapproval of systems constructed by individuals, Hitt developed his own codes for his communications with Major (later Colonel) Sosthenes Behn, who was supervising the construction of telephone lines for the Signal Corps. Correspondence identifies one code as dated April 2, 1918, and parenthetically refers to it as "Behn-Hitt," but nothing else is known about this code's properties. Later in April, Hitt documented a spelling code for proper names and place names to be used in conjunction with the April 2 code. This spelling code consisted of digraphs to represent alphabetical characters, and two nulls. Names were spelled out and broken into 10-character groups, which were filled out with nulls or the lesser-used letters *Q*, *X*, and *Z*. Only a handful of examples of this code's use can be located, and these messages violate standard practices by mixing clear text with the words enciphered with the spelling code.[45] There is no evidence that this

system was used beyond communications between Hitt and Behn.[46]

Even when the Code Compilation Section was fully functioning, there are instances of codes developed outside their auspices, such as a temporary code for reporting casualties issued on September 16, 1918, by the G3 to quell French objections to reporting casualties in plaintext.[47]

French Geographical Coordinate Strips and Squares

A strip-and-square system, designed by the French, was used to encode geographical coordinates passed by aerial observers and goniometric stations so they could be transmitted by radio in a secure manner. The system consisted of strips and squares that corresponded to the standard French maps in use (see photo). The strips and squares changed each time they were compromised (see chapter 8). This system was used in conjunction with the manual *Liaison for All Arms*.

Location and Unit Codewords

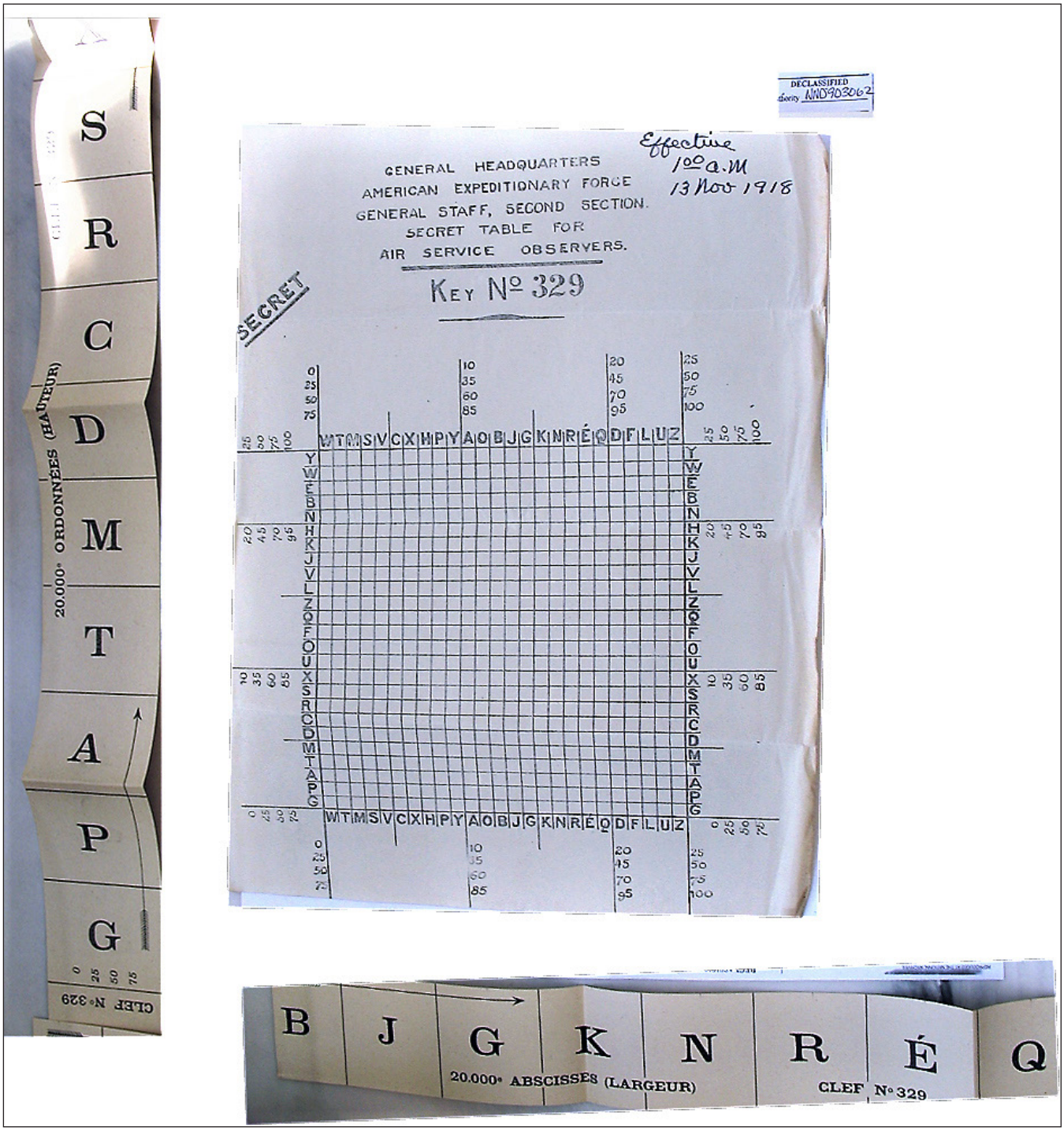
Little advance thought was given to preparing codenames used by American forces. On August 19, 1918, nine days after the First Army was established, Hitt, the First Army's chief signal officer, outlined his plan for codenames. Each corps and division was issued either a one-letter or a two-letter combination for its exclusive use in making codenames. The division signal officers had to use these letters to devise their codenames, which they would provide to Hitt no later than August 25, and which would go into effect when the First Army assumed tactical command of the corps.[48]

Hitt stressed that care needed to be taken to not duplicate codenames within their unit, and not use geographical names of towns for codenames if they were likely to be confused with the towns themselves. He suggested that it would be good practice to not use names of French towns and that it was "absolutely prohibited" to use women's first names as codenames (because of the conflict with the telephone code).[49]

Operations specific to the First Army itself, including telephone exchanges, used *W*, thus, WATERFALL for the army's headquarters and exchange at Ligny-en-Barrois. The 5th Division received *SA* to *SM*, the 82nd Division *AA* to *AM*, the 90th Division *TA* to *TM*, and the 42nd Division *ON* to *OZ*. The I Corps was assigned *B*, and its headquarters was BUSTER. One unit was called BONEHEAD. The 5th Division would eventually use SLAYER as its name, the 82nd Division ALBANY, the 90th Division TAYLOR, and the 42nd Division OPTIMUS.[50]

In addition to the codenames, a system of numbers was assigned to officers and staff positions to be used after the codename; for instance, BUSTER ONE would refer to the commanding general of the I Corps and WATERFALL 10 to the chief signal officer of the First Army.[51]

The selection of some of these names resulted in some amusing anecdotes, which have a person answering the phone, unaware of the codename, and taking umbrage at the operator addressing him as Buster. Tony Gallo of the 406th Telegraph Battalion, who had been promoted to corporal since his adventure supporting the Radio Section at Seicheprey (see chapter 10), recalled working at BONEHEAD and trying to make a connection for a lieutenant who called in, but who did not respond when Gallo tried to connect him. "Hello, Bonehead!" Gallo called again. This evidently revived the lieutenant for he came back: "Who's a bonehead? Young man, do you know who you are talking to?" "No, sir," said Gallo. "Well this is Lieutenant ------ and I want you to understand that I'm no bonehead." "Yes, sir," Gallo replied. When the lieutenant asked for Gallo's name and organization, he replied, per regulations, with "I don't know," which further upset the lieutenant. Gallo promptly switched the call to a French operator as he "was too busy to continue the fight; there was some real fun because the lieutenant couldn't speak French and the operator couldn't understand



Example of French-designed "strip-and-square" system used to encipher locations. National Archives and Records Administration, College Park, Record Group 120, Records of the American Expeditionary Forces, Entry 105, Box 5768

English, so I left him to cool off." Gallo immediately reported the conversation to his signal officer, Colonel Alvin Voris, who, he said, "had a good laugh."[52]

Many organizations issued lists of codewords for place names, control points, and internal people and organizations, primarily for use on the telephone. One example provides a code issued by the G3 to the 82nd Division on June 24, 1918. The codenames for towns were a mixture of Civil War battle names, names of other French towns (a practice that would be strictly forbidden later in the year for the possible confusion it could cause), and names of US states; people were given bird, insect, or snake names. It was a bizarre mixture of codenames, with one French location, Bernécourt, inexplicably given the name Rain-in-the-Face, which is also the name of a Lakota chief present at Custer's last stand. This system inevitably caused confusion because other organizations often assigned different codenames to the same place—for instance, the 82nd Division used BULL RUN for Ansauville and another unnamed unit used VICKSBURG for Ansauville and BULL RUN for the town of Minorville.[53]

Another point of confusion was the use of names of French towns from other regions of France as codenames for units. General W. D. Conner of the 63rd Infantry Brigade pointed out that the names in use in the 32nd Division for units were "much alike—that is MARSEILLES, VERSAILLES, and EMILE." He proposed that the names DETROIT, SAGINAW, LANSING, and GRANDRAPIDS be used instead. This system was immediately implemented. The 32nd Division largely consisted of volunteers and draftees from Michigan and Wisconsin; no consideration seems to have been given to the fact that these codenames would give away their identity in this way.[54] This confusion was never entirely brought under control, but progress in standardizing codenames was made in August 1918.

Records of the 32nd Division illustrate the wide range of ever-changing call names. In May 1918, the names provided were those of the French central telephone offices through which American offices could be reached by adding the letter F to the French codeword. Thus, the 63rd Infantry Brigade was Ludovic-F beginning in May 1918, DETROIT beginning July 30, 1918, and FREEBOOTER from mid-September 1918.[55]

Special Codes for the G2A6 and Radio Section

Moorman used an unspecified code for short telegraphic communications between the French Cipher Bureau in Paris and G2A6 beginning in early 1918. The messages probably involved the exchange of key recoveries for the German trench code as they correspond in size and date with entries in the G2A6 logbook.[56]

A special code was developed, probably in September 1918, for communications between the First Army G2A6 (Charles Matz) and the G2A6 at Chaumont. It was not enciphered and was used to transmit special information only, used in combination with the German codebook. The code groups covered the subject of keys and types of codes, groups to represent which radio station had intercepted the code, and other phrases that the codes sections would need to communicate. German text within a message was sent using another (unspecified) special codebook.[57]

Moorman raised the issue of a special collection operators' code with Robert Loghry on October 2, 1918, that could protect what were currently plaintext exchanges between stations.[58] This idea became the Code Compilation Section's American Radio Service Code No. 1 later that month.[59]

On June 5, 1918, Captain Georges Painvin of the French Cipher Bureau proposed to Moorman a cipher to be used for telegrams when the two organizations exchanged ADFGVX key recoveries.[60] On July 1, this system was extended to the British, and Hitchings shared it with MI1(b) and the Belgian Army. The first group in the message provided the date, where the day was given in numbers, followed by a digraph for the month (for example, June was JN), and then the group was filled out to five plac-

es using the letter X. So June 1 would be 1JNXX and June 28 would be 28JNX. The key, normally expressed in numbers from 1 to 25, would be turned into letters using a simple substitution where 1 = A and 25 = Z. For the substitution grid, letters would be substituted with the next letter in the alphabet (so a C became a D) and numbers remained the same. When the last group was less than five characters, it was filled out with numbers; if the encipherment had characters that equaled a multiple of five, a five-number group would be added at the end. If a partial key was sent, the missing letters were represented by a question mark.[61]

This relatively simple system provided minimal protection to the regular key exchange. The system was used at least into the middle of November 1918, although MI1(b) appears to have preferred to send written notes, with the keys and table unenciphered, to the G2A6 rather than using the telegraph.

MI-8 Codes and Ciphers

The Military Intelligence Division's MI-8 had a Code Compilation Section to handle codes needed by attachés for internal military intelligence matters and for the War Department in general. See appendix B for a list of codes.

Navy Codes and Ciphers

As discussed in chapter 6, producing cryptographic material was the sole cryptologic focus of the Navy Code and Cipher Section. Russell Willson's Navy Cipher Box was considered so secure that it was used to protect transatlantic communications during the Paris Peace Conference as well as for President Woodrow Wilson's communications. See appendix B for a list of codes.

Conclusion

As the range of communications technology available to the war fighter expanded, the need for communications security increased. Telephone and telegraph transmittals using ground telegraphy were vulnerable on the front lines, and radio was more so. No European combatant force in World War I was initially prepared to secure their communications from exploitation, and the AEF was similarly unprepared. The few cryptologic experts of the US Army knew that their existing code and cipher systems were insecure in advance of the American entry into the war, but there was no mechanism for improvement. There was no doctrine of communications security to consult, and no advance planning took place to ensure that the first American forces in France had the cryptographic material they needed to protect their conversations and messages from enemy intercept. The result was a chaotic series of homemade call words, codes, and ciphers that were ineffective. Dennis Nolan remembered that the failure to use codes properly "kept the enemy frequently informed as to our movements, although we were amused to find in a German report captured in October 1918 which gave the Allied battle order over a large part of the front, an apology for having passed an entire week with no identification by radio of one of the American Divisions."[62]

Thanks to the efforts of Frank Moorman, Howard Barnes, and Parker Hitt, better systems were in place by the time of the first large American action at St. Mihiel in September 1918. But secure systems, vigilant communications security monitoring, and corrective actions could not overcome the fact that many officers and enlisted men lacked the training to understand the importance of securing their communications and the practical experience to effectively use protective measures. The creation, production, and distribution of codes and other cryptographic material were successful and impressive in speed and scope. It would be a difficult (if not impossible) task to reconstruct the information that the German Army radio intelligence gained from monitoring the communications of the AEF, but, even without that analysis, it should be assumed that, at a minimum, better communications security would have saved lives.

Notes

1. Frank Moorman to G2, memo, June 17, 1918, Center for Cryptologic History (CCH) File Series II.F.2.19, copy held by author; *Historical Background of the Signal Security Agency*, vol. 2, *World War I* (Washington, DC: Army Security Agency, 1945), 166, Special Research History 001, copy held by National Cryptologic Museum Library.
2. Moorman to G2, memo, February 22, 1918, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 457, Records of the National Security Agency, Entry P11, Box 214. This "thoughtful report" was forwarded by General Dennis Nolan, the G2 chief, to the AEF Chief of Staff on February 27, 1918. NARA CP, RG 457, Entry P11, Box 214.
3. *The United States Army in The World War 1917-1919*, vol. 16 (Washington, DC: Center for Military History, 1948), 450.
4. Moorman recommendations to Edgar Russel, February 22, 1918; Russel response to Moorman, March 11, 1918. Both in NARA CP, RG 457, Entry P11, Box 214.
5. Moorman to Colonel Arthur Conger, March 19, 1918; Nolan to the AEF Chief of Staff, memo, March 20, 1918. Both in CCH File Series II.F.2.19, copy held by author. Moorman to G2, memo, June 17, 1918; General Order 103, *The United States Army in The World War 1917-1919*, vol. 16, 359.
6. Moorman to Conger, March 21, 1918, NARA CP, RG 120, Records of the American Expeditionary Forces, Entry 105, Box 5761.
7. Moorman to Nolan, September 26, 1918, NARA CP, RG 120, Entry 105, Box 5761.
8. Moorman provided a plan of instruction for these officers and was clearly planning ahead for the war to go into 1919. Moorman to Nolan, September 26, 1918.
9. Multiple memos from October 11, 1918, NARA CP, RG 120, Entry 105, Box 5761; General Order 190, *The United States Army in The World War 1917-1919*, vol. 16, 503.
10. Erwin Falk to Moorman, October 17, 1918, NARA CP, RG 120, Entry 105, Box 5768.
11. Army Artillery First Army to Chief of Staff, memo, October 12, 1918, and reply, October 14, 1918, NARA CP, RG 120, Entry 765, Box 19.
12. William Friedman, *American Army Field Codes in the American Expeditionary Forces During the First World War* (Washington, DC: War Department, 1942), later issued as Special Research History 315, 24, NARA CP, RG 457, Entry 9002, Box 56.
13. Ralph Van Deman to Colonel C. H. French, memo, April 22, 1918; Stephen Slocum to Van Deman, April 26, 1918. Both in NARA CP, RG 165, Records of the War Department General and Special Staff, Entry 65, Box 3862.
14. Hitt probably attended the demonstration although no record of the attendees can be located. Moorman seems not to have known that by May 1918 the Pletts device had been tested already by William Friedman at Riverbank Laboratories and had been rejected for use. Nolan to French, memo, May 14, 1918, CCH File Series II.F.2.19, copy held by author.
15. Moorman, "Use of Code and Cipher by AEF," May 28, 1918, CCH File Series II.F.2.19, copy held by author.
16. Herbert O. Yardley to Joseph O. Mauborgne, memo, May 31, 1918, NARA CP, RG 165, Entry 65, Box 3862.
17. Weekly Report of MI-8, early June 1918, NARA CP, RG 165, Entry 65, Box 3522.
18. Weekly Report of MI-8, mid-June 1918, NARA CP, RG 165, Entry 65, Box 3522.
19. Marlborough Churchill to Slocum, telegram, June 11, 1918; John Powell to Malcolm Hay, memo, June 12, 1918. Both in NARA CP, RG 165, Entry 65, Box 3862.
20. Elizebeth S. Friedman, "Memoires," 34, George C. Marshall Foundation Research Library (ML), Elizebeth S. Friedman (ESF) Collection, Box 12, File 1-2, 47-48, as cited in G. Stuart Smith, *A Life in Code: Pioneer Cryptanalyst Elizebeth Smith Friedman* (Jefferson, NC: McFarland, 2017), 24.
21. Churchill to Slocum, June 11, 1918; Powell to Hay, June 12, 1918.
22. Moorman to G2, "Use of Plett's [*sic*] cipher,"

June 19, 1918, CCH File Series II.F.2.19, copy held by author.

23. William Friedman to Elizebeth Friedman, August 12, 1918, ML, ESF, Box 2, File 15.
24. Yardley, *The American Black Chamber* (New York: Ballantine Books, 1931), 17-18.
25. William Friedman used the material from others to annotate his copy of Yardley's book. His copy can be found in the collection of his papers at the George C. Marshall Foundation's Research Library in Lexington, Virginia. The foundation has digitized this item. Accessed March 1, 2017, http://marshallfoundation.org/library/wp-content/uploads/sites/16/2014/06/American-Black-Chamber_II_watermark.pdf. The references to the material he gathered are on the flyleaf and page 43 of the book.
26. Precise date supplied in David Kahn, *The Codebreakers* (New York: Scribner, 1996), 327.
27. J. Rives Childs, interview, April 19, 1977, NSA-OH-1977-06, transcript, CCH, Ft. Meade, MD.
28. William Friedman, *American Army Field Codes*, Appendix 10, 9-17; Childs, *Let the Credit Go* (New York: K. S. Giniger, 1983), 30-31; Kahn, *Codebreakers,* 327.
29. Childs memo to Moorman, "Experimentation with our Code," May 17, 1918, Randolph-Macon College Flavia Reed Owen Special Collections and Archives (RMC), J. Rives Childs Collection (JRC), Folder 14.
30. See Childs, *Let the Credit Go,* 30-31, and Kahn, *Codebreakers,* 327.
31. There are slight variations in Childs's official account in 1918 and the memoir he wrote later in life. William Friedman also examined this story in 1942 and supported Childs's account, which is also later discussed in *The Codebreakers*. See William Friedman, *American Army Field Codes*, Appendix 10, 9-17; Childs, *Let the Credit Go,* 30-31; and Kahn, *Codebreakers,* 327.
32. Yardley, *The American Black Chamber*, 18-19.
33. Letters between Yardley and William Friedman, as well as a May 16, 1931, letter from William Friedman to Moorman that quotes Yardley's April 18, 1931, *Saturday Evening Post* article, RMC, JMC, Folder 14. Some letters also in NARA CP, RG 457, Entry 9031, Box 110.
34. *Final Report of the Radio Intelligence Section, General Staff, General Headquarters American Expeditionary Forces 1918-1919*, Special Research History 014, NARA CP, RG 457, Entry 9002, Box 9, Enclosure G, 50-52.
35. Moorman, "Code and Cipher in France," *Infantry Journal* XVI, no. 12 (June 1920): 1043-44.
36. Thomas M. Johnson, *Our Secret War: True American Spy Stories 1917-1919* (Indianapolis: The Bobbs-Merrill Company, 1929), 44.
37. Howard Barnes, *Report of Code Compilation Section, General Headquarters American Expeditionary Forces December 1917-November 1918*, 1. Reprinted as a Technical Paper of the Signal Intelligence Section, War Plans and Training Division, Washington, 1935, with a foreword by William Friedman. Reprinted as a Special Research History 321 by NSA, declassified November 21, 1973. NARA CP, RG 457, Entry 9002, Box 88.
38. Barnes, *Report of the Code Compilation Section*, 30.
39. Memo from Robert C. Davis, AEF Adjutant General, to each army, army corps, and division, providing key words for Playfair ciphers, August 22, 1918, in William Friedman, *American Army Field Codes,* Appendix 3, 36, NARA CP, RG 120, Entry 765, Box 19. At least seven such memos were issued.
40. William Friedman, *American Army Field Codes,* Appendix 25, 273.
41. General Order 3, *The United States Army in The World War 1917-1919,* vol. 16, 3.
42. Terrence J. Finnegan, *A Delicate Affair on the Western Front: America Learns How to Fight a Modern War in the Woëvre Trenches* (Stroud, Gloucestershire: Spellmont, 2015), 88.
43. Along with this memo, someone provided a list of names and assigned letters and words to be used instead of ciphering the names. Moorman to Colonel A. Moreno, memo, March 15, 1918, George C. Marshall Foundation Research Library, William F. Friedman Collection, Item 43.

