ANATOMY OF A CIPHER

During the American Civil War, Union generals and civilian leaders sent millions of telegrams to coordinate and direct a society at war. Perhaps tens of thousands of Union telegrams were sent in cipher during the war to prevent rebels or their sympathizers from understanding the messages they may have intercepted.

Anson Stager developed the first telegraphic cipher used for military purposes during the Civil War.[1] Shortly after the war began, Governor William Dennison of Ohio asked Stager to develop an encryption plan for communication with the governors of Indiana and Illinois. Major General George B. McClellan appointed Stager as superintendent of all telegraph lines in the Department of the Ohio and asked Stager to develop a field telegraph system to follow his army. The War Department adopted Stager's cipher system, and in October 1861, Stager went to Washington to become an assistant quartermaster with the rank of captain. On November 25, he was appointed the head of the United States Military Telegraph with the rank of colonel. However, he did not resign as general manager of the Western Union Telegraph Company and soon returned to Cleveland to resume active direction of the company. He delegated much of the responsibility in Washington to Major Thomas T. Eckert.[2]

Although Stager's cipher was not terribly complex, it depended for success on absolute secrecy, and the operators were told not to reveal the code to any person, including commanding officers and even President Abraham Lincoln himself. A Civil War telegrapher described the system: "The principle of the cipher consisted in writing a message with an equal number of words in each line, then copying the words up and down the columns by various routes, throwing in an extra word at the end of each column, and substituting other words for important names and verbs."[3]

The following example from April 1865 shows the cipher in action in a telegram from Abraham Lincoln in Washington to Major General Godfrey Weitzel in Richmond. Major General Weitzel had first entered Richmond on April 3 and immediately reestablished telegraphic communication between Richmond and Washington. "In that hour," a military telegrapher later wrote, "the country was electrified by the intelligence that the Confederate capital, now re-possessed by the Federals, was telegraphically connected with the National head-quarters."[4]

Abraham Lincoln to Godfrey Weitzel[5]
12 April 1865

385

Time _____ Office U.S. Military Telegraph,
WAR DEPARTMENT,

"Cypher"

Washington, D.C., April 12, 1865 .[6]

Major General Weitzel
Richmond, Va.

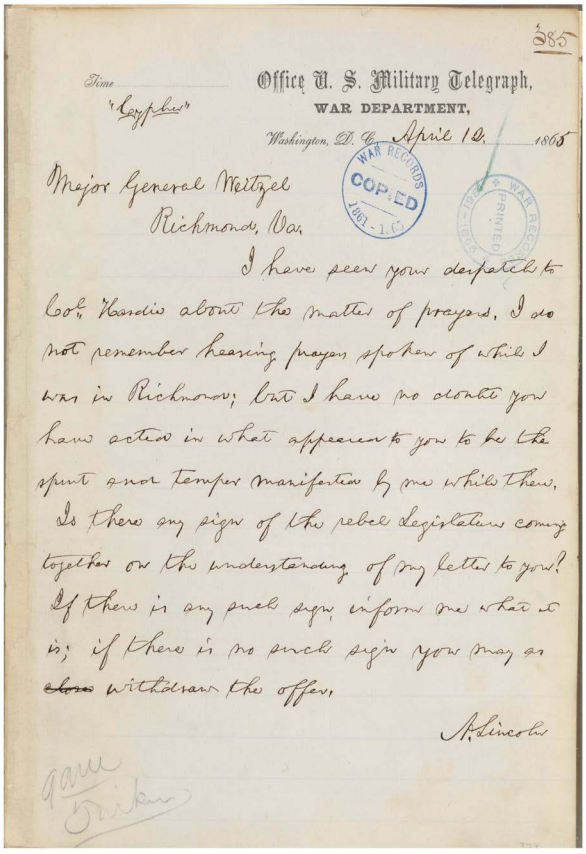
I have seen your despatch to Col Hardie about the matter of prayers. I do not remember hearing prayers spoken of while I was in Richmond; but I have no doubt you have acted in what appeared to you to be the spirit and temper manifested by me while there.

Is there any sign of the rebel Legislature coming together on the understanding of my letter to you? If there is any such sign, inform me what it is; if there is no such sign you may as ~~close~~ withdraw the offer.

A. Lincoln

[*Endorsement*]
9[am]

Tinker[7]


385

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