44. Hitt to G2, July 12, 1918, forwarded by the G2 to the Adjutant General, CCH File Series II.F.2.31, copy held by author.
45. Telegrams, May 23, 1918, Moreman-Mustain Collection of Parker Hitt Material.
46. After the war Behn founded the International Telephone and Telegraph Company with his brother.
47. William Friedman, *American Army Field Codes*, 251-252.
48. Hitt to First Army units, memo, August 19, 1918, NARA CP, RG 120, Entry 1018, Box 160.
49. Hitt to First Army units, memo, August 19, 1918.
50. Multiple memos assigning codenames, July-August 1918, NARA CP, RG 120, Entry 1018, Box 161.
51. G3 "Confidential Bulletin No. 1," August 22, 1918, NARA CP, RG 120, Entry 765, Box 19.
52. Peter Lambert Schauble, *The First Battalion: The Story of the 406th Telegraph Battalion, Signal Corps, US Army* (Philadelphia: Bell Telephone Company of Pennsylvania, 1921), 216.
53. William Friedman, *American Army Field Codes*, Appendix 19c, 233-236.
54. Commander of 63rd Infantry Brigade to Division headquarters, memo, July 30, 1918, NARA CP, RG 120, Entry 1241, Box 12.
55. Telephone directory, May 1918; Major General William Lassiter to the AEF Historical Section, memo, dated March 28, 1919, enclosing memorandum from R. M. Beck dated September 25, 1918. Both in NARA CP, RG 120, Entry 1241, Box 12.
56. The messages can be found in NARA CP, RG 120, Entry 105, Box 5768. The author holds a complete set of these messages and welcomes queries and discussion on their solution.
57. "Special Code for Use between Second Section (G-2 A-6), First Army Headquarters and Second Section (G-2 A-6) General Staff," n.d., NARA CP, RG 120, Entry 105, Box 6699.
58. Moorman to Robert Loghry, memo, October 2, 1918, NARA CP, RG 120, Entry 105, Box 5767.
59. American Radio Service Code No. 1, NARA CP, RG 457, Entry P11, Box 214.
60. Georges Painvin to Moorman, letter, June 5, 1918, NARA CP, RG 120, Entry 105, Box 5752.
61. Oswald Hitchings to the French, Belgians, MI1(b), and the AEF Armies, letter, July 1, 1918, NARA CP, RG 120, Entry 105, Box 5752.
62. Nolan, chapter on codes and ciphers, first draft of proposed history of World War I (unpublished manuscript, n.d.), 2-3, US Army Military History Institute, Carlisle Barracks, Dennis E. Nolan Papers.

Chapter 13

Radio Deception

One of the most intriguing, and poorly documented, aspects of World War I-era radio intelligence is the use of intelligence assets to conduct radio deception in the fall of 1918. On at least three occasions, men from either regular Signal Corps units or the Signal Corps Radio Section implemented plans to set up fake radio networks meant to deceive the enemy.

The British, French, and German armies used a variety of means, including false radio traffic, to deceive their adversaries, particularly in the period 1917-1918. The British were particularly skilled at combining false signals with good communications security, and used these techniques with varying effectiveness before every major attack of 1918.[1] It is no surprise that American Expeditionary Forces (AEF) intelligence, almost certainly influenced by British and French efforts, employed both signal troops and radio intelligence assets to generate fake radio communications networks to deceive the Germans.

Specific records relating to these deception efforts are sparse. Even among organizations whose activities were already secret, radio deception seems to have been even more secret; the details were little shared and complete records may not have been kept. Postwar accounts by participants and by journalists are suspect, for they frequently jumble the dates and details. A careful study of available material makes it probable that at least three radio deception operations took place in the fall of 1918: the Belfort Ruse of late August-early September, the Lorraine Deception of mid- to late September, and the X Army/ Verdun Deception of late October.

Belfort Ruse

The Belfort Ruse, the most well known of the AEF deception operations, commenced in late August 1918 prior to the St. Mihiel offensive. The goal was to prevent the German Army from moving reinforcements into the St. Mihiel salient. Colonel Arthur L. Conger, the assistant to General Dennis Nolan, the chief of the G2, attributed the idea to General John J. Pershing.[2] However, an official account says that while Pershing, Brigadier General Fox Conner, Colonel Conger, and one other officer developed the plan, the idea originated in an August 19, 1918, letter from General Phillipe Pètain, commander in chief of the French Army, to Pershing. While the human intelligence side of this operation is well known, it is less known that the First Army established fake radio stations—that is, real radio stations formed into an artificial network that did not service operational troops—along the Belfort front.

Radio intelligence assets, such as the Signal Corps Radio Section and officers from the G2A6 Radio Intelligence Section, likely did not participate in the radio deception operations of the Belfort Ruse. Lieutenant Colonel Donald B. Sanger, commander of the 6th Field Signal Battalion, credits its Signal Corps elements associated with the 6th Division, headquartered at Gérardmer, with this work. According to Sanger, "In order to be sure that our messages would be picked up an NCO [noncommissioned officer] went out into No Man's land and laid a telephone circuit across a Boche listening-in circuit, which was then connected up with the Advance PC of a regiment. Messages were then transmitted over this wire to this regimental commander using a code that was known to have been captured by the Germans. At the same time considerable increase in the activity of the Radio was indulged in."[3] Historian James H. Hallas noted that operators of the 29th Division conducted the work using borrowed French wireless equipment, and that "thousands of false coded messages" were sent, "liberally seasoned with the profane and violent English customarily employed by American radio operators."[4] The entire ruse was judged successful as it caused the Germans to move four divisions into the Belfort Sector.[5]

Lorraine Deception

Just after the St. Mihiel offensive, another radio deception operation took place in the Lorraine region, focused on the territory around the cities of Nancy and Luneville. Some accounts confuse this effort with the earlier Belfort Ruse, but it was clearly a separate effort.[6] The intent of the operation was to slow the movement of German reserves to the Meuse-Argonne front.

Newspaper reporter Thomas M. Johnson placed the origin of this operation in a conference held at the First Army headquarters in Ligny-en-Barrois between General Pershing, General Hugh Drum, and Colonel Wiley Howell, the First Army G2A.[7] Though Johnson does not mention him, Colonel Parker Hitt, the chief signal officer of the First Army, likely participated. As a result of the discussion on September 18, 1918, Hitt organized a network that saturated the airwaves using newly established radio stations east of Nancy. These stations sent false traffic to deceive the Germans into thinking that an American corps had moved to that region.[8] The French VIII Army was aware of the American operation, which involved not just radio stations in their zone of operation but the movement of tanks for diversionary maneuvers.[9] Almost immediately, German observers remarked on increased American air and artillery activity.[10]

It is possible that the radio intelligence collectors of the Radio Section were involved in this effort, for on September 24, Charles Matz, the chief of the First Army Radio Intelligence Section, reported to Frank Moorman at Chaumont that the listening station personnel "have been drawn out and the personnel combined with the personnel of the French II Army to be used for a special purpose."[11] Some of these men were already establishing listening stations on the new front on the Woëvre plain. It is not clear where the other men were deployed, but their "special purpose" might have been to participate in the radio deception effort.

Lending credence to this idea is the fact that Colonel Robert Loghry, head of the AEF Signal Corps Radio Section, was credited with leading the men who set up the radio stations, which "fooled the Germans" between Nancy and Luneville, although a postwar newspaper story misdates the activity to the days before the St. Mihiel salient, possibly confusing the Lorraine Deception with the earlier Belfort Ruse.[12] Similarly, George Sterling, an intercept operator who in 1948 became commissioner of the Federal Communications Commission, gave an oral history nearly 60 years after the war and recalled setting up two phantom radio stations, one in Nancy, sending "a stream of messages"; Sterling remembered that one operator complained that his messages were never answered.[13] Little documentary evidence has been found to tie memories of the

deception work in Nancy and Luneville to the pre-St. Mihiel Belfort operation, which makes it likely this was a separate operation.

One document muddies the waters a bit about who was running the Nancy-Luneville deception and where it took place. A memo dated September 21, 1918, issued by the Fourth Army headquarters, by command of Major General Joseph T. Dickman, with a signature from the General Staff G3, ordered establishment of a radio network the next day "for secret reasons." The network was to be located northeast of Nancy and consist of a corps-level network with two division nets and a control station, which would operate until September 24 at 1000. The 82nd Division set up stations at Morey (13 kilometers southeast of Pont-à-Mousson), Serrières (3 kilometers northeast of Morey), and Sivry (3 kilometers east of Morey). The 5th Division put stations at Agincourt (23 kilometers southeast of Pont-à-Mousson), Laître (4 kilometers northeast of Agincourt), and Laneuvelotte (4 kilometers east of Agincourt). Additionally, the 2nd Division set up a control station at Custines (15 kilometers southeast of Pont-à-Mousson). Call signs and wavelengths were provided to the operators. Though the G2 was given the details of the false stations, there is no indication that the G2 helped devise the plan. There is no record showing which organization devised the false traffic. These networks, stretching from just north of Nancy to Pont-à-Mousson, were likely the northern edges of the Nancy-Luneville deception.[14]

Some of the American fake messages were in an easily broken code that has not, to date, been identified.[15] When the Germans decoded these messages, they believed that at least six divisions, belonging to a mythical Tenth Army (see next section) were moving up to a front, presumably to attack the city of Metz.[16] According to Johnson, the messages were considered so important that they were sent immediately to German Generals Paul von Hindenburg and Erich Friedrich Wilhelm Ludendorff.[17] A German intelligence report dated September 27 noted that the "possibility of an imminent, large scale, Franco-American attack in Lorraine" had not been decreased by the start of the Meuse-Argonne offensive the previous day, and that "intercepted radio communications" indicated that strong American reserves were moving to the front between Verdun and Luneville.[18]

The X Army/Verdun Deception

More is known about this third radio deception effort than the others because the *1919 Report of the Chief Signal Officer* describes it, and there was also a spate of postwar articles on the subject. The deception operation, from the point of view of the radio intelligence operators tasked to set up the fake networks, is described in some detail in Ernest Hinrich's memoir *Listening In.*

In the pause between the second and third phases of the Meuse-Argonne operation, beginning on October 23, 1918, and lasting until the early days of November, a fake radio network sprang up along a front from Beaumont to Fresnes. This network belonged to the mythical X Army (or, more properly, the Tenth Army). The operation was reportedly developed by a "handful of American junior officers," under the supervision of First Army G2A Howell and Chief Signal Officer Hitt.[19]

The junior officer in charge, Charles Matz, played the role of commander in chief of the Tenth Army. Matz was detailed from the G2A6 Radio Intelligence Section at AEF headquarters to serve as Howell's radio intelligence officer; in this job he had frequent interaction with Hitt, who supervised the Radio Section signal collectors assigned to the First Army. Lieutenant John A. Graham, also assigned from the G2A6, worked with Matz on the operation and was named chief of troop movements.[20] Matz was likely privy to Hitt's work on the Lorraine Deception, and this final deception operation may have been turned over to him, as Hitt was busy overseeing signal operations for the Meuse-Argonne offensive.

The communications for the headquarters of this imaginary Tenth Army, and all related division and brigade communications, were handled by Radio Section operators working on top of the citadel of Verdun. Two portable radio stations were established near the ruined village of Eix, east of Verdun, on the road to Étain. These stations were frequently shelled by the Germans.[21]

The first message to the army was in an easily broken code, directing that no stations answer but to be alert for incoming messages at set times. This was followed by a series of messages directed to imaginary officers along the front. The mobile stations sent out messages designed to make the Germans think a large force was present—such as a request for 200 copies of a map—and that an attack was imminent. Telephone teams moved frequently and sent indiscreet messages, sometimes deliberately laying their wires in no-man's-land so that they might be more easily intercepted. It did not take long to provoke the Germans into aerial reconnaissance of the area as well as trench raids. By October 26, First Army listening stations reported that enemy ground telegraph stations had been drawn back.[22]

General Nolan described encountering this effort very late in October:

> I found the First Army working this on its own by establishing a wireless station that used a leaky code, the wireless station sending being that of a new army going in on the right of our First Army in the Meuse-Argonne battle. The young man in charge of the enemy radio section of the First Army was working it and the Germans could get about everything from that station in the line of orders to an army in this leaky code. After it had been working four or five days, I found this wireless section at Souilly very much depressed one morning when I came in and asking the reason for it, I was told the German turned their artillery on it the night before and succeeded in destroying our sending apparatus at this point completely and they were afraid that Army X would have to go out of business.[23]

Hinrichs was one of the Radio Section men sent to run the radios and send false traffic. He, along with Ralph E. Lenz, Oscar E. Schenk, Albert H. Willman, Ray H. Holmes, and three others ("Pete," "Schmidt," and "Scotty") were sent out to the field by Lieutenant George Benjamin about one week into the operation. After several days at Eix, some of the group, including Hinrichs, moved to Fort Vaux (see photo). When the team began to set up their equipment and run their wire in front of the fort, French soldiers protested and noted "*Les Americans sont fou*" (the Americans are crazy). Though the operation had been approved by the commander of the fort, the French troops were aghast that this unit was deliberately communicating with the enemy. Hinrichs and his team returned to Souilly on October 30 after a week in the field.[24]

The operation was successful; the fact that two German divisions were held in reserve in Metz was credited to the work of Matz and his team.[25]

Radio Deception in the Navy

The AEF was not the only US service to practice radio deception. "Tricking an enemy by radio" was a known technique in the US Navy, and there were instructions for radio officers to do so. One suggested method was to vary the strength of radio signals to mislead the enemy of the distance of the American fleet. Other approaches included mimicking radio operations of merchant ships and repeating the enemy's code messages in an attempt to confuse intercept operators. There seems to have been agreement that it was crucial to have radio operators who were capable of handling these more complex tasks. The author has not located any operational examples where these techniques were used; it is possible that a search of ships' logs might uncover instances of radio deception.[26]

Fort Vaux, east of Verdun, 1919. Radio Section units set up operations at the top of this fort in October 1918 as part of a radio deception effort. Digitization courtesy of Meuse-Argonne.com. National Archives and Records Administration, College Park, Record Group 120, Records of the American Expeditionary Forces. Photographs taken by the "Griffin Group" of areas occupied by American troops during World War I combat operations, 1918-1919. 120-G-1-SM-38-77, 120-G-1-AM-1140-81

Conclusion

Reading between the lines of the convoluted and conflated stories about fake radio stations, we find an evolution of the AEF's employment of this deception technique from a hastily put together network devised by signal troops to a more complex operation conducted in joint effort between the G2A6 and the Signal Corps Radio Section. The increasingly confident use of radio deception, a technique not initially part of AEF intelligence doctrine in 1917 but learned from French and British allies, demonstrated the ability of the radio intelligence effort to grow and adapt over the course of the short period of active American combat operations.

While not intrinsically a cryptologic task, radio deception does have a cryptologic element when it

involves the transmission of fake coded messages or involves personnel that normally were assigned to radio intercept functions. Deception efforts in the fall of 1918 were quickly planned, appear to have used Signal Corps assets close at hand, and are poorly documented due to either haste or secrecy. Further research on this subject is warranted.

Notes

1. John Ferris, "The British Army and Signals Intelligence in the Field During the First World War," *Intelligence and National Security* 3, no. 4 (1988): 18-21.
2. Major A. L. Conger, "G-2-A at General Headquarters, AEF," lecture given to the Military Intelligence Division on March 1, 1920, 14, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 319, Records of the Army Staff, Entry P1218, Box 1, 14.
3. Donald B. Sanger, Narrative 602, NARA CP, RG 120, Records of the American Expeditionary Forces, Entry 2040, Box 132.
4. James H. Hallas, *Squandered Victory: The American First Army at St. Mihiel* (Westport, CT: Praeger, 1995), 61.
5. Max A. Ray, *The History of the First United States Army From 1918 to 1980* (Fort Meade, MD: First United States Army, 1980), 7-8.
6. A letter from Conger in 1926 makes a clear distinction between the Belfort operation and the "subsequent matter of Luneville," although 12 years after the fact he gets the dates wrong. "G-3 GHQ AEF Folder 1167-A: letter from Conger in the Office of the Military Attaché Berlin November 25, 1926," in *The United States Army in The World War 1917-1919*, vol. 8 (Washington, DC: Center for Military History, 1948), 62-64. However, in a lecture Conger gave in 1920, he clearly placed the Luneville operation as post-St. Mihiel and noted that after the war he had occasion to discuss the operation with a former chief of staff of the opposing German Army group who had been "especially worried" by the impression radio messages had left that fresh reinforcements were arriving in the Luneville region. Conger, "G-2-A at General Headquarters, AEF," 15.
7. Thomas M. Johnson, "Two Unfought Battles: A True Secret Service Story of the War," *The Century Magazine* 114, no. 1 (May 1927): 83. First Army headquarters moved from Ligny to Souilly; the fact that this conference took place before the move makes it likely that Johnson's account is linked to the Lorraine Deception, although it shares a great deal of detail with the story of the Verdun Deception.
8. Sources on this operation are regrettably difficult to locate. One mention comes in "Report of Chief Signal Officer, First Army," January 5, 1919, NARA CP, RG 120, Entry 24, Box 3396. A memo written by Parker Hitt on September 18, 1918, directing the establishment of the network to send false traffic, was among papers Hitt donated to the First Army Museum in 1964 (Letter from First US Army Museum to Colonel Hitt, March 13, 1964, Moorman-Mustain Collection of Parker Hitt Material) but cannot be located in the First Army holdings, which were moved from Governor's Island, New York, to Fort George G. Meade, Maryland, in the 1960s. Hitt's effort is mentioned in Hallas, *Squandered Victory*, 231; however, no source citation is given.
9. *The United States Army in The World War 1917-1919*, vol. 8, 75, cites *Les Armées Françaises dans la Grande Guerre*, Tome VII, vol. 1 Annexes, 2nd vol.: Instructions.
10. Hallas, *Squandered Victory*, 230-232.
11. Charles Matz to Frank Moorman, September 24, 1918, NARA CP, RG 120, Entry 105, Box 5767.
12. "He Leaves Elmira As Private, Returns As Lieutenant Colonel, After Twenty-One Years' Absence," Elmira *Star-Gazette*, Wednesday, June 2, 1920, 5.
13. George Sterling, interview NSA-OH-1975-01 (December 17, 1975). While Sterling remembers this happening before the St. Mihiel offensive, it is much more likely that it happened immediately afterward.
14. Memo issued by the headquarters of the Fourth Army by command of Major General Joseph T.

Dickman, with a signature from the General Staff G3, September 21, 1918, NARA CP, RG 120, Entry 105, Box 5768.

15. Precisely what code was employed is not known.
16. Hallas, *Squandered Victory,* 231. This is the only reference known to the fictional Tenth Army during the time period of the Lorraine Deception; as the reference is not sourced there remains the possibility that this activity actually took place in late October 1918. It is equally plausible that the concept of a fictional Tenth Army was developed in September and later employed in October. Additional research is needed to resolve this question. It is possible that the source of Hallas's information is the 1927 article written by war correspondent-Johnson, "Two Unfought Battles."
17. Johnson, "Two Unfought Battles," 85-86.
18. *The United States Army in The World War 1917-1919*, vol. 9, 514-516.
19. *Annual Report of the Chief Signal Officer to the Secretary of War 1919* (Washington, DC: Government Printing Office, 1919), 336-337. There are many newspaper articles about this, including "Yanks Tricked Huns: Officers Created Mythical Army on the Etain Front," *The Washington Post,* October 26, 1919, 25. This basic story also appears in "That Phantom Yankee Army on the Verdun Front," *The Literary Digest* 63, no. 10 (December 6, 1919). And it appears in Abraham Lincoln Lavine, *Circuits of Victory* (Garden City, NY: Doubleday and Company, 1921), 542-543.
20. "Yanks Tricked Huns," *Washington Post*.
21. "Yanks Tricked Huns," *Washington Post*; Ernest Hinrichs, *Listening In: Intercepting German Trench Communications in World War I* (Shippensburg, PA: White Mane Books, 1996), 93-95.
22. "Yanks Tricked Huns," *Washington Post*; Matz also explained the plan in Matz, "Final Report of First Army," November 15, 1918, in *Final Report of the Radio Intelligence Section, General Staff, General Headquarters American Expeditionary Forces 1918-1919,* Special Research History 014, NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 9.
23. Dennis Nolan, "Comments," 445-446. These are Nolan's comments on a draft of Pershing's memoirs in the Nolan Papers, US Army Military History Institute, Carlisle Barracks, Pennsylvania. Quote provided courtesy of Mark Stout.
24. Hinrichs, *Listening in,* 93-101.
25. *Annual Report of the Chief Signal Officer to the Secretary of War 1919*, 336, 337; Matz, "Final Report of First Army," November 15, 1918, 36.
26. "History of US Naval Communication Service in the World War prepared Apr 30, 1921," 84-85, NARA CP, RG 45, Naval Records Collection of the Office of Naval Records and Library, Subject File 2D, Communications History Navy Department Historical Section.

Part Five

Special Topics

Chapter 14

Was Radio Intelligence Used in AEF Siberia?

For about one month in late 1918, it appeared that the US Army was preparing to set up a radio intercept operation to collect radio intelligence in Omsk, Russia. While the request caused a flurry of activity within the Military Intelligence Division's (MID's) Radio Intelligence Section (MI-10E), the request was made in error, and it seems unlikely that either of the American Expeditionary Forces (AEF) forays into Russia included communications intelligence operations. Why Omsk? In one of the more obscure military ventures of the twentieth century, the United States sent troops into Russia in the late months of World War I during the Russian Civil War.

The two AEF contingents sent into Siberia and Northern Russia in the second half of 1918 were dispatched for both diplomatic and military reasons that dated from President Woodrow Wilson's July 6, 1918, decision to join the British and French intervention in Russia. The Bolshevik Revolution of November 1917, Russia's subsequent withdrawal from the Allied effort in the war against Germany in March 1918, and the ongoing Russian Civil War resulted in a complicated and chaotic political situation. The Allies were concerned that war materials they had supplied to Russia would fall into German or Bolshevik hands. They wanted to employ the Czechoslovak Legions, a force composed of Czech and Slovak soldiers and formed at the beginning of World War I by the Russian Czar and attached to the Czarist Army. After the Bolshevik Revolution and Russia's withdrawal from the war, the legions were augmented by Czech and Slovak soldiers from the Austro-Hungarian Army who had been released from Russian prison camps. One plan was to evacuate these fighters from Vladivostok and redeploy them in France. The British and French wanted to deploy these troops to reconstruct the Eastern Front and defeat the Bolsheviks, thereby stopping both the Germans and the spread of communism.

The AEF Siberia Expedition arrived in Vladivostok in mid-August 1918 and did not leave until April 1, 1920. The AEF North Russian Expedition (also known as the Polar Bear Expedition[1]) arrived in Arkhangelsk in September 1918 and departed in July 1919.

In July 1918, Herbert O. Yardley, in MI-8, was asked to draw up plans for a contingent from MI-8, the MID Code and Cipher Section, to go with the AEF to Siberia. Although there are some indications that personnel had been selected, plans seem to have been scrapped when Yardley was ordered to report to France instead.[2]

On November 19, 1918, the US government's Committee on Public Information (CPI) made a request to the Signal Corps. The CPI, established by

President Wilson's executive order on April 13, 1917, was charged with disseminating pro-war American propaganda—"Propagation of faith"[3]—both abroad and domestically. Walter S. Rogers, head of the CPI's Foreign Press, Wireless, and Cable Service in New York, asked General George Squier, the US Army's chief signal officer, to send a radio receiving set to the Signal Corps officer stationed with General William S. Graves, the head of AEF Siberia, in Omsk. Rogers had been advised by Captain David W. Todd, director of naval communications, that a receiving set in Omsk could probably hear the CPI's news service broadcast from the naval radio site at Cavite, in the Philippines, and might even hear the broadcast from the naval site in Peking. Rogers thought that a receiving station in Omsk could also "undoubtedly" receive the recently established French government news service transmitting from Lyon.[4]

The need to use the Signal Corps to broadcast propaganda was slightly unusual since the government had long relied upon the US Navy for long-distance radio. In 1904, a board established by President Theodore Roosevelt to look at the government's use of this new technology had declared that the US Navy's interest in radio was paramount, since they needed communications between and with ships at sea. While recognizing the US Army's right to operate radio stations in military areas, the board said that other government departments should transfer their radio installations to the navy. While this was not backed with congressional action, the navy took this as a mandate. The Radio Act of 1912 authorized the Department of Commerce to regulate nongovernment radio operations. So, when the CPI was established, it relied on naval radio communications to broadcast US propaganda to the world.[5]

Squier approved of Rogers's idea and forwarded his request for action. He thought a "properly constructed" receiving station at Omsk could receive some European broadcasts and recommended that "certain special receiving apparatus, which has been used in the trans-Atlantic [*sic*] investigation recently discontinued" be sent to Omsk along with an officer familiar with both these investigations and the working of long-distance radio communications.[6]

The problem was that the Signal Corps had two efforts underway that could be construed as being involved with transatlantic investigation of radio communications. There were experimental efforts to investigate the technical capabilities of this still relatively new technology under the direction of Major Charles A. Culver[7] in the Signal Corps Engineering and Research Division. And there were the experimental efforts of the MID's MI-10E station at Houlton, Maine.

Somehow, those in charge of the MID misunderstood Squier's endorsement to be directed at MI-10E, and the plans were rapidly hatched. An urgent message was sent to Major Carl Kinsley, the head of MI-10E, who was then visiting radio tractor units along the Mexican border. Kinsley's December 14 telegram noted that a "Radio Intelligence Receiving Station" for Omsk was under consideration and would copy traffic from Lyon, Rome, Cavite, and possibly Peking. Colonel John M. Dunn, acting director of the MID, noted that personnel would be volunteers, and their slots in the United States would be filled by men from the Houlton station. Equipment would be the same as that currently used at Houlton, along with a radio tractor and a truck from Fort Sam Houston in Texas. Although the message clearly noted "matter still provisional," other telegrams were sent that same day to potential volunteers, asking whether they might desire an assignment in Siberia. Also on that same day, Dunn signed a long planning message to Kinsley, which identified two men who had volunteered, discussed the future of Houlton, and provided a two-page list of material needed for Siberia.[8]

One can imagine the surprise, and perhaps consternation, in the MID when a memorandum from a young officer in the Office of the Chief Signal Officer reached them on December 17. Lieutenant Colonel Joseph O. Mauborgne (who would one day be the army's chief signal officer) attempted to set matters straight on two subjects. He made it clear that the sta-

tion at Houlton was not connected with the Signal Corps and that the Signal Corps had no objections to Houlton's work continuing. He then noted that "it would appear that an error has been made in your office" regarding the assignment to Omsk. The Signal Corps intended to send personnel and equipment from Signal Corps stations "used prior to the signing of the armistice in the reception of trans-Atlantic [*sic*] signals," stations that were under the direction of Major Culver and which "were not in any way connected with the Radio Intelligence Section" (that is, MI-10E).[9]

Six days later, the MID sent a memorandum to Mauborgne, noting that their December 14 memo had been withdrawn and canceled, and a memo concurring with the plan to send a Signal Corps unit had been sent to the army chief of staff.[10]

There would be intelligence sections set up in both AEF Siberia and AEF North Russia, and both contained sections responsible for codes, ciphers, and communications.[11] At least one of the officers sent to the Siberia intelligence effort, Lieutenant Ben Stinchfield, had served in MI-8, the MID Code and Cipher Section run by Yardley.[12] It seems unlikely that these units had communications intercept capability, but they probably performed codebreaking or cipher breaking on messages obtained through any means, electronic or otherwise.

Incidents such as the misunderstanding about the proposed collection site at Omsk undoubtedly contributed to underlying tensions between the MID and the Signal Corps as to responsibility for communications intercept. This would be resolved in favor of the Signal Corps with the realignment of the army in 1920, when the intercept function was subordinated to the Signal Corps and the MID Radio Intelligence Service was disestablished.

Notes

1. The 339th Infantry Regiment, the primary source of soldiers of the Arkhangelsk effort, was composed of natives of Michigan and Wisconsin who adopted a polar bear logo for their regimental crest as a commentary on their remote location. *Polar Bear Club, Official Publication of the 339th Infantry*, United States Army, 1926, accessed March 8, 2022, https://www.google.com/books/edition/History_of_the_339th_Regiment_of_Infantr/cZPhAAAAMAAJ?hl=en&gbpv=1.
2. Herbert O. Yardley, *The American Black Chamber* (New York: Ballantine Books, 1931), 132.
3. George Creel, *Rebel at Large: Recollections of Fifty Crowded Years* (New York: G. P. Putnam's Sons, 1947), 158.
4. Walter S. Rogers to General George G. Squier, memo, November 19, 1918, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 165, Records of the War Department General and Special Staff, Entry 65, Box 69.
5. Hugh G. J. Aitken, *The Continuous Wave: Technology and American Radio, 1900-1932* (Princeton, NJ: Princeton University Press, 1985), 253-263.
6. First Indorsement to Rogers's memo dated December 6, 1918, and sent to the adjutant general, NARA CP, RG 165, Entry 65, Box 69.
7. Culver had a PhD in physics from the University of Pennsylvania and was a professor at Beloit College when he joined the Signal Corps Reserve in June 1917.
8. Telegrams and planning messages all found in NARA CP, RG 165, Entry 65, Box 69. At that time the future of the MI-10E station at Houlton was in some doubt, hence the willingness to use Houlton's personnel to backfill other units.
9. Joseph O. Mauborgne to MID, memo, December 17, 1918, NARA CP, RG 165, Entry 65, Box 69.
10. MID to Mauborgne, memo, December 23, 1918, NARA CP, RG 165, Entry 65, Box 69.
11. Bruce W. Bidwell, *History of the Military Intelligence Division, Department of the Army General Staff: 1775-1941* (Frederick, MD: University Publications of America, 1986), 214-229.
12. Some interesting material on Stinchfield: accessed May 22, 2018, https://sites.google.com/a/bates.edu/aefsiberia/home/.

Chapter 15

The Cloak of Secrecy

This chapter was published in a different form as "The Cryptologist's War: How World War I Helped Weave the 'Cloak' of Cryptologic Secrecy," *Cryptologic Quarterly*, 2017-03: 31-39. The article was adapted from a talk the author presented at the 2016 joint meeting of the National Council on Public History and the Society for History in the Federal Government. —Ed.

Why is it that the details of US World War I radio intelligence work, particularly that accomplished within the American Expeditionary Forces (AEF), have not previously been compiled into a single historical work? One reason might be the cloak of secrecy thrown over the subject in reaction to the work of Herbert O. Yardley. In early 1931, the small US government cryptologic community was horrified by the publication of *The American Black Chamber*, a book by one of their own, Yardley.[1] (The book was also excerpted in the *Saturday Evening Post*, reaching a wide audience.) Not only did the book purport to reveal untold World War I cryptologic stories, but it went into some detail about the work of Yardley's own secret cryptologic organization, the Cipher Bureau, in the 1920s.

William F. Friedman, the pioneering American cryptologist, inscribed "*Omnis Homa Mendex*" or "All men lie" on the fly leaf of his copy of Yardley's book. The men, once friendly on a collegial level but near opposites in personality and habits, had grown apart over the years. Friedman's career was on the rise as the head of the Signal Intelligence Service, while Yardley's was on the decline with the elimination of his organization, the Cipher Bureau. Friedman was so incensed by Yardley's betrayal of cryptologic secrets that he carefully annotated his copy of the book and solicited the opinions of other World War I-era figures whose work was misrepresented within. Next to part of Yardley's discussion of American cryptologic work during the war, Friedman carefully penned, "All this is a most amazing piece of misstatement, inaccuracy, and downright falsehood."[2]

Because cryptology was a poorly understood intelligence function at the time that the Espionage Act was passed in June 1917, the act contained no provisions that covered Yardley's revelations, and he effectively could not be prosecuted.[3] As a result of Yardley's book, the act was amended in 1933 to prohibit disclosure of foreign codes or anything put into code.[4]

Between the entry of the United States into

World War I in 1917 and the 1933 changes to the Espionage Act, the world learned quite a bit about US government cryptologic activity, including advances made during the war. Military intelligence personnel grappled with the concept of secrecy—what should be protected, what is a secret, why it is a secret, and how to handle or protect this material. While this was likely the first time the US military establishment struggled with the issue of protecting cryptologic material through classification, it would not be the last.[5]

Wartime Secrets

Why was cryptology so obscure that the Espionage Act had neglected to protect this vital work? There was no formal cryptologic service prior to World War I, although there had been a rudimentary start at radio interception and codebreaking in 1916—so rudimentary that the US mail was used to send secret intercepts to those who might be able to break the codes and ciphers within. One of the most in-depth US publications on the subject, *Manual for the Solution of Military Ciphers*[6] by Captain Parker Hitt, was not classified upon its release in 1915 and was never retroactively controlled. When war on Germany was declared in April 1917, there was a rush to establish code and cipher sections in the army and navy. Cryptologic organizations were also established within the AEF in France.

Concepts of secrecy and classification differed on the home front and Western Front. On the home front, a large private organization—Riverbank Laboratories, owned and operated by George Fabyan—had been lending cryptologic assistance to the government for several years. Friedman, then Riverbank's chief cryptologist, produced groundbreaking publications on the science of ciphers that Fabyan had freely distributed. In contrast to Fabyan's approach, Colonel Ralph Van Deman, the head of the Military Intelligence Division (MID) for the War Department, desired to protect cipher information and contemplated having some Riverbank publications withdrawn from the Library of Congress for reasons of secrecy. While Fabyan appreciated the military's need for secrecy, he had the competing urge to publicize his organization's work. Still, in May 1917 he announced to Van Deman, "your work at the present time is all being handled by the men, Miss Jensen, Miss Ford, and Miss Smith, and they all understand that if one word pertaining to it leaks out there will be trouble."[7]

The struggle over the Riverbank publications went on between Fabyan and the MID through much of 1918. Fabyan often noted to Van Deman and his staff that military personnel had inadvertently disclosed information more important than Fabyan's work, but this tried the patience of the MID leadership. The division was indeed frustrated that there were "many officers who do not appreciate the need for secrecy in regard to [cipher] information,"[8] but that did not give Fabyan the right to disclose secrets. Despite Fabyan's considerable generosity and patriotism in allowing Riverbank to do War Department work at his personal expense, just days before the Armistice in November 1918, Brigadier General Marlborough Churchill, Van Deman's replacement at the MID, determined that it was unwise for the department to exchange further information with Fabyan. The tipping point? Fabyan wanted to send copies of his publications on cryptanalysis to Japan. While Japan was an ally of the United States during World War I, the military was aware that they might someday be an adversary, and this was just a step too far.[9]

On the Western Front, the standard for work in France was to classify in order to keep operations secret from the adversary rather than to classify because of the nature of the work. Codebooks were classified SECRET and marked "Must not fall into hands of enemy"—with the code group to report loss of the book designated "DAM." Details of signals interception were sometimes marked CONFIDENTIAL or SECRET but most often not marked at all. Examination of AEF records reveals a similar situation; some ciphered or coded messages were stamped SECRET while others were

not marked at all. The government withdrew select material from the files in 1917 and 1918 because it was determined too sensitive to be kept with general paperwork. There seems to have been no consistent standard applied to protecting the work. Postwar wrap-up reports were sometimes classified and sometimes not; many of these were reprinted in the 1930s as CONFIDENTIAL and eventually declassified in the 1970s and 1980s.[10]

Postwar Free-for-All?

After the war, men were actually permitted to take some of their work home. One example of this is a British War Office *Manual of Cryptography*, published in 1911 and used in World War I. Despite being marked "For Official Use Only" with the caution, "The information given in this book is not to be communicated, either directly or indirectly, to the Press, or to any person not holding an official position in His Majesty's Service," it found its way into the possession of First Lieutenant William Friedman in the Radio Intelligence Section (G2A6) in 1918 and can be found in Friedman's papers at the George C. Marshall Foundation's Research Library.[11] The many journalists accredited to follow the war in France were censored and rarely mentioned intelligence matters. An early exception was the widespread publication in September 1917 of the United States' ability to read German messages, although the information was unspecific.[12]

After the war, some correspondents wrote more about the secret side of the war with no apparent repercussion. Participants in signal collection and codebreaking documented their work in army professional journals and radio magazines. In 1920, Colonel Frank Moorman, who had headed the G2A6 in France, asked for permission to publish an article on the "Use of Code and Cipher in France" in the US Army's *Infantry Journal*. Permission was sought, and granted, for Moorman to do this despite dissent on the matter. The dissenter? None other than Yardley, who said, 11 years before his own book was published, "Since the creation of the Cipher Bureau, I have steadily maintained a position of secrecy and non-publication of any information dealing with codes and ciphers."[13] Lectures on the subject by those who had participated were given to junior officers with no apparent caution for sensitivity. The war was over; the Allies were successful; the stories were known.

Between 1919 and 1922, quite a lot of information was available in one way or another. An August 1919 article in a San Antonio, Texas, paper about the Radio Intelligence unit at McAllen, Texas, being recognized as the most efficient in the service, was deemed "regrettable" by the MID. A memo to Washington from the unit's commander notes, "[T]he men of these units have been informed time and again that under no circumstances were they to divulge or discuss the work of the units in any way on the outside." While the men denied giving out information, they did admit to discussing the prize money they had received for this recognition amongst themselves at the local Community Service Club, where a reporter likely overheard them. The commander subsequently warned the editors of the local papers that "under no circumstances" were they to print anything concerning these units.[14]

In September 1919, *The Wireless Age* published the first of what would be four articles titled "Wireless in the A.E.F." Written by Lieutenant Colonel Louis R. Krumm, the officer in charge of the AEF's Radio Division, and his subordinate officer, Captain Willis H. Taylor, Jr., these articles comprehensively covered the work of the Radio Division, including its radio collection, direction-finding, and ground intercept (listening-in) efforts.[15]

The 1919 War Department *Annual Report*, published in 1920,[16] contained a chapter on the AEF Radio Section, which was entirely unclassified. It discussed intercept equipment, locations, the difficulties of code and cipher work, and examples of how this work supported the war. While this information was likely not in public circulation, it undoubtedly was available to those looking for it.

In 1921, Churchill, the head of the MID, pub-

lished an article in the *Journal of the United States Artillery* that glossed over the existence of a home-front code and cipher section and implied it was not needed in peacetime.[17] That same year, a book detailing the work of the 406th Telegraph Battalion in the war talked at length about sources and methods for communications intelligence, with no apparent repercussion.[18]

August 1922 saw *Radio* magazine print a talk that Major Robert Loghry, head of the Radio Section during the war, gave several times that year on the subject of military radio communications, to include the intercept work of the Signal Corps.[19] That same autumn the *American Legion Weekly* published an in-depth article by a journalist explaining how the AEF Code and Cipher Section broke a crucial German code in March 1918—with diagrams showing how they did it![20]

However, there are indications someone in government recognized that World War I secrets needed to be protected after the war. One of the most confusing cases involved the 1920 AEF publication, *The History and Principles of German Military Ciphers 1914-1918*.[21] This document, written in December 1918 by a junior officer in the AEF's Radio Intelligence Section, J. Rives Childs,[22] might have been among the resources officers were allowed to take home with them from the war.[23] In 1935, Friedman, while in charge of the Signal Intelligence Service, reprinted many of the postwar AEF writings on cryptology; at that time this information was marked CONFIDENTIAL. In 1946, *The History and Principles of German Military Ciphers 1914-1918* was downgraded to restricted, and Friedman kept a copy at home (as was allowed). In 1957, the classification was upgraded to CONFIDENTIAL by the National Security Agency (NSA). The Agency likely did not realize that their sister organization, the Army Security Agency, had declassified the book in late 1955. Despite these efforts to control the document, there were copies available to the public—in paper and on microfilm. In 1958, the American Cryptogram Association (ACA) notified some of its members about the availability of this work from University Microfilms of Ann Arbor, Michigan. David Kahn, author of *The Codebreakers*, obtained a copy in this manner. When the ACA asked NSA if it had objections to the association's magazine publishing a review of the book, the ACA was advised that it was CONFIDENTIAL and a review could not be authorized by NSA. At that time, it was also determined there was a copy of the document in the catalog of the Library of Congress, but it was missing (it was later located).[24]

The story of this one World War I document does not end here. In 1970, a copy of the document was found in the records of the AEF in the National Archives, and NSA had the copy withdrawn since it contained Security Classified information. Finally, in November 1973, NSA officially declassified the book. The Agency released it as Special Research History 310 more than 50 years after it was written and many years after the techniques and technologies were completely outmoded![25]

The Impact of Yardley

Yardley's book came out in 1931 and, in the aftermath of its publication, it is clear that writers familiar with the World War I radio intelligence effort became more cautious. General Peyton March's 1932 book *The Nation at War*[26] had only a brief mention of radio intelligence work. General Dennis Nolan's lecture on military intelligence in the AEF for the Army War College in 1933 was classified CONFIDENTIAL.[27]

In 1932, Childs, whose wartime work had been misrepresented by Yardley in *The American Black Chamber*, anonymously published a memoir of sorts, *Before the Curtain Falls*,[28] which discussed his World War I service. Many years later, in 1983, it was published under his name in a revised form as *Let the Credit Go*.[29] Although most names of people, including Childs himself, are anonymized in the first book, Childs used Yardley's true name. Childs, under the guise of Anonymous, does give some detail of codebreaking operations and the US relationship with

British and French cryptologic personnel. He also talks about the March 1918 breakthrough against a German code, which had already been revealed in the *American Legion Weekly* article in 1922.

In his book *Secret and Urgent*,[30] released in 1939, Fletcher Pratt chose to steer away from the core of US cryptologic work in World War I. He mentions the British work on German codebooks in their Room 40, and he discusses the discovery of codebooks in the papers from a downed German Zeppelin. He writes, "The story of ciphers and codes in the World War is still locked in the secret record of the World's Black Chambers." He even directly references Yardley, noting that when part of the story gets out, "there are wigs on the green"—effectively, heads will roll!

Conclusion

World War I was the first time the US military had to grapple with cryptologic secrecy on a large scale. While the MID showed signs of understanding the need to protect concepts and techniques, and resisted George Fabyan's desire to share these with allies far and wide, the AEF was more concerned with protecting current information from the adversary. Once the fighting ended, the AEF allowed material to be kept as reference material or souvenirs and did not stop journalists from writing about the wartime success of the cryptologists.

The 1917 Espionage Act did not properly cover the then little-known discipline of cryptology, but the stunning revelations in Yardley's *The American Black Chamber* forced changes to the law. The release of so much material about World War I was considered a serious security leak as late as 1948, long after the material revealed had any relevance to modern cryptologic practices.[31] However, Yardley's unexpected revelations did force the cryptologic community to come to grips with protecting information; the reaction to his work meant that material written about World War I, during or just after, was often reclassified or hidden away. Books and magazine articles could not be hidden or confiscated, but in that pre-Internet era and in the normal course of life the material fell out of easy access to most people. The reaction to Yardley's book had an immediate chilling effect on others who wanted to write about the cryptologic work of the Great War. Some of this effect lasted well into the 1970s and early 1980s.

Looking back, these World War I revelations are, while not laughable, quite minor in proportion to later security lapses. But the damage Yardley did by publicizing his success in the 1920s against Japanese code cannot be discounted since the information potentially changed Japanese cryptologic efforts to the detriment of US interests.[32] By the time the United States entered the Second World War, the dangers of revealing cryptologic capabilities were much better understood, partly because of the angst caused by Yardley's work. Well-thought-out standards for classification and control of material began to be used to protect cryptologic material.[33] In June 1945, at the end of the European portion of the Second World War, Preston Corderman, commander of the Signal Security Agency, issued a memo reiterating that secrecy about signals intelligence operations needed to be maintained "during the remainder of the war and in peace as closely as it has been maintained in the past" for the future safety of the United States.[34] And with a few notable exceptions,[35] the cryptologic secrets of the Second World War were kept for three decades or more after the war's conclusion, unlike the secrets of the First World War.

Notes

1. Herbert O. Yardley, *The American Black Chamber* (New York: Ballantine Books, 1931).
2. Friedman's annotated copy is in the collection of his papers at the George C. Marshall Foundation's Research Library and Archive in Lexington, Virginia. The foundation has digitized this item. Accessed March 1, 2017, https://library.marshallfoundation.org/Portal/Default/en-US/RecordView/Index/15273. The citations can be found on the flyleaf and on page 43 of the book.
3. The Espionage Act of 1917 was preceded by the Defense Secrets Act of 1911; prior to that act, federal statutes applicable to espionage were those addressing treason, unlawful entry into military bases, and theft of government property. Interesting background on this subject is in Harold Edgar and Benno C. Schmidt, "The Espionage Statues and Publication of Defense Information," *Columbia Law Review* 73, no. 5 (May 1973): 929-1087.
4. Friedman himself wrote a memo in July 1943 calling for more care about security and better legislation, noting that a Yardley book had to be suppressed "which led to the enactment of a perfectly futile and silly law." Memo on Security from William F. Friedman to Colonel Corderman, head of the Signal Security Agency, July 23, 1943, accessed March 8, 2017, https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/reports-research/FOLDER_045/41712519075182.pdf.
5. The struggle was not unique to the United States; in the summer of 1914, the reports that French diplomatic codebreakers could read German, Italian, Spanish, and perhaps other nations' communications led to these codes being changed. "Thus it was on the very eve of the First World War, when communications intelligence was of the highest importance, the codebreakers were rendered powerless to provide it by the government's inability to impose even minimum standards of discretion." Christopher Andrew in *Déchiffrement et diplomatie*, 53-58, quoted in his own "Governments and Secret Services: A Historical Perspective," *International Journal* 34, no. 2, Knowledge and Power (Spring 1979): 167-186.
6. Parker Hitt, *Manual for the Solution of Military Ciphers* (Fort Leavenworth, KS: The Press of the Army Service Schools, 1916).
7. George Fabyan to Ralph Van Deman, May 31, 1917, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 165, Records of the War Department General and Special Staffs, Entry 65, Box 2241.
8. Marlborough Churchill to Fabyan, June 22, 1918, NARA CP, RG 165, Entry 65, Box 2243.
9. Churchill to the Army Chief of Staff, November 13, 1918, NARA CP, RG 165, Entry 65, Box 2243.
10. Material amassed by the American Expeditionary Forces Radio Intelligence Section (G2A6), NARA CP, RG 120, Records of the American Expeditionary Forces (World War I), Entry 105.
11. General Staff, British War Office, *Manual of Cryptography* (London: War Office, 1911), in William Friedman Papers, George C. Marshall Foundation Library, Item 90.
12. Basil M. Manly, "Possible For U.S. To Read Secret Codes: No Message Received That Uncle Sam Cannot Make Out," September 17, 1917. Published in many newspapers under different headlines, the article was published under this headline in what the author assumes to be a Chicago newspaper and sent by Fabyan to Van Deman in late September 1917. Van Deman's reply, dated September 29, 1917, notes that Manly was "a very rabid labor agitator, of anarchistic views" and claims that "the better class of newspaper men are afraid of him." Van Deman agreed with Fabyan's assessment that the publication "of matter of this kind" was a "great mistake." NARA CP, RG 165, Entry 65, Box 2241. An interesting discussion of censorship of journalists during wartime is in Daniel Smyth's "Avoiding Bloodshed? US Journalists and Censorship in Wartime," *War & Society* 31, no. 1 (March 2013): 64-94.
13. Frank Moorman, "Code and Cipher in France," *The Infantry Journal* XVI, no. 12 (June 1920): 1039-1044. For Moorman's request for permis-

sion, General Dennis Nolan's granting of permission, and Yardley's dissent see NARA CP, RG 165, Entry 65, Box 1876.

14. The documents related to the McAllen fiasco are preserved in NARA CP, RG 165, Entry 65, Box 84. The newspaper article that started it all was headlined "McAllen Radio Station is Most Efficient," which appeared in the *San Antonio Express* on August 21, 1919. The article was picked up by at least one other paper, the *Republican and Herald* of Pottsville, PA, which was the hometown paper of Joseph L. Richey, one of the men in the unit.
15. Lieutenant Colonel Louis R. Krumm and Captain Willis H. Taylor, "Wireless in the AEF" (four parts), *The Wireless Age* 6, no. 12 (September 1919): 12-18; 7, no. 1 (October 1919): 9-21; 7, no. 4 (January 1920): 12-19; and 7, no. 7 (April 1920): 10-14.
16. *War Department Annual Report for 1919*, vol. 1, Chief Signal Officer, chap. 13, Radio Service, American Expeditionary Forces (Washington, DC: Government Printing Office, 1920), 1183-1217.
17. Churchill, "The Military Intelligence Division, General Staff," *Journal of the United States Artillery* 52, no. 4 (April 1920): 293-315.
18. Peter Lambert Schauble, *The First Battalion: The Story of the 406th Telegraph Battalion Signal Corps, U.S. Army* (Philadelphia: The Bell Telephone Company of Pennsylvania, 1921). The 406th was known as a Bell Battalion, since it was staffed by volunteers from the Bell Telephone Company.
19. Robert Loghry, "Military Radio," *Radio* 4, no. 8 (August 1922): 10-12.
20. William E. Moore, "The Jerry Who Spoiled the War," *The American Legion Weekly* 4, no. 35 (September 1, 1922): 7-8, 26-28.
21. J. Rives Childs, *The History and Principles of German Military Ciphers 1914-1918* (unpublished manuscript, n.d.), National Cryptologic Museum Library, Ft. Meade, MD.
22. Childs went on to be a diplomat and international expert on Casanova, as well as the author of several books.
23. The document exists in both Friedman and Childs's papers.
24. David Sherman, "The National Security Agency and the William F. Friedman Collection," *Cryptologia* 41, no. 3 (2016): 13-14.
25. Withdrawal Notice for file 4131-60 dated 20 October 1974 found in NARA CP, RG 165, Entry 65, Box 1876.
26. Peyton Conway March, *The Nation at War* (New York: Doubleday, Doran & Company, 1932), 225-227.
27. But has since, of course, been declassified. Major General D. E. Nolan, "Military Intelligence in the A.E.F. Lecture," delivered March 20, 1933, as part of G2 Course No. 19 (1932-1933) at the Army War College. In the collection of the US Army Military History Institute Lectures, Army War College, 1932-1933 (no. 19).
28. [J. Rives Childs], *Before the Curtain Falls* (New York: Bobbs-Merrill, 1932).
29. Childs, *Let the Credit Go: The Autobiography of J. Rives Childs* (New York: K. S. Giniger Co., 1983), distributed by Frederick Fell Publishers, December 1983.
30. Fletcher Pratt, *Secret and Urgent* (New York: Bobbs-Merrill, 1939).
31. Army Security Agency, *History of the Signal Security Agency*, vol. I, part I (1948): 150i, accessed March 15, 2017, https://media.defense.gov/2021/Jun/29/2002751406/-1/-1/0/HISTORY_OF_THE_SIGNAL_SECURITY_AGENCY_VOL_ISRH364.PDF.
32. "The Black Chamber: The Man Who Made Edward Snowden Inevitable," *The Economist*, December 19, 2015, accessed March 1, 2017, https://www.economist.com/christmas-specials/2015/12/16/the-black-chamber. See also Roger P. Alford, "Government Leaks in the Internet Age," in *Proceedings of the Annual Meeting* (American Society of International Law), vol. 105, *Harmony and Dissonance in International Law* (2011): 147-150.
33. Memo from the Commander-in-Chief, United States Fleet and Chief of Naval Operations, "Control and Dissemination of Radio Intelligence," June 20, 1942, accessed March 8, 2017,

https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/reports-research/FOLDER_356/41750589078977.pdf. Reiterated more emphatically in a memo of March 25, 1943, accessed March 8, 2017, https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/reports-research/FOLDER_356/41750569078975.pdf. The second memo seems to mark the navy's transition from the term "radio intelligence" to the more modern "communications intelligence."

34. Corderman memo, "Maintenance of Security Standards After the End of the European War," June 1, 1945, accessed March 15, 2017, https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/reports-research/FOLDER_045/41717919075721.pdf.
35. Allied work against Japanese codes and ciphers was well known before the success of similar work against Germany.

Chapter 16

American Indian Codetalkers in World War I

Codetalking was a late innovation of World War I and was used to transmit critical information securely over the telephone. As has been documented in chapter 12, American forces, despite frequent reminders, did not practice good security when using the telephone at a time when there was no voice encryption available. German radio intelligence was easily able to monitor American phone and radio communications, as were the US Army Radio Section personnel devoted to policing the American communications lines (chapter 10). At least two army divisions relied upon American Indians as codetalkers, and members of multiple tribes provided this life-saving form of safe communications.

This chapter was written by Dr. Steve Huffman and is based on his unpublished article "American Indian Codetalkers in World War I." It is used by courtesy of the author. Huffman earned his BA in archaeology from Wheaton College and his master's and PhD in computational linguistics from Georgetown University, where his study focused on American Indian languages. He worked in the Department of Defense for 35 years as a cryptanalyst, linguist, and researcher. —Betsy Rohaly Smoot

Note on terminology. At this moment in American society (2022), there is a vigorous reevaluation of what terms should be used to refer to various ethnic and racial groups. For 300 years, the standard term for the descendants of those who inhabited America before Columbus has been American Indian, or simply Indian. Some people now argue that American Indian is pejorative and should be replaced by the term Native American. The men I interviewed over the course of my research unanimously preferred to refer to themselves as American Indian or Indian, and some actively rejected Native American as inaccurate and borderline offensive. To honor their deeds and their memory, I have chosen to use the term they preferred. Also, please note that this article contains numerous quotations from the past, some of which contain epithets for enemy soldiers in wartime and phrases that reference common (at that time) stereotypes that are offensive today.

From their earliest settlement of North America, European settlers fought alongside and against American Indians. During many conflicts over hundreds of years, there were settlers who developed a deep respect for the American Indians' skills as scouts and warriors and actively courted American Indian allies whenever there was fighting to be done.[1] Some of the most prominent US Army

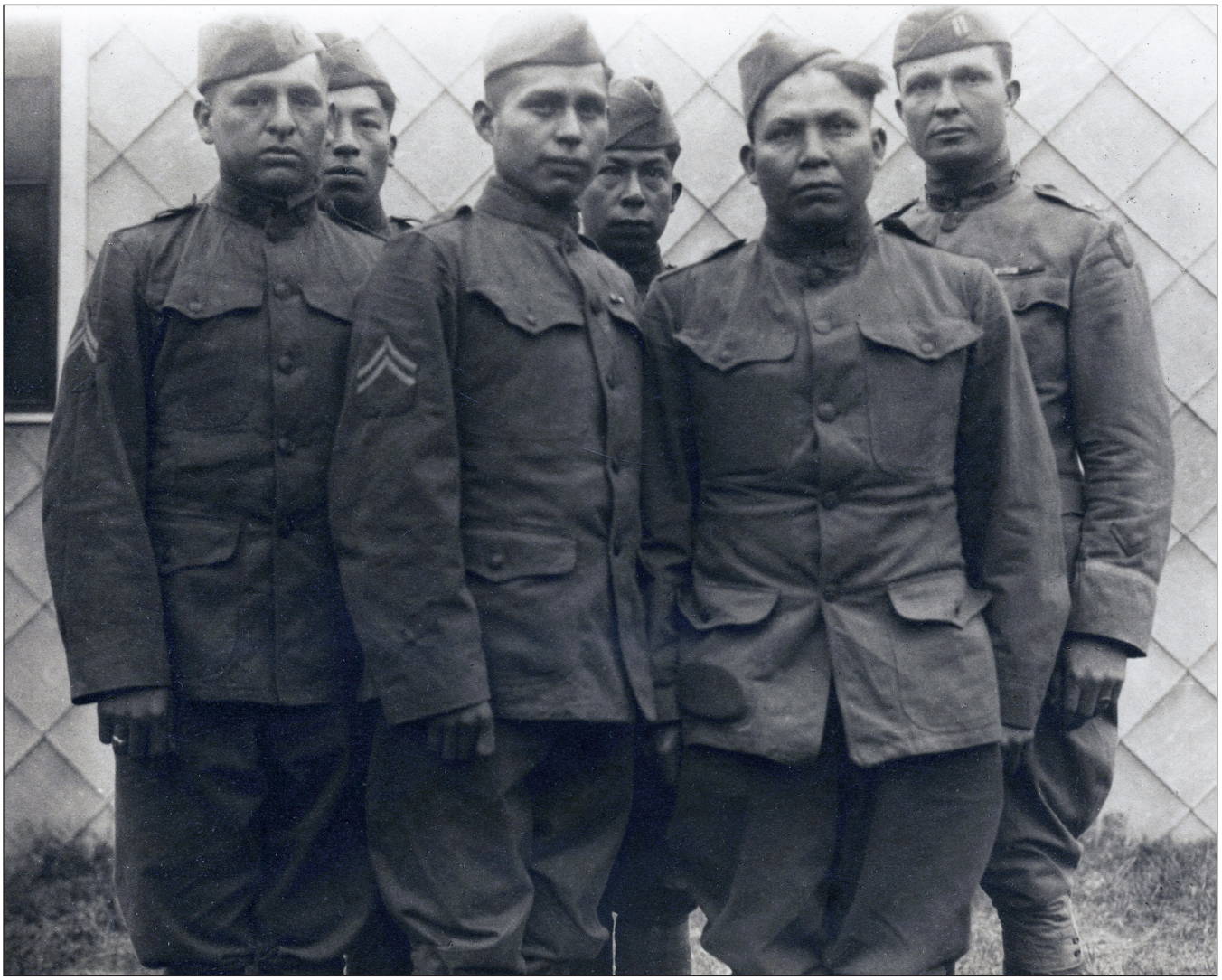
officers of the latter part of the nineteenth century expressed their appreciation of the fighting qualities of the American Indians. General Nelson Miles, who led campaigns against the Plains Indians in the 1870s and 1880s, wrote, "They employed the art of deceiving, misleading, decoying, and surprising the enemy with great cleverness. The celerity and secrecy of their movements were never excelled by the warriors of any country. They had courage, skill, sagacity, endurance, fortitude, and self-sacrifice of a high order."[2] General William Sherman was the commanding general of the US Army from 1869 to 1883 and led the army's wars against various American Indian tribes in the West. Sherman was no friend of American Indians, but he admired their war-fighting skills, saying, "Their sagacity and skill surpass that of the white man."[3] General George Crook also fought against various American Indian tribes throughout the American West from the 1860s to the 1880s. One of his staff officers wrote that his Shoshoni auxiliaries were "the finest light cavalry in the world."[4] General Charles King, who campaigned against the Sioux in the 1870s, wrote, "The Indians were always scientific fighters, but when they succeeded in arming themselves with breech-loaders and magazine rifles, the Sioux of the Northern Plains were foemen far more dreaded than any European cavalry."[5] As recently as the 1916 Punitive Expedition along the Mexican border (see introduction), the US Army had relied on Indian scouts, and General John Pershing, commander of the Expedition, wrote "… Indian Scouts rendered valuable service in the brief campaign against Pancho Villa."[6]

Given the experiences of the US Army in conflicts with American Indians in the period after the Civil War, along with the testimony of army leaders like Generals Sherman, Crook, King, Nelson, and Pershing, it is not surprising that many in the military believed that Indians would excel as scouts, message runners, and sharpshooters.[7] But there was a debate about whether Indian soldiers should serve in their own dedicated units (as African Americans did in the Civil War) or be assigned to existing units. Some officials, including Secretary of the Interior Franklin Lane, thought that the country could raise several infantry divisions of American Indians (a World War I army division contained approximately 28,000 men). Ultimately, however, it was decided that it would be best to integrate American Indian recruits into existing units. Since regiments and divisions were raised mostly by geographical region throughout the United States, some units, such as those from Oklahoma and the southwestern United States, contained a high proportion of American Indians.[8]

Estimates vary, but about 12,000 American Indians fought in the US military during World War I.[9] Many of these men were probably still fluent in their tribal languages.[10] Indians' reputation as superb warriors meant that many American soldiers were pleased to learn that they would have Indians alongside them in combat. After WWI, Major General Hugh Scott wrote, "The Indian was popular in his organization of white soldiers, wherever he served, no word of misprision ever reaching my ears. As a race he played a higher part in the war on the side of patriotism than the ordinary white man, notwithstanding the fact that it was but a short time since we were pointing guns at him."[11]

Among those American Indians who participated in World War I, some would serve the country in a unique way by using their native languages to prevent the enemy from listening in to frontline communications. Much of our knowledge concerning American Indian codetalkers in World War I comes from the work of Lieutenant John R. Eddy, who was assigned to the Historical Section of the US Army General Staff. Prior to the war, Eddy had been with the Bureau of Indian Affairs and had been the superintendent of the Tongue River reservation (now the Northern Cheyenne Indian reservation) in southeastern Montana from 1906 until 1914.

In early 1919, Eddy was attached to the 39th Division stationed at Base Hospital 99 in Hyères on the Mediterranean coast of southern France.



Choctaw telephone squad, 1919. Indiana University Museum of Archaeology and Anthropology, Mathers Ethnographic Collection, 1962-08-6453

Deeply interested in the contribution of American Indians to the war effort, he approached Lieutenant Colonel E. Bowditch, a member of the Army General Staff assigned to the I Corps headquarters, and asked to be "attached to the Historical Section of the General Staff, for the purpose of making a first-hand investigation of what the American Indian has accomplished in modern warfare."[12]

Eddy's transfer was granted, and he immediately began "collecting information relative to the special work and value of the North American Indian as a scout." Moving to Chaumont in northern France, 60 miles from the front, Eddy gathered information on the performance of American Indians in combat from their commanders. He believed "that from this investigation it will be conclusively shown that Indians, on account of native adaptability, showed marked superiority over the average soldier as night runner and scout." He apparently had no idea when he began his research that

some military units relied upon American Indian codetalkers to provide secure communications capability.[13]

While Eddy's basic methodology was suspect (undertaking an investigation with the conclusion already assumed), his work led to the first official record of codetalking in World War I when several officers from the 142nd Regiment of the 36th Division responded to his survey with information about Choctaw codetalkers.[14]

Choctaw Codetalkers of the 142nd Regiment

The Choctaw members of the 142nd Regiment became the most widely recognized American Indian codetalkers of World War I. In the fall of 1917, two National Guard units, the 7th Texas and the 1st Oklahoma Regiments, were organized by the federal government into the 142nd Regiment, commanded by Colonel Alfred Bloor. The 142nd was then made part of the 71st Brigade, which was in turn incorporated into the 36th Division. The insignia of the 36th Division was an arrowhead with the letter *T* superimposed, representing Oklahoma and Texas, and so it became known as the Arrowhead Division. According to Lieutenant Lucien Coppinger, aide to division commander Major General William R. Smith,

> Practically every Indian tribe in the Southwest is represented in the Division, including Choctaw, Commanche [*sic*], Chickasaw and Cheyenne Indians. A great many of them could not speak English; they spoke their native language … There was one Indian Lieutenant and three half breed Lieutenants. There are several Indian noncomms [non-commissioned officers] in the Division.[15]

Bloor found that the Indians in his regiment, which included several American Indian officers, spoke 26 different languages.[16] One company of 150 soldiers in the 142nd Regiment, Company E, contained approximately 120 American Indians from 14 different tribes. It was sometimes referred to as the "Millionaires Company" since many of the American Indians were landowners and some received quite substantial royalties from oil concessions on their land in Oklahoma.[17]

The 36th Division arrived in France in the summer of 1918 and was put under the operational command of the French IV Army. The 142nd Regiment underwent its baptism by fire on October 8, attacking the Germans at Saint-Étienne in a confused and bloody battle. Written orders for the attack arrived at the front lines at the last minute, in some cases without being translated from French. The Allied artillery supporting the attack overshot the German trenches. Intense German machine gun fire killed many of the American officers leading the attack. The French tanks, which were supposed to support the attack, fell behind the advancing American infantry, killed a number of Americans in the confusion, and then abandoned the fight, trundling back to their starting point. Nearly one-fourth of the Americans in the attack were killed or wounded, but they managed to take their objectives and hold them in the face of heavy German artillery fire. The next evening, the German Army pulled back to new defensive positions several miles to their rear.[18]

On October 10, the Americans pushed after the retreating German Army, heading toward the Aisne River, behind which the Germans had set up their next line of defense. On October 12, the 142nd Regiment reached a position overlooking the valley of the Aisne River. Here they paused, clearing Germans out of the valley on the south side of the river, burying the dead of both sides, resting, and resupplying.[19]

The commander of the 36th Division, Major General William Smith, quickly discovered just how thoroughly the Germans were monitoring American communications when he deliberately sent "fake orders over the phone. The general gave out a message stating that a contingent of troops would be on a certain hill. The Germans nearly tore the hill down." But the Americans would soon find a unique

way to defeat the German eavesdroppers—American Indian codetalking.[20]

The precise sequence of events that led to the use of codetalkers in the 142nd Regiment is a bit unclear, but the basic story appears to be as follows. On or shortly after October 12, while the regiment paused south of the Aisne River, a captain (sometimes identified as Captain Lawrence, but more likely Captain Elijah Horner, commander of Company E [Eddy]) walked past some soldiers of Company E and overheard Solomon Louis and Mitchell Bobb chatting. It struck the officer that their conversation was completely unintelligible to him, so he asked the men what language they were speaking. They explained that they were talking in their native Choctaw and told the captain that there were several more Choctaw speakers in the regiment. The officer immediately called the headquarters company and located two Choctaw speakers who were assigned there. He wrote a message in English and asked Private Bobb to translate it into Choctaw "on the fly" over the field telephone to Choctaw speaker Private Benjamin Carterby back at the headquarters company. Carterby then translated the message into English for the battalion commander, who in turn relayed the message back to the officer, who confirmed that it was essentially the same message he had originally composed.[21]

After demonstrating that the idea was feasible, the officer suggested to Bloor that Choctaw speakers transmit the regiment's messages over the field telephone using their native language. Bloor agreed to give the idea a try and directed Captain Horner to assign Choctaw speakers from his company to each of the regiment's command posts.[22] (At least one other source, though based on recollections from 1942, suggests that the idea of employing Choctaw speakers as codetalkers actually originated at the regimental level.[23])

Before they could send coded messages, the Choctaw codetalkers needed to designate words in Choctaw to substitute for English terms that did not exist in their language, particularly technical and military vocabulary. For instance, the Choctaw language had no word for the English term *poison gas*, and if the subject came up while two Choctaw were talking with each other, they would simply say the words *poison gas* in English. When sending coded messages, however, codetalkers needed to avoid interspersing English terms in the messages, since even a few intelligible words would give German eavesdroppers a sense of what the message was about. So the Choctaw came up with native Choctaw words to use in place of the English terms they would normally use. According to Lieutenant Colonel William Morrissey, the Choctaw codetalkers decided to use the Choctaw term for "bad air" for the English words *poison gas*, "the tribe" for *regiment*, "one grain of corn" for *1st battalion*, "bow" for *company*, "arrows" for *ammunition*, "stone" for *grenade*, "many scouts" for *patrol*, "scalps" for *casualties*, and so on.[24]

The 142nd Regiment soon had the opportunity to try out their new code. In October 1918, while most of the German Army had retreated to defensive positions north of the Aisne River, a battalion of the 9th Colberg Grenadier Regiment of the veteran 3rd Prussian Guards Division still occupied a strategic position south of the Aisne, where the river made a tight horseshoe bend nearly enclosing a piece of high ground. The position was accessible only by a narrow strip of land between the river bends. From the high ground, the Germans could easily observe Allied troop movements in the vicinity and call down artillery fire on Allied forces in the Aisne Valley. If the Allies tried to cross the Aisne River near the German position, the Germans could bring fire on their flank. General Marie Léon Louis Prax, commander of the XI Corps of the French IV Army, decided that the German position must be taken before the Allies continued their advance.

The French 73rd Division twice tried to drive the Germans out but was thrown back with heavy losses.[25] Frustrated, General Prax ordered the

American 36th Division to capture the position. The coming battle would be known as the battle of Forest Farm, after an abandoned farm near the German position.[26]

On October 26, the 142nd Regiment moved forward, pushing two companies toward the town of Chuffilly-Roche until their advanced posts were barely 60 yards from the Germans. They found that the Germans had fortified the short neck of land between the river bends with trenches covered by belts of barbed wire and felled trees, backed by strongpoints bristling with dozens of machine guns.[27]

In preparation for the attack, the Allied artillery fired gas shells at the German defenses. The Germans responded in kind, laying down a particularly heavy bombardment of high explosives and mustard gas on the American troops around Chuffilly. One officer recalled that "the troops around the town were burned by the splashing liquid in the foxholes where they lay … [t]he division gas officer paid a visit to the area and declared that it was dangerous for the troops to be there."[28] Bloor decided to order the men in the two exposed companies to withdraw to the village of Chardeny for the night, sparing them for the assault scheduled for the next day. But he faced a problem: if he sent the orders using runners, there was a very good chance that they would not get through the German bombardment. On the other hand, if he sent orders for the withdrawal over field telephone using the standard army voice communications, he knew that the Germans would most likely intercept and decrypt those messages. If the Germans learned when the American troops were leaving their cover, they could blast the ground over which the Americans were retreating with gas, high explosives, and machine gun fire, inflicting serious losses.

However, the endangered companies now had Choctaw speakers handling their communications, so Bloor took a gamble on this new, untested system and sent the orders for the withdrawal over the telephone in Choctaw. At the appointed time, under cover of darkness, the men left their positions and quietly made their way back to safer ground. From the Germans' lack of reaction, it was clear that they had no inkling of the American withdrawal.[29]

The next day, Sunday, October 27, orders for the American attack were transmitted over the telephone to each company in Choctaw. At 1630, the doughboys attacked the German positions behind a rolling artillery barrage. There were a few moments of confusion when both the German counter barrage and friendly artillery, falling short, hit the American troops as they left their trenches, but the men quickly recovered and rushed the German lines. The assault was a complete success. For once, the Americans had caught the Germans by surprise, and the entire force of German defenders was killed or captured.[30]

A map prepared soon after the battle by Captain Philip E. Barth, the regimental intelligence officer of the 142nd Regiment, shows the preparations for this attack and contains notations indicating the use of the Choctaw codetalking. This is possibly the earliest official documentation of Indian codetalking in the US military.[31]

The next day, the 36th Division was relieved by the French 22nd Division. The doughboys were given a short time for rest and retraining at Louppy-le-Petit before marching southeast to join the Second Army in preparation for a new offensive. Hoping to build on the success at Forest Farm, more Choctaw speakers were trained as codetalkers. Lieutenant Temple Black of the 142nd Regiment recalled: "I was in charge of the work of training these Indians, so I selected three non-comms [non-commissioned officers] and eighteen men to put through a course of instruction. At first I gave them simple messages to transmit, and inside of a week they could send and receive messages of any length with accuracy."[32]

But before the 142nd Regiment saw any more combat, the Armistice was signed, ending the fighting. Nonetheless, the use of an American Indian language as a code had given the 142nd Regiment the powerful advantage of secure battlefield communications. As Bloor put it, "the possi-

bilities of the telephone had been obtained without its hazards."[33]

It is not clear exactly how many Choctaw in the 142nd Regiment actually had the opportunity to perform as codetalkers in battle. Captain Horner specifically mentioned that he detailed eight Choctaw for this work, while Lieutenant Black said he eventually trained 21 Choctaw to be codetalkers.[34] Gregory Pyle, chief of the Choctaw Nation of Oklahoma, listed 18 World War I Choctaw codetalkers in testimony to the US Senate.[35] (See appendix A for one list of Choctaw codetalkers.) It is possible that the difference in numbers reflects one or more of the following: the first codetalkers who communicated on October 26 and 27 (most often mentioned as eight); those who sent messages at any time in Choctaw before the Armistice; and those who were in training to be codetalkers but were never deployed.

Cherokee Codetalkers of the 30th Division

The Choctaw are usually credited with being the first American Indian codetalkers, but that honor probably belongs to the Cherokee. In 1931, while attending the Infantry School at Fort Benning, Georgia, Captain John W. Stanley wrote an account of his time in the 105th Field Signal Battalion of the 30th Division during World War I, which stated that the division employed Cherokee codetalkers in the fall of 1918.[36] The soldiers of the 30th Division were from North Carolina, Tennessee, Georgia, and South Carolina. It was known as the Old Hickory Division, after Andrew Jackson, who was a native of the region. More importantly, the recruiting area for the division was also the ancient homeland of the Cherokee people, which aligned with Captain Stanley's report about Cherokee codetalkers in the 30th Division.

By July 1918, the men of the 30th were in the trenches near Ypres, Belgium. In September, the Allies launched several offensives designed to break the will of the German Army once and for all. As part of that effort, the 30th Division was assigned to the British Fourth Army. Their mission was to assault the Hindenburg line, a heavily fortified German defensive position, on September 29.

The Germans knew an attack was coming, and they shelled the Allied positions relentlessly. Nonetheless, the men of the 30th Division attacked as scheduled on September 29 at 0550 in a heavy fog. In a brutal four-day battle, the Allies broke through the Hindenburg Line and drove the Germans back nearly two miles. The 30th Division was briefly relieved, but on October 5 they were again back on the front line, preparing to attack the Germans on the morning of October 8.[37]

Captain Stanley recounted the difficulties his company faced in laying and repairing the division's telephone lines under the heavy German artillery fire, but he also highlighted the problem of communications security. Many of the division's officers simply did not understand how effective the Germans were at intercepting their messages. Captain Stanley illustrated how bad the problem was:

> About October 6 or 7, late one afternoon near sunset as I recall, Colonel "A" at Division Headquarters called Colonel "B" of one of the regiments in the assault echelon over the telephone, and the conversation ran something like this: Colonel "A" to Colonel "B", "How is everything coming along over there?" "Oh, fine," replied Colonel "B", "they are shelling us pretty heavy but their shells are all striking about 100 yards in rear of my reserves." The conversation ran on for several minutes when suddenly Colonel "B" exclaimed, "By Jove, they are planting them right on my reserve line," and almost in the same breath, "There! One landed right on top of my dugout; they are surely giving us hot peas now." From the above conversation it can plainly be seen what Colonel "B" did. He didn't only correct the range for the enemy artillery but told them when they were on target" [emphasis in original].[38]

The day after the above incident, the division's signal officers met to explore ways to improve communications security. Stanley continued:

> Pardon this personal reference, but at this meeting I pointed out to the Division Signal officer that the old 1st N.C. Regiment which was split up … and its personnel assigned to the 119th and 120th Regiments, contained quite a number of Cherokee Indians which were now somewhere in the division, and that in my opinion, if a number of the most intelligent of them were placed at each telephone, and that they transmit all messages in their native tongue, I felt sure that even a battalion commander could use them in transmitting messages to his company commanders in perfect safety. The matter was taken up with the division commander, and the next day found every command post from brigade forward, including some company command posts, a telephone with a Cherokee Indian beside it … From then on until October 12, 1918, at which date I was ordered back to the United States as an instructor, the Cherokees were kept on the job with continued success, and I understand were used until the end of the war.[39]

If Stanley's dates are correct, Cherokee codetalkers of the 30th Division were used in combat about two weeks before the Choctaw of the 36th Division. Furthermore, if the Cherokee codetalkers were really placed "at every command post from brigade forward," there were probably more Cherokee codetalkers deployed in the 30th Division than there were Choctaw codetalkers in the 36th Division.

The soldiers of the 30th Division, along with the British Third and Fourth Armies, attacked the German lines on October 8, the very day Stanley says the division deployed the Cherokee codetalkers. In a few weeks of fierce fighting, the division drove the Germans from their defenses and suffered heavy casualties.[40] Though casualties were acute, it is almost certain that Cherokee codetalkers aided the American attacks by keeping the Germans from listening in on their communications.

Stanley's account doesn't mention the creation of any special code terms. Since the Cherokee were deployed within one day, it suggests that they could immediately talk in their own language about machine guns, aeroplanes, and so forth. Had the Cherokee already devised terms in their language for those items? Or did they intersperse English words? At the moment, we just don't know.

More Examples of World War I Codetalking

While the Choctaw and Cherokee examples provided above are the best documented instances of World War I codetalking, evidence suggests there were additional occurrences of American Indians using their languages as codes.

General Smith, the commander of the 36th Division, specifically stated that his division used Cherokee codetalking in addition to Choctaw codetalking: "The Germans … had been tapping our telephone wires just as they had been cutting in on the wires of other divisions and in this manner they were able to learn much of our plans. When we discovered this we decided to use Oklahoma Indians on both ends of the wires and have them speak Cherokee and Choctaw. They did and completely baffled the Huns. They had never heard the tongues and were completely at sea."[41]

Private George Adair may have been one of the Cherokee codetalkers General Smith alluded to. Adair was a Cherokee speaker born and raised in Oklahoma. He "enlisted for the World War on September 19, 1917, and was assigned to the 36th Division, was taken from the firing line in France and placed with other full blood Cherokees in the telephone service, where they foiled the German 'listeners in' by repeating, receiving, and transmitting the military orders in the Cherokee language. Young Adair, who … is intensely patriotic … counts this service among the proudest days of his life."[42] Unfortunately, it is not yet known when or where

Adair and the other Cherokee in the 36th Division performed this service.

The Comanche language may also have been used as a code in the 36th Division. Major George Robinson was commander of the 111th Field Signal Battalion, a unit attached to the 71st Brigade of the 36th Division. In a newspaper interview in 1919, Robinson recalled:

> When we wanted to give messages quickly and did not have time to translate them into code, we put a couple of Indians on the phone…in the Forty-First Infantry there were a number of Indians of several different tribes. The message would be written out in English and given to the Indian. He would [speak] in Choctaw, Comanche or whatever he happened to be. The Indian at the other end would translate it into English … I expect the Germans had every Chinaman in their army trying to figure out the new language or code.[43]

Another report mentions that the Osage of the 36th Division spoke their native language over military telephones, but it is unclear if they were actually codetalkers passing military messages or were merely talking with friends. Either way, it would have added to the frustration of German intercept operators.[44]

It is not known if the various codetalking efforts in the 36th Division all developed spontaneously, or if units that successfully used codetalking told other units about their discovery. In any case, the German intercept operators listening to communications of the 36th Division must have had some frustrating days in the fall of 1918.

Almost certainly, other American Indian languages were used as codes during World War I. Unfortunately, only a few tantalizing records exist to suggest which ones. *The American Indian Magazine* in 1919 tells of a group of Sioux-speaking codetalkers but fails to give any specific information about the soldiers, their unit, when they performed their actions, whether they devised code terms in their language, and so on. The account simply states:

> The commander of one brigade of artillery attached to an American division was particularly annoyed by enemy wire tappers in a heavily wooded section of the Argonne. Code messages from artillery observers were being intercepted by Boche listeners-in and the commander knew…that no code is impregnable when experts get working on it.
>
> The commander took up with the colonel of one of the line regiments the question of the Huns' wire-tapping. And the colonel hit upon an idea. Two Indians, both of proud Sioux lineage, members of one of his companies, were assigned as telephone operators. One was to go forward with the artillery observer, the other to remain at the brigade receiving end of the wire which the artillery commander was certain the Germans had tapped somewhere along the line … The Sioux stuck on their jobs for three days and nights.[45]

Don Loudner, commander of the American Indian Veterans Association, told me that Private Albert Grass and Corporal Richard Blue Earth, both members of the Standing Rock Sioux, were codetalkers in World War I who worked together as a team.[46] Their military records show that they served together in the 164th Regiment for a few weeks in the winter of 1917-1918. Private Grass was killed in action at Soissons-Paris Road, July 18, 1918, while Corporal Blue Earth was killed in action on October 9, 1918, during the Meuse-Argonne offensive.[47] It is quite possible that the oral tradition that identifies these men as codetalkers is correct, and, if so, they would have performed that task earlier than either the Choctaw or Cherokee. They may even have been the soldiers referenced in the above *American Indian Magazine* article.

A number of Winnebago (also known as Ho-Chunk) served in the 3rd Division, and there is

evidence that some of these men also used their native language to foil German eavesdroppers. An article published at the Carlisle Indian School in 1919 stated, "Another place [the Winnebago soldiers] were invaluable was in transmitting telephone messages, where there was a possibility of messages being intercepted by Germans. In these cases the Indians would transmit the messages in their own tongues."[48]

On the eve of World War II, many people reflected on the lessons learned during World War I as the country prepared for the coming conflict. In those reminiscences are occasional references to American Indian codetalkers of World War I, unfortunately almost always without crucial details such as names, units, dates, or places. Typical of these is an article from the Washington, DC, *Evening Star* newspaper in 1940. A Mr. Becker, professor of English at Cameron Agricultural College in Lawton, Oklahoma, is quoted: "Several Comanches from Southwestern Oklahoma were used for relaying secret messages in the last war." Becker recalled, "One would be at a telephone at the front in communication with another back at headquarters. They would relay orders in their native language. The Germans had tapped the wires, and it must have driven them crazy."[49]

Another tantalizing glimpse of World War I codetalking comes from the "Federal Diary" column of *The Washington Post* on September 26, 1939:

> If you talk of war-time codes and ciphers to Indian Office executives they will tell you with great glee of a secret message system developed during the World War that had the Germans tearing their hair. The story, which they swear is true and offer to dig up the official records in proof, tells of a situation on the Western Front, where time was the essence in phone and radio messages. These, however, were being tapped by the enemy and every code which could not be broken was too cumbersome for use. As a solution, Indian braves … were put on both ends of the line and transmitted their message quickly, accurately and with complete secrecy in their own tribal dialect.[50]

One can only hope that there really are official records still buried somewhere that might someday shed additional light on Indian codetalkers in World War I.

While the brief postwar accounts of codetalking in World War I are frustratingly vague and incomplete, they are evidence that the successful use of codetalking was not forgotten between the wars. The memory of codetalking in World War I paved the way for the far more organized and widespread use of the technique in World War II.

The literature of the American Indian codetalkers is replete with fascinating stories whose only defect is that they are not true. Perhaps the earliest example of this is the myth of the captured enemy officer who begs to know what the mysterious language is that his men have been hearing on their radios. Captain Stanley ends his report about the Cherokee codetalkers of the 30th Division with a story that was told to him after the war:

> About the second or third day after this system was put into effect, a colonel of the enemy intelligence staff was captured and sent back to Division Headquarters for questioning. He could speak English exceedingly well, and after the officers at Division Headquarters had about finished their examination of him, he asked permission of them to ask a question himself, which was granted. It went something like this, "Gentlemen, we have officers in our army that can speak and translate the majority of the languages of the world, but none of them can understand the language you Americans are using over the telephone. Now please, gentlemen, won't you tell me what it is?" There was quite a bit of laughter but no one gave the secret away.[51]

Having your enemy confirm the security of your code is the ultimate proof of its security, but Stan-

ley's account provides no verifiable details, such as the name of the German officer, the unit to which he belonged, or the names of any of the men who supposedly talked to him. This makes it likely that Stanley's story is just an early (perhaps the first) myth connected to American Indian codetalking. —Dr. Steve Huffman

* * * * *

Afterword

Between the time that this chapter was written in 2018 and the publication of *From the Ground Up*, a new work on the codetalkers has been published. William C. Meadows' *The First Code Talkers: Native American Communicators in World War I* (Norman: University of Oklahoma Press, 2021) provides a more in-depth examination of the subjects covered by Dr. Huffman's overview and should be consulted for additional details. Meadows' work has been used to expand and refine the list of Native American codetalkers presented in appendix A. —Betsy Rohaly Smoot

Notes

1. Kevin Gover, director of the National Museum of the American Indian, Washington, DC, pointed out in his May 22, 2015, HuffPost Contributor Platform post: "American Indians serve in their country's armed forces in greater numbers per capita than any other ethnic group, and they have served with distinction in every major conflict for over 200 years." https://www.huffpost.com/entry/american-indians-serve-in-the-us-military_b_7417854.
2. Nelson Miles, *Serving the Republic: Memoirs of the Civil and Military Life* (New York, London: Harper and Brothers, 1911), 117.
3. *Report of the Secretary of War at the Beginning of the Second Session of the 44th Congress*, H.R. Exec. Doc. No. 1, 44th Cong., 2nd Sess., vol. 1, part 2, 36 (1876).
4. Patrick Edward Byrne, *Soldiers of the Plains* (New York: Minton, Balch, 1926), 179.
5. Byrne, *Soldiers of the Plains*, 180.
6. John Pershing, memorandum, "Appreciation of the American Indian in the World War, September 18, 1920," Gilder Lehrman Collection, Gilder Lehrman Institute of American History, #GLC03911.07.01.
7. Lieutenant John R. Eddy, "American Indians as Battalion Scouts," February 15, 1919, Study of American Indians Serving with the A.E.F., National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 120, Records of the American Expeditionary Forces, Entry 441.
8. Thomas A. Britten, *American Indians in World War I: At Home and War* (Albuquerque: University of New Mexico Press, 1997), 104-105.
9. The United States World War One Commission, "Native Americans," accessed May 19, 2022, https://www.worldwar1centennial.org/index.php/edu-home/edu-topics/588-americans-at-war/4994-native-americans.html.
10. Eddy, "American Indians as Battalion Scouts."
11. Hugh Lenox Scott, *Some Memories of a Soldier by Major General Hugh Lenox Scott* (London: The Century Company, 1928), 563.
12. Lieutenant Colonel E. Bowditch, "Memorandum for the Secretary, General Staff, January 9, 1919," copy in Center for Cryptologic History, Series 4.
13. Brigadier General Oliver L. Spaulding, Jr., "Memorandum from Chief of the Historical Section, G.S., February 24, 1919," NARA CP, RG 120, Entry 441; Eddy, "American Indians as Battalion Scouts."
14. Eddy, "American Indians as Battalion Scouts."
15. Eddy, "American Indians as Battalion Scouts."
16. Eddy, "American Indians as Battalion Scouts."
17. Lonnie White, *Panthers to Arrowheads, The 36th (Texas-Oklahoma) Division in World War I* (Austin, TX: Presidial Press, 1984), 12.
18. Captain Ben-Hur Chastaine, *Story of the 36th* (Oklahoma City, OK: Harlow Publishing, 1920), 89-195.
19. Chastaine, *Story of the 36th*, 89-195.
20. "Major Robinson, Back From France, Describes Victories of the Thirty-Sixth Divi-

sion," Fort Worth, Texas, *Star Tribune*, January 19, 1919.
21. "The Choctaw Code," *Bishinik*, August 1986.
22. Eddy, "American Indians as Battalion Scouts."
23. William C. Meadows, *The First Code Talkers: Native American Communicators in World War I* (Norman: University of Oklahoma Press, 2021), 97.
24. Lieutenant Colonel William J. Morrisey to Lieutenant John R. Eddy, memo, "Terms used by Indians over telephone," March 2, 1919, NARA CP, RG 120, Entry 441.
25. Major Ben-Hur Chastaine, *Operations of Company A 142nd Infantry (36th Division) in the Champagne Offensive October 7 to October 12, 1918* (Fort Benning, GA: The Infantry School, Fourth Section, Committee "H," Advanced Course 1931-1932), 221.
26. Chastaine, *Operations of Company A*, 195-239.
27. Chastaine, *Operations of Company A*, 217-230.
28. Chastaine, *Operations of Company A*, 226.
29. Colonel Alfred W. Bloor to the Commanding General 36th Division, memo, January 23, 1919, "Transmitting messages in Choctaw," in *Utilization of American Indians as Communication Linguists,* Special Research History 120, National Security Agency, 18-19, NARA CP, RG 457, Records of the National Security Agency, Entry 9002, Box 29.
30. Chastaine, *Operations of Company A,* 235.
31. General Headquarters, General Staff, Historical Section of the General Staff, Correspondence, Reports and Other Records Relating to American Indians Serving with the AEF, 1917–1919, NARA CP, RG 120, Box 3471.
32. Eddy, "American Indians as Battalion Scouts."
33. Bloor, "Transmitting messages in Choctaw."
34. Eddy, "American Indians as Battalion Scouts."
35. *Hearing before the Committee on Indian Affairs United States Senate 108th Congress, Second Session on Contributions of Native American Code Talkers in American Military History*, September 22, 2004 (Gregory Pyle, chief of the Choctaw Nation of Oklahoma).
36. Captain John W. Stanley, "Personal Experiences of a Battalion Commander and Brigade Signal Officer, 105th Field Signal Battalion, in the Somme Offensive, September 29-October 12, 1918," 1932 (WWI student paper collection), 5, benning.army.mil/Library/Donovanpapers/wwi/index.html.
37. Major John Walker, *Official History of the 120th Infantry from August 5, 1917, to April 17, 1919* (Lynchburg, VA: J. P. Bell, 1919).
38. Stanley, "Personal Experiences," 5.
39. Stanley, "Personal Experiences," 5-7.
40. R. Jackson Marshall III, "Old Hickory Division," 2006, North Carolina electronic encyclopedia, https://ncpedia.org/old-hickory-division.
41. Leo Sack, "Panther General Tells Congress of Indians' Heroism," *Fort Worth Star-Telegram*, June 11, 1919.
42. Emmet Starr, *The Cherokee Indians and Their Legends and Folk Lore* (Oklahoma City, OK: The Warden Company, 1921), 517.
43. "Major Robinson, Back From France, Describes Victories of the Thirty-Sixth Division." This reference to the "Forty-First Infantry" is either a typo or misstatement for either the 141st Regiment or the 71st Brigade.
44. Britten, *American Indians in World War I*, 107.
45. "Played Joke on the Huns," *American Indian Magazine: The Quarterly Journal of the Society of American Indians* VII, no. 2 (Summer 1919): 101.
46. Don Loudner, interview with the author, September 2013.
47. Loudner, interview.
48. Meadows, *The First Code Talkers*, 191.
49. "30 Comanches to be Trained to Relay Secret Army Orders," *Washington Evening Star*, December 12, 1940, A-10.
50. Alfred Friendly, "Hatch Act Allows Contributions for Politics, Say Officials," The Federal Diary, *The Washington Post*, September 26, 1939.
51. Stanley, "Personal Experiences," 6

Chapter 17

The Role of Women in Cryptology during the War

A surprising number of women served in cryptologic positions during the First World War.

Before the war, Genevieve Young Hitt broke Mexican codes and ciphers for the US Army, working with her husband (then a captain) Parker Hitt before, during, and after the 1916 Punitive Expedition. At the time, Genevieve Hitt worked in the Intelligence Office of the Southern Department at Fort Sam Houston in Texas. Her job was largely coding and decoding army messages, and she often did cryptologic work against messages intercepted by radio or through postal censorship.[1]

The cipher department staff at Riverbank Laboratories, working on the Baconian cipher theory, was comprised largely of women before William Friedman was placed in charge of the department in early 1917.[2] (See appendix A.) One of the women in the department, Elizebeth Smith, was highly skilled in breaking codes and ciphers. Smith and Friedman married in May 1917, shortly after Riverbank started doing war-related work for the Military Intelligence Division (MID) and the State Department.[3] William was in charge of the effort and Elizebeth was his deputy.[4]

In addition to Elizebeth Friedman, Clara Jensen and a "Miss Ford" were given material from the MID and the State Department to break, but it is impossible to know who did what.[5] George Fabyan, Riverbank's proprietor, well understood that women had the potential to contribute to the field, telling Colonel Ralph Van Deman, head of the MID, that "our experience at Riverbank demonstrated that women are particularly adapted to this kind of work."[6] Of the women on staff at Riverbank, Jensen was considered for full-time work at MI-8 but does not appear to have made the move to Washington.[7]

Elizebeth Friedman took the lead in training the first four junior officers that MI-8 sent to Riverbank in the late fall of 1917.[8] William Friedman did conduct some of the training but was also engaged with preparing to testify in the Hindu Conspiracy trial in California.[9] She also played a significant role in training the larger class of officers that arrived in February 1918 and the small group of latecomers and stragglers who made up the March class. As discussed in chapter 12, Elizebeth also contributed to the successful attack against the Pletts cipher device in June 1918.

Fabyan believed there was a place for women in cryptologic work, though he held then-common and now clearly sexist views on women's capabilities. He wrote the following:

> Women endowed with a normal brain who have had a rearing which enables them to keep their minds from topics of sex and

> dress make better operatives with the proper training than men but you want earnest, genuine people, college graduates preferred who are something to themselves and fond of their own society in preference to that from which they can gain nothing and at that you will get a lot of lemons and false alarms. They must possess an active brain, imagination to a certain extent but dam practical, and the mechanical and mathematical mind is preferable to others.[10]

Four women who were married to officers attending the course were allowed to take the February training along with their husbands: Josephine Morris Dailey (Major George Dailey); Mary Matthews Clendenin (Major William Clendenin); Jessie Wright Harris (Lieutenant Colonel Herbert Harris);[11] and Bessie Bauer Woellner (Second Lieutenant Edwin Woellner). Lieutenant Woellner was among the officers who went to the G2A6 in France, and Bessie stayed on to work at Riverbank.[12] Jessie Wright Harris was the sister of Nellie Wright Fabyan, who was married to Riverbank owner George Fabyan.[13]

My reconstruction of the staff list for the MID's Code and Cipher Section (MI-8) from secondary sources and examination of the limited remaining primary source documents (appendix A) reveals at least 13 women's names, eight of whom are known to have worked in the Code and Cipher Solution subsection. The office had a huge clerical staff, and the names of this staff appear to be largely unrecorded, so it is likely that many women are missing from this list. Of the women in MI-8, the one who is most well known is Dr. Edith Rickert (see profile in chapter 5). Ruth Willson (later Ruth Willson Wilson) began her cryptologic career in MI-8 and moved to New York with the organization in 1920.[14]

Many of these women appear to have been recruited through MI-8 Shorthand subsection Chief Franklin W. Allen's efforts, which specifically targeted women with strong language skills. Allen used his contacts to recruit for the entire organization. Letters from the MID went out under General Marlborough Churchill's signature to college professors at Harvard, Smith, Vassar, Simmons, and other primarily East Coast institutions looking for qualified women to work in MI-8 for $1,400 per year. Female college graduates with fluent knowledge of German or Spanish were sought out; they were cautioned that there would be two months of paid training and that if "a candidate's patriotism is likely to ooze away under the strain of living in Washington under wartime conditions, it will be better for her not to apply for this position."[15]

As late as the end of September 1918, William Friedman was discussing the possibility of John M. Manly finding a place for Elizebeth Friedman at MI-8, but she never joined that organization having turned down the opportunity to work for MI-8.[16] In October, William Friedman heard that Bessie Woellner and Clara Jensen had visited Washington on "secret business"; he believed Elizebeth should not regret declining the position in Washington.[17] Elizebeth Friedman left Riverbank in October 1918, but she would return in 1919.[18]

MI-8 was not the only office in which women did cryptologic work. At least two women worked in the Washington office of MI-10E, the MID's Radio Intelligence Section, in 1920; it is possible that they were there during the war. Katharine A. Lonergan was the office administrator, keeping the records of personnel and intercepted messages. She scanned the Mexican intercepted messages (50 to 300 per day) and selected items for translation, forwarded code messages for decipherment, and routed for distribution translated and deciphered material. Lonergan indexed information concerning radio stations in all countries, took care of office files as well as correspondence for the section, and produced occasional reporting on lectures.[19] Irene A. Dickinson made translations from material in French, German, and Spanish as well as traffic collected from the high-power radio station at Chapultepec, Mexico.[20]

Women who were amateur radio operators, some of whom completed a January 1918 Wire-

less Class for Women at Hunter College in New York, served as instructors to train the men going to France. One instructor, Rita Perrine, who had taken radio training at the 86th Street YWCA in New York, possessed a first-class radio license and could receive 30 words per minute. While working as an instructor for Signal Corps men, she saw a recruiting letter from the chief of the MID to the radio school in July 1918 and responded, noting that she could fill one of the positions for she was "exceedingly anxious to serve my country along the lines for which I am best fitted." She was immediately and gently turned down for radio service on the Mexican border. The men accepted for the position on average could only receive 15 words per minute.[21]

While women employed as cryptologists were accepted on the home front, women were not hired into similar positions in the American Expeditionary Forces (AEF). But there were at least two attempts to supplement the G2A6, the AEF's Radio Intelligence Section, with women codebreakers. Parker Hitt was anxious for Genevieve Hitt to come to France.[22] If she had made the trip, it is not certain she would have worked; however, she conceivably could have been offered a position in the G2A6 had she been present in country. As her experience was largely against ciphers, she would have had to be trained to do code work. Before the Hitts could figure out the logistics, the AEF quickly prohibited officers from bringing their wives to France.[23]

When Captain John Powell, from the MID by way of Riverbank, made his trip to Europe in February 1918, he told General Dennis Nolan, the head of the G2, about William Friedman and his wife, "a young lady who is equally capable. I do not know whether it would conform to your regulations to have a female cipher operator, but I may add that she is as thoroughly capable as her husband, if she were asked to accompany him it would make the affair more easy to arrange."[24] But there was never any serious discussion about bringing Elizebeth Friedman to France. Captain Emory Nourse, a colleague of William Friedman's in the G2A6, mentioned to Friedman that he had heard many nice things about Elizebeth Friedman, which William described in a letter to her: "in view of all your excellent qualities he says he hopes you won't come over here—he thinks it's a bad place for women."[25] Despite this, William Friedman kept thinking that he should talk to Frank Moorman about Elizebeth coming to France, writing in early September:

> I came near asking the Major a couple of times but naturally have hesitated not only on account of my being comparatively a newcomer but also because such a request might easily be construed along other lines than a pure devotion to the Service. But now that the bars are let down to admit women, I don't see why you couldn't fill a niche here—only I guess the sentiment of my superiors is probably against it—so I understand. I've talked it over with a couple of the men and have been advised against it. Nourse said that if he had a lovely wife like I have he'd see that she stayed away from this hell of a land.[26]

There is no record of William Friedman ever pursing the question with Moorman.

In August 1918, Major R. G. Van Horn[27] passed through Chaumont, and William Friedman overheard him speaking with someone (probably Moorman) about women and codebreaking; Van Horn wanted to know whether Genevieve Hitt was working in the G2A6.[28] Despite there being widespread agreement that women—or, at least, certain women—might be usefully employed for cryptology, I found no evidence that the AEF ever attempted to do so.

The women who served as telephone operators in France, known widely as the Hello Girls, were not strictly cryptologic personnel, but they were, in the interest of communications security, trained in the use of telephone codes and call words.[29]

Conclusion

Women have been part of the cryptologic workforce since the beginning of the modern era in 1917. Their numbers were modest and limited to service in the United States. After the war, women continued to play a role in the much smaller official efforts, for the army and the navy, in the 1920s and 1930s. Their numbers grew significantly in World War II. The experience of World War I confirmed an existing belief that women were equally capable of this work.

Notes

1. Betsy Rohaly Smoot, "An Accidental Cryptologist: The Brief Career of Genevieve Young Hitt," *Cryptologia* 35, no. 2 (2011): 164-75.
2. David A. Hatch, *The Dawn of American Cryptology, 1900-1917* (Fort Meade: Center for Cryptologic History, 2019), 17-20.
3. Hatch, *The Dawn of American Cryptology*, 20.
4. G. Stuart Smith, *A Life in Code: Pioneer Cryptanalyst Elizebeth Smith Friedman* (Jefferson, NC: McFarland & Company, 2017), 25.
5. Frustratingly, Fabyan rarely provides a first name for the women he writes about.
6. George Fabyan to Ralph Van Deman, letter, March 22, 1918, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 165, Records of the War Department General and Special Staff, Entry 65, Box 2243.
7. William F. Friedman to Elizebeth S. Friedman, letter, Thursday night, October 31, 1918, George C. Marshall Foundation Research Library (ML), Elizebeth Smith Friedman Collection (ESF), Correspondence Series (CS), Box 2, File 17.
8. Jason Fagone, *The Woman Who Smashed Codes* (New York: Dey Street, 2017), 101. Also see chapter 5 of this book and W. F. Friedman to E. S. Friedman, letter, Thursday evening, October 10, 1918, ML, ESF, CS, Box 2, File 17.
9. See Hatch, *The Dawn of American Cryptology*, 27-31, for discussion of the Hindu Conspiracy and William Friedman's role.
10. Fabyan to Van Deman, letter, November 16, 1917, NARA CP, RG 165, Entry 65, Box 2241.
11. Harris does not appear on the class list and has proved difficult to research.
12. Fabyan to Van Deman, March 22, 1918.
13. "Dr. H. J. Harris, Long Officer in U.S. Army, Dead," *Chicago Tribune*, Sunday, April 25, 1942, 21, accessed December 1, 2021, https://www.newspapers.com/image/371423518.
14. Details on MI-8 personnel gleaned from both *Historical Background of the Signal Security Agency*, vol. 2, World War I (Washington, DC: Army Security Agency, 1945), Special Research History 001, copy held by National Cryptologic

Museum Library and weekly reports of MI-8 located in NARA CP, RG 165, Entry 65, Box 3522.

15. John M. Manly to Professor J. D. Ford of Harvard University, letter, September 19, 1918; Manly to Professor Albert Schintz of Smith College, September 19, 1918; Manly to Miss Edith Falmestock of Vassar College, September 19, 1918; Manly to Simmons College, September 19, 1918. All in NARA CP, RG 165, Entry 65, Box 2880.
16. W. F. Friedman to E. S. Friedman, letter, Sunday night, September 29, 1918, ML, ESF, CS, Box 2, File 16. W. F. Friedman to E. S. Friedman, letter, Thursday night, October 31, 1918.
17. W. F. Friedman to E. S. Friedman, letter, Thursday night, October 31, 1918.
18. Smith, *A Life in Code*, 30-32.
19. "Personnel of Radio Intelligence Sub-Section," March 27, 1920, NARA CP, RG 165, Entry 65, Box 78.
20. "Personnel of Radio Intelligence Sub-Section."
21. Letters between Rita Perrine and the MID, July 1918, NARA CP, RG 165, Entry 65, Box 2241.
22. Parker Hitt to Genevieve Hitt, multiple letters, 1917, Moorman-Mustain Collection of Parker Hitt Material.
23. Smoot, *Parker Hitt: The Father of American Military Cryptology* (Lexington: The University Press of Kentucky, 2022), 82.
24. John A. Powell to Dennis Nolan, letter, February 25, 1918, Randolph-Macon College, Flavia Reed Owen Special Collections and Archives, J. Rives Childs Collection, Folder 3, General Cipher Correspondence etc.
25. W. F. Friedman to E. S. Friedman, letter, August 31, 1918, ML, ESF, CS, Box 2, File 15.
26. W. F. Friedman to E. S. Friedman, letter, September 4, 1918, ML, ESF, CS, Box 2, File 16.
27. Rather than a major, this was possibly Colonel R. G. Van Horn, who was a Signal Corps officer who would have known the Hitts.
28. W. F. Friedman to E. S. Friedman, letter, August 7, 1918, ML, ESF, CS, Box 2, File 15.
29. Elizabeth Cobbs, *The Hello Girls: America's First Women Soldiers* (Cambridge, MA: Harvard University Press, 2017), 158-159.

Closing Thoughts

The End of a War and the Beginning of an Intelligence Discipline

Closing Down

By early October 1918, the American cryptologic organizations—built from the ground up by individuals who had only the slightest idea of what they were doing—had come into their own. In the 18 months after the United States entered the war, these organizations hired and trained staff, established procedures and protocols, and devised techniques. From Mexico City to eastern France, approximately 1,000 people, with considerable assistance from America's French and British allies, created systems to collect, analyze, and report information that might otherwise have been hidden from view: codes, ciphers, and invisible ink in letters and parcels; communications carried on radio waves, in the ground, and through the ether; and information that could be derived from these communications based on how they were sent and where they were located. In Washington and in France, the people who made up these organizations were at a point where they were confident that they could accomplish the mission and provide results—actionable intelligence, in the parlance of the modern intelligence professional.

Staff was still being hired in October, and men were still arriving in France for the American Expeditionary Forces (AEF) radio intelligence effort. Of the 78 men who were part of the Radio Intelligence Section (G2A6) sometime during the war, 10 of them (12.8 percent) arrived in October and November. In the Signal Corps Radio Section, the numbers were even more dramatic: 493 names are on the books for that organization, but 214 of them arrived and were still in training in October and November 1918 (48.2 percent of the final staff total). The AEF was preparing for a war they believed would not end until sometime in 1919. In Souilly, the head of the Radio Intelligence Section for the First Army, Charles H. Matz, now a captain, informed Lieutenant Colonel Frank Moorman, who led the G2A6, in mid-October that his team was getting organized to spend the winter there.[1]

When the Armistice was signed, and the fighting stopped on November 11, it was a time of joy and relief. In France, the cryptologic work came to an almost immediate end. The highly skilled officers of the G2A6 were in much demand, particularly those who spoke German, for other duties, and they were given the opportunity to inform Moorman what they would like to do next.[2] By the end of November, most of them had been reassigned to other organizations, both involuntarily and on their own volition. By December, only Moorman, Captain Hugo Berthold, Captain Philip Whitehead, Lieutenant William Friedman, and a handful of clerks remained. A small team was sent to staff a radio intelligence effort

for the Third Army in Coblenz, Germany, but there is little evidence that there was ever much for them to do.[3]

Friedman, one of the last to depart the G2A6 at AEF headquarters in Chaumont, was employed by the Signal Corps in Washington in 1920, carrying the memories of cryptologic accomplishment during the war. He used lessons from the AEF in the 1930s when, as head of the Signal Intelligence Service (SIS), he planned for a time when SIS would need to provide cryptologic support during wartime. Moorman, too, found himself in Washington in the 1920s; while Moorman never had formal cryptologic responsibilities again, others consulted him on cryptologic matters.[4]

The signal collection effort of the Signal Corps Radio Section came to a halt in the days after the Armistice, although the press intercept station at Chaumont continued for some time. Robert Loghry remained with the Signal Corps; most of the others dispersed and found careers in civilian life, many of them in telegraph or telephone engineering or other jobs in the communications industry.[5]

Major Howard Barnes and the men of the Code Compilation Section sailed home together as a unit in April 1919. In 1920, Barnes was a civilian Signal Corps employee in Washington doing "confidential" work, which may have involved codes. That same year, Mark J. Ryan asked Parker Hitt for a recommendation for a similar government position, but it is not clear if he got the job. I can find no evidence that the other members of the section were engaged in codemaking after the war.[6]

The US Navy would not establish a cryptanalytic section, known as the Research Desk and commanded by Lieutenant (later Captain) Laurance Safford, until 1924.[7]

Holding on after the Armistice were collection efforts at Otter Cliffs, Maine, and Houlton, Maine, as well as the Radio Tractor Units (RTUs) on the US-Mexican border; their collection continued to go to MI-8, the Code and Cipher Section of the Military Intelligence Division (MID), in Washington. Alessandro Fabbri died in 1922; Otter Cliffs lived on as part of the navy's transatlantic service and then over time evolved into the Naval Security Group Activity Winter Harbor. The station at Houlton closed in late 1920. The radio collection at the US embassy in Mexico City ceased in early 1919. Many of the RTUs shut down in late 1919 and early 1920, although a handful of them, joined by additional stations, continued into the early 1920s.[8]

In 1919, General Marlborough Churchill, head of the MID, was aware that it was necessary to establish a permanent cryptologic organization. In a memo supporting the need for MI-8's activity to continue, he stated: "Code attack is indeed still in its infancy. It is capable of rapid and incalculable development. If we do not take part in this development, we shall be helpless when the next war comes, and it is by no means certain that we shall then have allies upon who[m] we may rely for knowledge which we should have developed for ourselves."[9]

MI-8 was gradually wound down in 1919; the cryptanalytic effort transferred to a new version of MI-8 called the Cipher Bureau. Headed by Herbert O. Yardley in New York, the "Black Chamber" was funded by, and provided support to, the State Department, the army, and the navy. The primary source of traffic would be diplomatic codes and ciphers found in telegraph traffic provided to the government by the telegraph companies. No radio collection was done in direct support to this office, although all parties were kept aware of the proliferation of long-distance radio stations around the world.[10]

Organizing for the Future

While the accomplishments of the various cryptologic elements, particularly those within the AEF, were valuable, there was no requirement for this mission to be sustained in the postwar world. Following the signing of the Treaty of Versailles, there was no strategic need for America to collect high-power long-distance broadcasts transmitting press and propaganda. There were no adversarial field radios, airplane transmissions, ground telegraphy, or

Montsec American Monument, France. Courtesy of the American Battle Monuments Commmision. Accessed November 5, 2018, https://www.abmc.gov/multimedia/photos?field_cemetery_or_memorial_nid=86

telephone conversations to collect, and no US force conversations to monitor. Codemaking continued in the US Navy and in the US Army Signal Corps. The new MI-8 in New York, the Cipher Bureau, turned toward breaking diplomatic communications because it was in the national interest to do so. But World War I cryptologic efforts, while not immediately continued, presaged the organization of communications intelligence work in World War II and influenced techniques and practices of the trade to this day.

For the navy, shortfalls in its ability to conduct codebreaking and cipher breaking almost certainly contributed to the establishment of the Research Desk (later OP-20-G) in 1924.

The army's cryptologic work within the MID and the AEF influenced the struggle for control of cryptologic efforts in the 1920s, which culminated

in the establishment of the SIS in 1930. It was generally agreed that cryptologic efforts should continue after the war. But how should they be organized? The MID and the AEF succeeded with very different structures. General Churchill's May 1919 memo "Permanent Organization for Code and Cipher Investigation and Attack" pressed for a civilian operation (along the British model) stating "the type of thinker with necessary language qualifications required for code and cipher attack is a special type—difficult to find in the Army, where an entirely different type is more useful, and not easily inducted into the Army if discovered in civil life." Churchill also revealed an inclination to include women in the workforce and remarked on the need for competitive salaries, writing that "[m]en and women of the high qualifications necessary can hardly be attracted to the work and—what is equally important—retained in it for smaller salaries."[11]

This was the beginning of what would be a decade-long exploration of how and where cryptology fit into the mission of the army, and whether it more properly belonged in the MID or in the Signal Corps. The Signal Corps traditionally made army codes and ciphers and collected communications. During the war, both functions were turned over to the MID, with MI-8 making codes and MI-10E collecting radio communications. In the AEF, the Signal Corps both collected communications and constructed codes, while the G2A6, in a MID-like function, broke codes and ciphers.

The MID made plans for a permanent Radio Intelligence Service to collect communications in the summer of 1919. But during the summer of 1920, the Signal Corps and the MID tussled over which organization should have control over the collection function. The Signal Corps believed that it should operate collection, as was done in the AEF, with the intercepted material forwarded to the MID; the MID, while it wanted the Signal Corps to supply the collection personnel, was loathe to lose administrative control. The matter was resolved in favor of the Signal Corps that summer, although the MID was allowed supervisory control over the intercept service (see chapter 5).

In October 1920, Brigadier General Dennis Nolan, now the director of the MID, documented a tentative agreement made between Moorman, then working in the MID, and a Colonel Curtis and a Major Moore from the Office of the Chief Signal Officer. The Signal Corps was to compile codes and ciphers, which would be reviewed and approved by the MID. Solution of codes and ciphers was agreed to be a function of the MID; however, the Signal Corps "will instruct its officers in the basic principles of such solution as one of the most effective means of impressing them with the importance of proper use of authorized codes and ciphers." Additionally, the Signal Corps would give preference to using code compilers, "those skilled in their solution on the grounds that such men are best qualified to devise systems," and that these men would be available to assist the MID when needed. Both parties agreed that the adjutant general should distribute codes and ciphers.[12]

This is a very interesting memorandum, not in the least because it acknowledges that cryptologists should not be doing codebook distribution, as happened in the AEF. The agreement lays the groundwork for the Signal Corps to hire Friedman, who at the time was working as a contractor for them, into the full-time position he would hold from 1921 to 1930 in charge of compiling codes. Friedman certainly met the criteria for someone skilled in code solution. The memorandum also sets the stage for competition between the MID, in the form of Yardley's New York organization, and Friedman's efforts in the Signal Corps.

It is not clear what prompted an apparent memorandum for the record on the need for a code and cipher section, unattributed and undated, but possibly written by Friedman in December 1921. Moorman initialed the memo, but whether he was back in the Office of the Chief Signal Officer at this time or still reporting to the MID is unknown. The memo author argues that "our" code and cipher section not

be discontinued, which makes it appear that there was a serious threat to his position, and he is using the lessons of World War I to make his case. This memo is worth reading in its entirety:

> Secrecy in regard to a code and cipher section is essential to its success. The fact of its existence should never be mentioned publicly or unnecessarily.
>
> In 1917 and 1918 the solution of many important messages was so delayed due to our lack of preparation and previous study that much of their value was lost. Studies are now continuously under way which if continued will, it is believed, prevent a similar delay in the future.
>
> Code[s] and ciphers are constantly developing. Even a temporary stop in the work means losing touch with current changes. Such loss can only be made good by much work otherwise unnecessary. It is like the loss of a link in a chain or a cog in a wheel. TO DISCONTINUE OUR CODE AND CIPHER SECTION NOW WILL, ALMOST CERTAINLY, MEAN THAT WE WILL ENTER THE NEXT WAR AS POORLY PREPARED FOR THE HANDLING OF THE ENEMY'S SECRET MESSAGES AS WE WERE IN 1917. [Emphasis in original][13]

Just how serious this threat was is unknown. Friedman kept his job. It was not until March 1929 that the question of how cryptologic duties should be assigned in the army resurfaced. W. K. Wilson of the General Staff War Plans and Training Section explained to the chief of staff that recent joint army and navy exercises demonstrated that the army's code and cipher solution effort was inadequate. Wilson drew a parallel between the techniques used to compile codes and ciphers and the work of cryptanalysis, noting that cryptanalysis required "a high degree of training," which "must be carried out by the Army, since there is no source in civilian pursuits from which this class of technician can be drawn." Attached to this memorandum was a draft memorandum on the way forward for code and cipher solution efforts.[14]

Wilson's memorandum, "Responsibility for the Solution of Intercepted Enemy Secret Communications in War," the final version of which was dated April 4, 1929, is a foundational document in the emergence of SIS and, thus, the eventual creation of the National Security Agency. The argument he makes is predicated on the structure of the cryptologic effort during World War I. Alleging that the split of cryptologic duties between the G2 (charged with solution of codes and ciphers) and the Signals Corps (interception of radio traffic and compilation of codes) was the "continuance of World War policy which was adopted in haste." Wilson, on behalf of the General Staff, urged that this work (cryptology) "should be assigned to one operating agency so that they may be organized into a properly coordinated whole."[15]

While the proposal delegated all phases of cryptology to the Signal Corps, it charged the G2 with control and supervision "of all means of secret and confidential communication in the Army." It also defined radio intercept, direction finding, solution of intercepted codes and ciphers, and secret ink investigations as activities "in time of war."[16] The Signal Corps assumed responsibility for the solution of codes and ciphers on May 10, 1929. Shortly after the Signal Intelligence Service became operational in April 1930, the adjutant general's office gave the new organization authorization for peace time radio intercept and direction finding.[17]

The Legacy of Tradecraft and Liaison

The cryptologic work of the First World War provided the foundational techniques and methodologies needed to conduct signals intelligence in the twentieth century. Traffic analysis, direction finding, procedures for logging intercept (including assigned operator signs or opsigns), and the use of the 24-hour clock were all devised and improved upon during the war. Cryptologic support to the warfighter was a priority, as evidenced by placing radio intelligence units with the First and Second Armies. There was

cooperation between analysts and collectors; cooperation between those making codes and those breaking codes; and, importantly, a free flow of cryptologic information between America's closest allies. These cooperative concepts would play crucial roles in signals intelligence during and after World War II.

The Start of Something Big

If the value of World War I cryptology is measured by the standards of the cryptologic effort in World War II or the Cold War, we might judge it to be, if not a failure, then an undertaking with marginal benefits at enormous expense. From some angles we see the chaotic effort of amateurs—disorganized, understaffed, and at the mercy of Allied foreign partners for direction. A closer look reveals the guiding hands of our nation's cryptologic and radio experts working to bring structure, policy, and reason to the hurriedly organized endeavor.

On the home front, the navy leveraged its expertise in radio to create, however inadvertently, the large and long-lasting station at Otter Cliffs. While abandoning efforts to break codes and ciphers, the cryptographic contribution of Russell Willson and his section created a cipher device that could protect the highest level of national communications. At the same time, the army found scholars, radio experts, and civilians with code and cipher skills who, under the guiding hand of Ralph Van Deman, tackled an enormous volume of mysterious messages from a multitude of sources and experimented to extract radio messages out of the ether.

In France, under the steady direction of Frank Moorman, a sophisticated and complex system of signal collection and analysis, as well as communications security measures and monitoring, agilely adapted to the needs of the Allied fighting forces. Their findings supporting the St. Mihiel offensive alone were worth the time and money spent. Moorman, partnering with Loghry and Barnes and receiving occasional advice from his cryptologic mentor Colonel Parker Hitt, is the hero of this story for his ceaseless efforts to make cryptology function in war.

Without British prodding over the Zimmermann Telegram, the United States might have been slower to develop a code and cipher service on the home front. Likewise, without extensive aid from the French (training and equipment) and the British (information and encouragement), the American cryptologists in France would not have been ready to provide high-level intelligence support during the two large AEF offensives in the autumn of 1918. Although the Allies were willing to share valuable insights on German military communications, they were less than forthcoming on other cryptologic subjects—particularly diplomatic intercept—where they wished to protect their national interests. The US cryptologists were more open to a wide exchange of information because they had no cryptologic secrets to protect. America's cryptologic relationships with France and Britain ended when the war did. The relationship with the British that developed from 1941 forward was not built on the legacy of the Western Front.[18]

Cryptology during the First World War had interagency rivalries, personal jealousies, and personal sacrifice. Though the circumstances and technology differ today, the underlying can-do American spirit is one to which modern cryptologists can relate. It was the work of the people that revealed the worth of this branch of intelligence; their accomplishments demonstrated that collectors and analysts could conquer modern technology to extract valuable information that would be used to defend national interests.

The proverbial acorn planted in 1917 was still a seedling in 1919. Though withered and neglected, its rootstock held strong. The fact that the tree existed, and the story of how it came to be, shaped the United States' approach to cryptology in the years before World War II. World War I cryptologic efforts resulted in organizational philosophies and analytic techniques applied during the rest of the twentieth century; grafts from that first tree were used to grow larger and stronger cryptologic organizations.

Notes

1. Charles Matz to Frank Moorman, October 17, 1918, National Archives and Records Administration, College Park (NARA CP), Record Group (RG) 120, Records of the American Expeditionary Forces, Entry 105, Box 5768.
2. See chapter 8. Personnel papers in NARA CP, RG 120, Entry 105, Box 5767.
3. See chapter 8. *Intelligence Section of General Staff HQ AEF in Germany Coblenz as of December 25, 1920*, NARA CP, RG 165, Records of the War Department General and Special Staff, Entry 65, Box 2280, booklet with picture.
4. For instance, see Betsy Rohaly Smoot, *Parker Hitt, The Father of American Military Cryptology* (Lexington: The University Press of Kentucky, 2022), 133-135.
5. See the profiles in chapter 10. George A. Benjamin worked as an engineer for Western Union. George E. Sterling served as a marine radio inspector in Baltimore, Maryland, and eventually became commissioner of the Federal Communications Commission. There are too many other examples to cite.
6. See the profile of Barnes in chapter 9. Mark J. Ryan to Parker Hitt, October 11, 1920, and Parker Hitt to "whom it may concern," October 12, 1920, both in the Moreman-Mustain Collection of Parker Hitt Material.
7. David Kahn, *The Codebreakers* (New York: Scribner, 1967), 10.
8. See chapter 5.
9. Marlborough Churchill to Chief of Staff, "Permanent Organization for Code and Cipher Investigation and Attack," May 16, 1919, NARA CP, RG 165, Entry 65, Box 3862.
10. Kahn, *The Codebreakers*, 359.
11. Churchill, "Permanent Organization."
12. Dennis Nolan, Director of the Military Intelligence Division, to the Chief Signal Officer, memo, "Code and Cipher Work by the Signal Corps," October 29, 1920, NARA CP, RG 165, Entry 65, Box 1876.
13. Unattributed memo, possibly written by William F. Friedman, December 3, 1921, NARA CP, RG 457, Records of the National Security Agency, Entry 9032, Box 777.
14. W. K. Wilson to Chief of Staff, March 18, 1929, "Memorandum for the Chief of Staff submitted herewith," NARA CP, RG 165, Entry 65, File number 65-7D-20.
15. Stanley H. Ford, General Staff G2, to Chief of Staff, memo, "Responsibility for the Solution of Intercepted Enemy Secret Communications in War," April 4, 1929, NARA CP, RG 165, Entry 65, File number 65-9D-20.
16. Ford, "Responsibility for the Solution."
17. Adjutant General's Office to the Chief Signal Officer, "Codes, Ciphers, Secret Inks, Radio Interception and Goniometry," April 22, 1930, Center for Cryptologic History files, copy held by author.
18. Betsy Rohaly Smoot, "Impermanent alliances: cryptologic cooperation between the United States, Britain, and France on the Western Front, 1917–1918," *Intelligence and National Security* 32, no. 3 (2017): 365-377.

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Bibliography

A surprising amount of material about American cryptology during the First World War exists, but it is not always easy to find. These resources can be loosely grouped into four categories: personal narratives and accounts, official end-of-war summary reports, newspaper and magazine articles, and the official records of government cryptologic organizations. Many have relied on the official summary reports (particularly the 1919 report of the chief signal officer, which is rich in detail about signal collection) and the final report of the American Expeditionary Forces (AEF) G2 organization, as well as the best-known personal account of World War I cryptology, Herbert O. Yardley's *The American Black Chamber*. David Kahn, in his encyclopedic *The Codebreakers: The Comprehensive History of Secret Communication from Ancient Times to the Internet*, made good use of contemporary articles and sought out personal accounts and documents from many who participated in the cryptologic effort, but, while it covers significant highlights, the nature of the book means that no subject is addressed in great depth.

Many works on this subject focus on tales of espionage and specifics of particular codes and ciphers but do not carefully examine the organizations or the people who made up these organizations. As a result, a somewhat lopsided view of the cryptologic picture has emerged, focused on the accomplishments of Yardley, Yardley's deputy John M. Manly, J. Rives Childs, and William F. Friedman.

Personal Narratives and Accounts

The value of personal accounts cannot be overstated, but they need to be used carefully as they are subject to the frailties of human memory. The four most-used narratives on the subject are Yardley's book, Ernest Hinrichs's diaries published as *Listening In: Intercepting German Trench Communications in World War I*, Childs's books *Before the Curtain Falls* and *Let the Credit Go: The Autobiography of J. Rives Childs*, and Samuel T. Hubbard's *Memoirs of a Staff Officer: 1917–1919*. John Dooley's 2016 volume *Codes, Ciphers and Spies: Tales of Military Intelligence in World War I* provides a great service to the scholarly community by making Manly's unpublished articles on World War I cryptology easily available.

Yardley and Manly's narratives have some problems in common when they discuss the cryptologic effort of the AEF in France: neither man had firsthand knowledge of the specifics of the work as it was being done. Both authors rely heavily on secondhand accounts and, as was typical for their time, do not cite their sources. Yardley's book in particular might be considered a good story unconstrained by facts, for,

while it often recounts verifiable stories for matters concerning MI-8, it is wildly inaccurate concerning the activities in France. It cannot be taken at face value on many subjects. Manly appears to have been more careful with his facts but also to have relied on Yardley for many of the accounts.

Childs's books are broad accounts of his life. In the anonymously published *Before the Curtain Falls*, he lightly obscures the names of most of his colleagues and provides a sometimes unflattering look at their personalities, while perhaps aggrandizing his own contributions a bit. Hubbard's account, which is not devoted to cryptology but touches on the subject, has some date inaccuracies (he wrote decades after the war), but his cryptologic stories nearly always can be verified in the official records. Hinrichs's diaries, in contrast, contain rich information about his experience as a signal collector in the AEF Radio Section, and his stories, filled with human details, align extremely closely with official records.

Postwar articles and lectures by cryptologic leadership in the AEF—Dennis Nolan, Louis Krumm, Robert Loghry, and Frank Moorman—though not intended as memoirs, fall into the personal narrative category. Krumm and Loghry's works are the most accurate, sticking to the facts and making extensive use of official government postwar accounts. Nolan provides interesting postwar reflections on the importance of collection, codebreaking, and cipher breaking, although his dates sometimes need to be verified. Moorman's enthusiastic and personable accounts provide color, although he sometimes dramatizes for effect.

Other personal accounts of cryptology during the war exist but have been little used by scholars. The most significant of these is the collection of narratives written by Signal Corps officers of the AEF immediately after the Armistice and found in Record Group (RG) 120 in the National Archives and Records Administration (NARA) at College Park, Maryland. Quite a few of the officers of the Radio Section, and others whose duties involved the Radio Section, wrote detailed accounts of their experiences while the memory was fresh. Unfortunately, the collection is missing 200 accounts (which seem to have been misplaced in the years between AEF records leaving France in 1919-1920 and the establishment of the National Archives in 1935). The narratives of Krumm and Loghry, among others, are missing. The files pertaining to Otter Cliffs, Maine, within the records of the Naval Security Group Activity at Winter Harbor, Maine (found in RG 181 at NARA at Boston), are filled with particulars due to the many personal letters and narratives from the men who served at Otter Cliffs.

William Friedman's letters home from France, in the collection of his papers at the George C. Marshall Foundation Research Library, contain interesting detail about people and the day-to-day life at AEF headquarters. Friedman was careful not to provide details of his secret duties (his letters were subject to censorship), but the letters contribute to our understanding of what life was like for the men working in the G2A6.

Recently uncovered short narratives by David H. Stevens (who was employed by MI-8) and John A. Graham (of the G2A6) shed further light on personalities and, in the case of Graham, life in France. I hope that other writings by the many accomplished but lesser known cryptologists may one day be discovered in archives and repositories.

Official End-of-War Summary Reports

There is great cryptologic detail in many of the official end-of-war reports from even the highest level, such as the multivolume official history *The American Army During the World War,* and the reports from the G2, the chief signal officer, and the secretary of the navy. A 1919 official history of the Military Intelligence Division (MID) served as the basis for some later writing on the subject. The AEF G2A6 and the Code Compilation Section created official reports, which were later republished by the Signal Corps in the 1930s before being reclassified; these reports appear again as Special Research Histories in

National Security Agency (NSA) records. A handful of detailed reports, written after the war in the G2A6 either by or with the assistance of Friedman, also document the procedures and accomplishments of the codebreakers and cipher breakers.

While the reports are factually accurate, the highest level reports often give only the most important stories or the state of the effort as of November 11, 1918. They are key pointers to what lies in the files of these organizations but do not necessarily provide depth on all topics. For instance, the chief signal officer report lists the location of AEF signal collection facilities in November 1918, and this has sometimes been presented as evidence that they were the only sites used during the war. Researchers should remember that summary reports by their nature will exclude some detail. This is less true of the reports produced by the G2A6, for they provide a great deal of detail and explanation which, when used with the archival files of that organization, explain and enhance the preserved documentation. The report of the Code Compilation Section falls in between these two cases: although it does not answer all researchers' questions about the section's activities, it is very nearly the sole source on the subject (see National Archives and Records Administration below).

Newspaper and Magazine Articles

Contemporary newspaper articles often provide the War Department's official account of accomplishments and can be reliable. Newspapers are also a great source for learning more about the cryptologists of World War I, since papers would often write about a local man's assignment or print a letter he wrote home to his parents discussing his time in France. After the war, feature articles in papers and magazines highlighted some of the dramatic tales of the cryptologists in France. Sometimes the material came from the official end-of-war reports, but articles from this period (1920-1939) are not sourced and should be used with care for research, for they are vulnerable to exaggeration and inaccuracy.

Official Records of Government Cryptologic Organizations

While MID records are overwhelming in number (almost 4,000 archival boxes of formerly classified material and correspondence), it appears that the files of MI-8 are incomplete and scattered within the collection. These files were known to be incomplete as early as 1945 when historians in the Army Security Agency were composing the *History of the Signal Security Agency*. Researchers don't know why these files are incomplete—whether it was poor record keeping, random or selective destruction of records at the end of the war, or another reason. Perhaps files were taken to New York with Yardley in 1920 and did not all make it back to Washington. Certain files are known to have been resident with the Signal Intelligence Service in the 1930s; some of those eventually found their way into the NSA Archives either directly or through an NSA historian's rescue of records from a warehouse at Fort Holabird in Maryland that were slated for destruction in the 1970s. Some of these records now reside in NSA's RG 457 at NARA, while others are in RG 165 with the rest of the MID. There is no guide to point a researcher to the file locations. The scattered and disorganized nature of these files perhaps explains the tendency of some researchers to rely on *The American Black Chamber*, although Kahn's book about Yardley, *The Reader of Gentlemen's Mail: Herbert O. Yardley and the Birth of American Codebreaking,* does highlight a selection of the original records.

Records for MI-10E (also in RG 165) are more complete and well organized; these files contain much of the collected intercept and even duty logs for specific facilities. Highlights of the files are detailed personnel records, which make it possible to know more about the people who performed signals collection on the US southern border.

The real treasure trove, however, is the AEF records in RG 120 at NARA. It is easy to believe that the AEF had no formal records disposition schedule (that is, a plan for destroying records that

were not of long-term historical use) and never threw anything away. The records still exist; the challenge for researchers is to find what they're looking for. Some AEF subordinate organizations' records are easy to find—the G2A6 has its own entry (likely packed up by Friedman), and they are orderly, as one would expect the records of a headquarters organization to be. But records for organizations such as the Radio Section, which was out in the field most of the time, are a bit more difficult to locate and incomplete. Still, by carefully examining the records of the AEF Signal Corps within RG 120, the large bulk of Radio Section monthly reporting and other documents can be located and studied. There is some intercepted traffic here (and in the records of the G2A6), primarily from the press station at Chaumont, France. Many of the records of the collection sites themselves appear not to have been preserved. Some of the Radio Section records in various RG 120 entries were moved to the Federal Record Center at Lee's Summit, Missouri, because they were infrequently consulted by researchers. These can be viewed only by appointment at the National Archives Kansas City facility.

The Code Compilation Section records are a special case, for while the section kept files, many of the official memos and materials were at some point withdrawn from the AEF records by NSA to preserve the secrecy of cryptologic techniques. In recent years, some of these missing documents have been declassified as they are located in disparate files in the NSA Archives. These were sent to NARA, where they were integrated into RG 457. Many of the Code Compilation Section records are now in RG 457, Entry P11, Box 214.

Conclusion

While all these sources contribute to understanding American cryptology during the war, the official files tell a more complex story than any of the other sources mentioned and have been used extensively in preparation of this book. The details of the cryptologic work of the AEF leap off the pages—here a network diagram, there a shift log in which someone has complained about working conditions. The obscurity of the records has made them difficult for researchers to locate in AEF files, and the significance of some details is clear only to those who have practiced or studied signals intelligence. I hope that this book has integrated the technical aspects of the records, the official reports, personal narratives, and contemporary journalism so that others can dig more deeply into this foundational period of American cryptology.

Selected Bibliography

This selected bibliography lists the repositories and databases I consulted. The articles and books listed provide context on World War I, intelligence practices during that war, and cryptology. They are a starting point for further research on the subject.

The following items do not appear in this bibliography but are referenced in the endnotes (and biographical sidebar source lists) where appropriate: correspondence and conversations; newspaper articles; journal and magazine articles focused on narrow topics; government registers and statistical compilations; university yearbooks and alumni publications; unpublished material from web pages and blogs; volumes in the NSA Special Research History (SRH and SRMA) series; and unpublished material contained in the listed repositories.

Articles or books cited by other authors and mentioned in this book are in endnotes, and those works are included in the bibliography.

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George C. Marshall Foundation Research Library, Lexington, VA
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- William F. Friedman Papers

Moreman-Mustain Collection of Parker Hitt Material

The National Archives (UK), Kew
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National Archives and Records Administration (RG = Record Group)

Lee's Summit Federal Records Center, Lee's Summit, MO
- RG 120 Records of the American Expeditionary Forces (World War I)

National Archives in Washington, DC
- RG 45 Naval Records Collection of the Office of Naval Records and Library

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- RG 181 Records of Naval Districts and Shore Establishments (NSGA Winter Harbor)

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Appendix A
Cryptologists of World War I

The names, ranks, and dates of more than 900 World War I cryptologists, plus a description of the research methodology used to identify them, are posted on the following webpage:
https://www.nsa.gov/History/Cryptologic-History/Historical-Publications/#world-war-1

Appendix B

American Codes and Ciphers Used during the War

Developed by MI-8

Details of these codes can be found in Special Research History 001, *Army Security Agency Historical Background of the Signal Security Agency*, Volume 2, and "World War I." Copy held by the National Cryptologic Museum Library.

- Cipher tables used with the War Department Telegraphic Code of 1915
- Military Intelligence Code 5
- Military Intelligence Code 9
- French Geographical Code
- French Geographical Code No 2
- Casualty Code
- Pocket code/Ideal Code

Developed by the US Navy

Details of these codes and ciphers can be found in the National Archives and Record Administration, College Park, Record Group 38, Records of the Office of the Chief of Naval Operations, Entry 1029, Boxes 26, 32, and 57.

- Signal Code (S.C.) Cipher No. 1
- US Recognition signals No. 1
- Visual Calls Memorandum No. 3 October 24, 1917
- D.P. Cipher No. 3 for use with Service Radio Code
- NCB Ciphers for Mark I with Naval Code A1 (Multiple ciphers issued with different variants for different organizations)
- Naval Code A1
- Naval Code A2

Developed by the AEF Code Compilation Section

More details on this subject can be found in the following sources:

William Friedman, *American Army Field Codes Used in World War I* (three volumes), published as Special Research History (SRH) 351. SRH 351 is available in the National Archives and Record Administration, College Park, Record Group 457, Records of the National Security Agency, Entry 9002, Box 92.

William Friedman, *American Army Field Codes in the American Expeditionary Forces During the First World War*, later published as SRH 315. This can be found at the National Archives and Record Administration, College Park, Record Group 457, Entry 9002, Box 86, or via https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_267/41784809082383.pdf (accessed October 27, 2018).

- First American Trench Code
- Front line code

- **River Codes**
  Potomac Code - June 24, 1918
  Suwannee Code - July 15, 1918
  Wabash Code - July 31, 1918
  Mohawk Code - August 3, 1918
  Allegheny Code - August 12, 1918
  Hudson Code - September 2, 1918
  Colorado Code - September 24, 1918
  Niagara Code - in press at the time of the Armistice, never issued
  Rio Grande Code - in press at the time of the Armistice, never issued
- **Lake Codes**
  Champlain Code - October 7, 1918
  Huron Code - October 15, 1918
  Osage Code - October 28, 1918
  Seneca Code - November 6, 1918
  Michigan Code - in press at the time of the Armistice
- Field Code Nos. 1, 2, and 3
- War Department Code Supplement
- Staff Code
- Casualty Code
- Telephone Code aka "Female Code"
- Emergency Code List
- American Radio Service Code No. 1
- Telegraphic codes

Other Official Codes

Signal Codes. A variety of other codes and signals were prepared by the Signal Corps and distributed for various purposes. For instance, there was a very short (22 groups) bilingual four-letter code to be used between airplanes and infantry and artillery units. These groups were frequently changed and issued in tables. Tables "T" and "Q" were issued at the same time (no date available), but "Q" was held in reserve and was not to be carried on planes until orders were given (source: National Archives and Records Administration, College Park, Record Group 120, Records of the American Expeditionary Forces, Entry 765, Box 19). Visual signal codes were also issued for communication between the infantry and airplanes by fireworks, light projectors, or "pennons" (a pennant that is larger at the hoist than at the fly).

Dempsey's Telegraphic Cipher Code. Prepared for the QM department, this code was authorized for use in connection with the movement of troops within the United States.

Unofficial Codes (Sample)

Many unauthorized, unofficial, and French code systems were used by the AEF. This list is just a sample. More details on this subject can be found in William Friedman's *American Army Field Codes in the American Expeditionary Forces During the First World War*, later published as Special Research History (SRH) 315 in 1973. SRH 315 is available at the National Archives and Record Administration, College Park, Record Group 457, Records of the National Security Agency, Entry 9002, Box 86, or via https://www.nsa.gov/Portals/70/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_267/41784809082383.pdf (accessed August 1, 2022).

- Ammunition codes
- Baseball Code
- Special edition of French Carnet Reduit
- Telephone—T.P.S.–T.S.F.–Visual Code

Appendix C

List of German Codes and Ciphers Worked by the G2A6

The American Expeditionary Forces Radio Intelligence Section, G2A6, encountered multiple German codes and ciphers in World War I. Details on these German codes and ciphers can be found in the following publications:

Field Codes Used by the German Army During the World War (SRMA-012). Accessed October 27, 2018. https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_437/41751269079046.pdf

Principles of Solution of Military Field Codes Used by the German Army in 1917 (SRH-311). (A British report reprinted by Friedman in 1935.) Accessed October 27, 2018. https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_438/41751199079040.pdf

German Military Ciphers From February to November 1918 (later SRH 310). Accessed October 27, 2018. https://www.nsa.gov/Portals/75/documents/news-features/declassified-documents/friedman-documents/publications/FOLDER_268/41784789082381.pdf

Codes

Three-Letter Codes

KRU Codes

G Sector – Fritz code and day introduced	H Sector – Albert code and day introduced*
Fritz 3: August 29, 1917	
Fritz 6: October 31, 1917	
Fritz 11: November 27, 1917	
Fritz 14: December 27, 1917	Albert 6/Nancy 1: December 28, 1917
Fritz 19: January 29, 1918	Albert 7/Nancy 2: January 26, 1918
	Albert 8/Nancy 3: February 22, 1918
Fritz 23: March 1, 1918	Albert 9: March 22, 1918
Fritz 28: April 5, 1918	Albert 10: April 5, 1918

*The United States first started calling these codes *Nancy* but eventually changed to match French designator *Albert*.

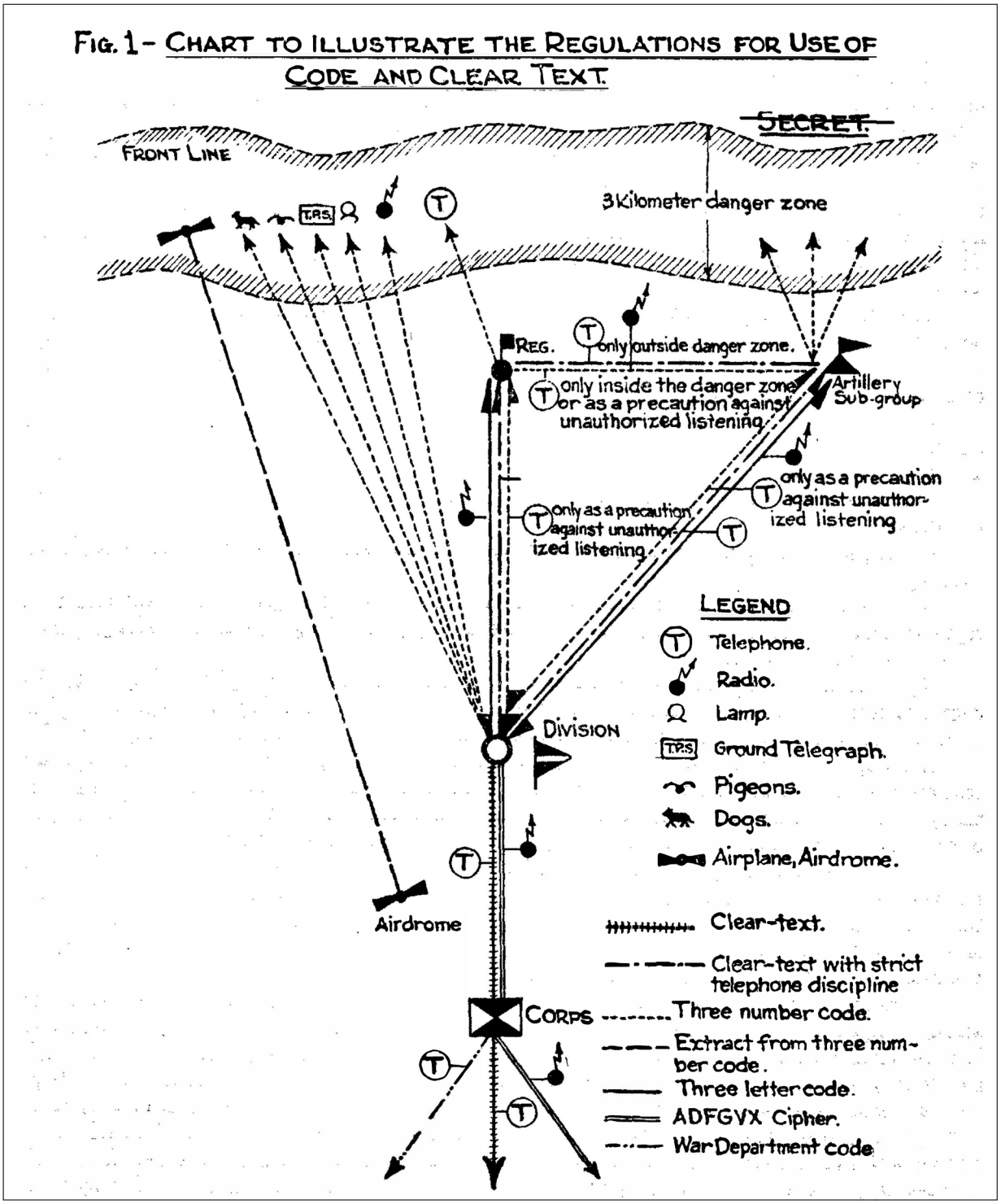

Chart showing German regulations for use of codes and ciphers, from *Field Codes Used by the German Army During the World War* (SRMA-012)

KRUS Codes

G Sector – Jean code and day introduced	H Sector – Albert code and day introduced
Jean 1: May 6, 1918	Albert 11: April 30, 1918
Jean 2: May 24, 1918	Albert 12: May 20, 1918
	Albert 13: June 7, 1918

KRUSA Codes

G Sector – Andre code and day introduced	H Sector – Albert code and day introduced
Andre 3: June 21, 1918	Albert 14: July 1, 1918
Andre 7: July 15, 1918	Albert 15: July 15, 1918
Andre 8: August 1, 1918	Albert 16: August 7, 1918
Andre 9: August 15, 1918	

KRUSÄ Codes

G Sector – Marcel code and day introduced	H Sector – Albert code and day introduced
Marcel 1: August 22, 1918	Albert 17: August 22, 1918
	Albert 18: September 17, 1918
Marcel 2: September 23, 1918 (Satzbuch 105 or 152?)	
Marcel 3: October 4, 1918	
Marcel 4: October 13, 1918	Albert 19: October 22, 1918
Marcel 5: November 4, 1918	

Three-Number code (*Schluesselheft*)

Introduced March 10, 1918

Telephone Codes

Fernsprechschluessel (telephone key)

Schluesselschieber (secret sliding rule)

Several different types of telephone codebooks

Emergency Signal System

Used prior to the three-number code on the front line; used an 18-by-18 square with two key word alphabets (changing); messages sent in groups of three letters. Discontinued in April 1918.

Aviation Codes

Three-letter codes, each with special initial letters:

GLF

GLFWX

GLFVZ

Primarily used by zeppelins

Meteorological Codes

Weather stations initially used three-letter or three-number codes but developed several new systems.

In July 1918, each group of four numbers (representing weather data) was split into two parts, and then each part was encoded by three-letter KRUSA code groups (the codebook had a section exclusively for weather reports).

In September 1918, the *Baltasekunden* system was introduced. This included a word representing the report's time of day (fixed at 0600, 0900, 1200, 1500, 1800, 2100, and 0100) followed by 11 groups of five ciphers.

There were also special messages in five-figure groups for the weather forecast.

Ciphers

Substitution Ciphers

Cipher	Also known as	Used
777 Cipher	General Kress von Kressenstein cipher	A few days in November 1918
Wilhelm	FUER GOD	1917-1918

Transposition Ciphers
UBCHI
ABC
ABCD
German admiralty cipher

ADFGX/ADFGVX

Western Front	Eastern Front
ADFGX: March 1, 1918	Not used
ADFGVX: June 1, 1918	July 1918

Appendix D

Collection Equipment Used by the American Expeditionary Forces Radio Section

For the majority of its time in France, the AEF Radio Section almost exclusively used French receiving, goniometric, and transmitting equipment in its intercept stations. The French had used this equipment successfully, and there was little American radio equipment to spare. Receivers were ordered from the United States in December 1917, but they did not arrive until the end of August 1918 (some of them arrived even later or not at all).

This information is derived from "History of the Activities of the Radio Division," National Archives and Records Administration, College Park, Record Group 120, Records of the American Expeditionary Forces, Entry 2040, Box 131; and from Lieutenant Colonel Louis R. Krumm and Captain Willis H. Taylor, "Wireless in the AEF," *The Wireless Age* 6, no. 12 (September 1919): 12-18; 7 no. 1 (October 1919): 9-21; 7 no. 4 (January 1920): 12-19; and 7 no. 7 (April 1920): 10-14.

Equipment Used for Intercept of Ground Telegraphy

French amplifier type 3-ter, a low-frequency, three-step, vacuum tube amplifier, coupled by means of transformer and supplied with current by storage batteries. This receiver was connected by insulated wire to a pair of ground stakes just like the transmitter. For best results, the two base lines, or line of ground stakes of transmitter and receiver, needed to be parallel (or approximately so) and laid out with a compass.

The US equivalent equipment was the **SCR-72**. The SCR-72 was tested at listening stations, including at Xivray and Chausseur, in early 1918, but in its earliest form was found to be unsuitable.

The American **SCR-76 TPS** set (from the French for ground telegraphy, *telegraphie par sol*) combined a receiver and a transmitter and was considered superior, electrically and mechanically, to the French equipment, but it was never available in quantities for distribution to US signal troops. The SCR-76 TPS was not used for intercept.

Equipment Used for Radio Intercept (Ground and Air)

French amplifier Type 3-ter – see above

Radio set type E-10-bis – Best for undamped wave communication, most compact and rugged of all the undamped wave, standard French radio apparatus. Connected to horizon-

tal V-shaped antenna 29 meters per side and 4 meters above ground on bamboo poles, it could transmit on wavelengths of 600-1,000 meters; range usually 50-60 kilometers; and used eight 40-volt storage batteries or an American 12-320 volt Westinghouse dynamotor. It was provided with three vacuum tubes to receive damped or undamped. (An unnamed American equivalent was being developed in the United States at the end of the war, but none were ever available to the AEF.)

Radio set type E-3-bis – Wavelength of 1,000-1,350 meters; undamped wave; adapted to receive both undamped and damped signals "of a range of wavelength somewhat greater than that for transmission."

Radio set type E-3-ter – Wavelength 1,350-1,800 meters; undamped wave; adapted to receive both undamped and damped signals "of a range of wavelength somewhat greater than that for transmission."

Radio set type E-13 – developed by the French shortly before Armistice; extremely compact; wavelength 1,200-2,800 meters.

Receiver type A-1 No. 2 – 150-6,000 meters

Receiver type A-1 No. 3 – 300-15,000 meters

Amplifier R-2-bis

Amplifier R-3-ter

Wave meter type No. 2

Equipment Used for Direction Finding

Loop receiver type No. 2 or No. 3 Loop compensator

Amplifier type L-3 amplified L-3 200 – (1,498.96 KHz) to 1,000 meters (299.79 KHz) Note: Gonio tractors also used an E-3-bis transmitter.

APPENDIX E

American Expeditionary Forces General Orders Pertaining to Code and Cipher

GENERAL ORDERS
No. 103

GENERAL HEADQUARTERS, A. E. F.
France, June 26, 1918

The following instructions regarding use of code and cipher are published for the information and guidance of all concerned:

1. War Department Telegraph Code Book, 1915.

This book will be used for telegraphic correspondence between these headquarters, the War Department, troops of the S. O. S. and offices specially designated by the Adjutant General, A. E. F.

A "distribution list" will be supplied by the Adjutant General to those authorized to use the War Department Telegraph Code Book. Such list must be consulted before sending a telegram in this code.

Officers signing telegrams for transmission in the War Department Telegraph Code are responsible that they are not addressed to those not in possession of the code.

If special means for enciphering War Department Telegraph Code messages are prescribed by the Adjutant General for use between certain offices, the greatest care will be taken that messages so enciphered are sent only to the designated offices.

Until receipt of "distribution list" use of the War Department Telegraph Code will continue as heretofore.

2. Staff Code Book.

This book will be used for telegraphic correspondence between these headquarters, headquarters of armies, corps and divisions, and offices specially designated by the Adjutant General, A. E. F.

A "distribution list" will be furnished and used as in case of the War Department Telegraph Code.

The Sending by radio-telegraphy of messages encoded by use of the Staff Code Book is prohibited.

3. Trench Code Book.

This book will be issued to all army, corps, division, brigade, regimental and battalion headquarters. It is primarily intended for communication within the division,

but may be used for messages to higher headquarters.

Messages encoded by its use may be transmitted by any of the authorized means.

4. Use of Cipher.

It will sometimes occur that an important message must be transmitted when no code book is at hand. If circumstance or means of transmission are such that message may fall into the hands of the enemy, some means of temporarily concealing its meaning are necessary. For this purpose the Playfair Cipher will be used until further orders. New keys will be prescribed at frequent intervals.

Any considerable number of these messages, or even one long one, falling into the hands of the enemy will enable him to discover the key used. Its use must therefore be limited to cases of absolute necessity. On the other hand, it must always be expected that messages in this cipher will be received at times when mistakes or delays will have the most serious results. It is therefore essential that all officers and others charged with receiving messages or preparing them for transmission be thoroughly familiar with its use. Instructions for use of the Playfair Cipher are given in Par. 8 of this order.

5. Use of Plain Language.

Messages may be sent in clear in the following cases and no others:

(a) When transmitted by buzzerphone.

(b) When sent by messenger or mail under normal conditions.

(c) When transmitted by visual signal stations especially designated as "safe" by division or higher commander.

(d) When transmitted by telephone or telegraph, provided both stations are more than four miles from front line and message is not of a confidential nature.

(e) On the written order of an officer, when delay necessary for encoding or enciphering a message is more dangerous than giving information to the enemy. In this case officers ordering messages sent in clear do so on their own responsibility and will be required to justify their action.

6. Conventional Telephone Signals.

The following paragraph of the "Signal Book, United States Army, 1916," is brought to the attention of those who may be required to send code or cipher messages by telephone:

"68. There are certain letters of the alphabet which are at times confused with other letters of similar sound. Such is particularly true when using the telephone. This condition gives rise to delays and errors, especially when transmitting cipher.

"To provide a ready means of phonetically distinguishing similar sounding letters, the following is authorized:

A-Able	N-Nan
B-Boy	O-Opal
C-Cast	P-Pup
D-Dock	Q-Quack
E-Easy	R-Rush
F-Fox	S-Sail
G-George	T-Tare
H-Have	U-Unit
I-Item	V-Vice
J-Jig	W-Watch
K-King	X-X-Ray
L-Love	Y-Yoke
M-Mike	Z-Zed

"Example: If the operator receives 'buy' as 'vie,' and difficulty is experienced in distinguishing 'B' from 'V', 'buy' may be spelled 'boy-u-y.'"

7. Special Codes and Ciphers.

Each battalion or lower unit may, subject to control by higher authority, arrange for such codes or special signals as may be deemed necessary. It must be clearly understood that use of such codes or special signals must be confined to the units concerned.

If the Playfair Cipher is designated for this purpose, the key must be changed at frequent intervals as must be different from that used by the division.

When, to meet particular conditions, codes or ciphers not otherwise provided for, are required, a report to that effect will be submitted, through military channels, to the Adjutant General. Three copies of the proposed code or cipher and instructions for its use will accompany the report.

On receipt of this order, required copies of special codes and ciphers in use will be submitted to the Adjutant General for approval. Their use may continue until further orders.

Except in case of emergency, or as above authorized, no special code or cipher will be used until approved by the Adjutant General.

8. Playfair Cipher.

This is to be regarded as an emergency means for preparing messages for transmission.

To prepare a message for transmission by use of Playfair Cipher, divide a large square into twenty-five small squares as shown below.

Commencing at the upper left hand corner, write first the key-word and then the remainder of the alpahbet in regular order, one letter per small square. Any letter repeated in the key-word is omitted after its first occurrence. "I" and "J" are put in the same small square.

Thus, if the key-word is "AMEXFORCE," we will have:

A	M	E	X	F
O	R	C	B	D
G	H	IJ	K	L
N	P	Q	S	T
U	V	W	Y	Z

Now write your message in groups of two letters each. If both letters of a group are the same, place "X" after the first and use the second as first letter of following group. When a period occurs replace it with "Q". Numbers must be spelled out.

Next, find equivalents for each pair of letters, in the following manner:

(a) If both letters of a pair occur in the same vertical column of alphabet square, substitute for each the letter immediately below it. If one of them is at the bottom of the column, substitute for it the one at the top of the same column. Thus: VH is substituted for PR, GA for OU, etc.

(b) If both letters of a pair occur in the same horizontal line of alphabet square, substitute for each the letter next on its right. If one of them is at the extreme right of the line, substitute for it the one at the extreme left of the same line. Thus: ME is substituted for AM, AX for FE, etc.

(c) If the letters of a pair occur at opposite corners of a rectangle, each letter of the pair is represented by the letter in the other corner of the rectangle, and in the same horizontal line with it. Thus: HT is substituted for LP, QH for PI, etc.

The following message, intended for signal officers, 1st Division.

"No. 1. 8:30 Telephone lines cut Need 20 repair men Jones" would be enciphered as follows:

TE	LE	PH	CN	EL	IN	ES	CU	TN	EX	ED
qf	if	vp	gu	fi	gq	xq	ow	np	xf	fc
TW	EN	TY	RE	PA	IR	ME	NQ	JO	NE	SQ
qz	aq	sz	cm	nm	hc	ex	ps	gc	qa	ts

Capital letters represent clear text. Lower case letters represent enciphered message.

Further procedure is as follows:

(a) Write enciphered message on the prescribed blank form, or, in its absence, on any blank paper, in groups of five letters each.

(b) Place number of message and hour of signing, when necessary, immediately before first group.

(c) Sign an order of transmission in following form:

"Send this message to (place or organization) via (means of transmission, when necessary to indicate it)

(Signature)"

Ordinarily means of transmission will be left to discretion of Signal Corps personnel, but when they consider it necessary, commanders may designate means to be used.

Message handed to Signal Corps operator will then appear as follows:

"No. 1. 8:30 QFIFV PGUFI GQXQO WNPXF FCQZA QSZCM NMHCE XPSGC QATSK
Send this message to First Division.

J. M.
Capt. 1st Inf."

In the foregoing it should be noted:

(a) That no address is deemed necessary. The order for transmission indicates that message is to go to division headquarters. The context is sufficient to indicate division signal officer as soon as message is decoded at division headquarters.

(b) That final "K" is used merely to complete last group.

By Command of General Pershing:

JAMES W. McANDREW,
Chief of Staff.

GENERAL ORDERS
No. 190

GENERAL HEADQUARTERS, A.E.F.
France, Oct. 29, 1918

I. 1. The sending of code or cipher messages is forbidden unless it is positively known that addressee is in possession of the key.

2. Officers using the War Department Telegraph Code or the Staff Code will consult the "Distribution Lists" before signing messages to be sent in these codes.

3. Officers using the Trench Code may assume that division, brigade, regimental and battalion commanders of their own division are supplied with the code. Before messages are sent to neighboring division, it must be ascertained whether or not such divisions have the proper code. If not, the procedure prescribed in Par. 20, G. O. No. 172, c. s., these headquarters, will be followed.

4. Officers using the Emergency Code List may assume that it is in the hands of companies and battalions of their own division.

5. Each code or cipher message, except those in the War Department Telegraph Code, will have the particular code or cipher used indicated by a special signal to

to appear as the first group in the body of the message.

6. Group for designating the "Staff Code" will be as indicated in "Secret Memorandum No. 1," issued with this code book.

7. Group for designating the "Trench Code Book" will appear on each edition of this code, immediately below the title. The books now printed without this "designation group" will be indicated by using the first three letters of the name of the book as the first group in the body of the messeges; thus all messages encoded by use of the "Mohawk" Code will be preceded by the group, "MOH.".

8. Group for designating "Playfair" Cipher will be "PLAYF."

9. Group for designating any special codes or ciphers now authorized will be announced by the officer responsible for the particular code or cipher.

10. Whenever special codes or ciphers are submitted for approval of the Adjutant General, the proposed designating word or signal will be indicated as part of the code.

11. Whenever special codes or ciphers are distributed they will be accompanied by a statement showing definitely the persons or offices to which messages in such code or cipher may be sent.

12. At each headquarters persons authorized to use any special code or cipher will inform the commanding officer, or an officer designated by him, of the "designating" word or signal.

13. Officers who receive messages in unknown code or cipher will submit them to the commanding officer, or his designated representative, for determination as to what code or cipher was used, and whether or not it can be decoded at his headquarters.

14. In any case, an effort will be made to determine the officer responsible for sending a message in violation of Par. 1, above, and the facts reported to the proper commander for disciplinary action.

15. The code office of the Second Section, General Staff, is designated to receive messages in unknown codes at these headquarters.

II. Attention of all officers is invited to the fact that a "Security Service" has been organized at these headquarters, charged with the duty of:

(a) Copying telephone conversations and reporting:

(1) Violations of censorship regulations and orders governing secrecy of operations.

(2) Unnecessarily long conversations.

(3) Use of long-distance lines for trivial or personal conversations.

(b) Examining telegrams, radio and other messages and reporting:

(1) Improper use of code.

(2) Radio messages sent in clear.

(3) Improper use of addresses.

(4) All messages which from their contents and method of transmission seem liable to give valuable information to the enemy.

(5) All code messages sent to persons not in possession of the key.

III. Officers having occasion to make use of telephone, telegraph or other means for transmitting messages should be thoroughly familiar with:

(a) Instructions regarding use of code and cipher (G. O. No. 103, 1918).

(b) Regulations governing distribution, care and use of trench code books (G. O. No. 172, 1918).

(c) Instructions furnished with the particular code or cipher used.

(d) Method of addressing and forwarding telegrams (G. O. No. 86, 1918).

IV. 1. Paragraph 5, G. O. No. 103, c. s., these headquarters, provides that messages may be sent in clear in the following cases, and no others:

(a) When transmitted by buzzerphone.
(b) When sent by messenger or mail under normal conditions.
(c) When transmitted by visual signal stations especially designated as "safe" by division or higher commander.
(d) When transmitted by telephone or telegraph, provided both stations are more than four miles from front line and message is not of a confidential nature.
(e) On the written order of an officer, when delay necessary for encoding or enciphering a message is more dangerous than giving information to the enemy. In this case officers ordering messages sent in clear do so on their own responsibility and will be required to justify their action.

2. Messages transmitted by telegraph or telephone where both stations are more than four miles from the front line may be divided into three classes:
(a) Ordinary routine messages to be sent in clear.
(b) Messages relating to or indicating important troop movement or giving stations of units. These may be encoded wholly or in part by use of the special codes prepared by the various sections of the General Staff.
(c) Messages of a specially confidential nature to be sent only in code.

While exercising all necessary precautions to prevent leakage of information which would be of positive military value to the enemy, it is at the same time essential that officers avoid the unnecessary use of code or cipher. The delay in transaction of business, and the liability to error always entailed in encoding and decoding messages, are real and practical disadvantages which should not be made to attach to the conduct of military business except for compelling reasons.

3. Messages to be transmitted by radio or earth-telegraphy must be entirely in code, except as indicated in Par. 1 (e) above. Under no circumstances will a message transmitted by radio or earth-telegraphy be partly in code and partly in clear. If the entire message cannot be encoded, no code whatever will be used. The message must give no indication of organization, of origin or destination. The order directing transmission will give the organization for which intended. The Signal Corps operator will then send it to the station serving that organization.

V. Paragraph XI, G. O. No. 146, c. s., these headquarters, is amended to read as follows:

XI. TELEGRAPHIC, CABLE AND TELEPHONE CENSORSHIP

The general provisions relating to field censorship apply to telegrams, cables and telephone messages.

The provisions of Sec. III, Bul. No. 28, c. s., these headquarters, and Rule 3, Bul. No. 40, c. s., these headquarters, will govern in the matter of preparation of private telegrams and cablegrams of members of the American Expeditionary Forces, as well as telegram arrangements.

Due to the great danger involved in the indiscreet use of the telephone, division commanders will carefully scrutinize its use in their commands and issue such detailed orders as local conditions may require.

By command of General Pershing:

JAMES W. McANDREW,
Chief of Staff.

"From the Ground Up: American Cryptology during World War I features . . . Betsy Rohaly Smoot's passion for the all-but-forgotten men and women who served in France, Britain, and America . . . in a sprawling theater of war. In her hands, the beginnings of America's modern signals intelligence capabilities have come to light and (figuratively) to life." Michael Warner, Command Historian, US Cyber Command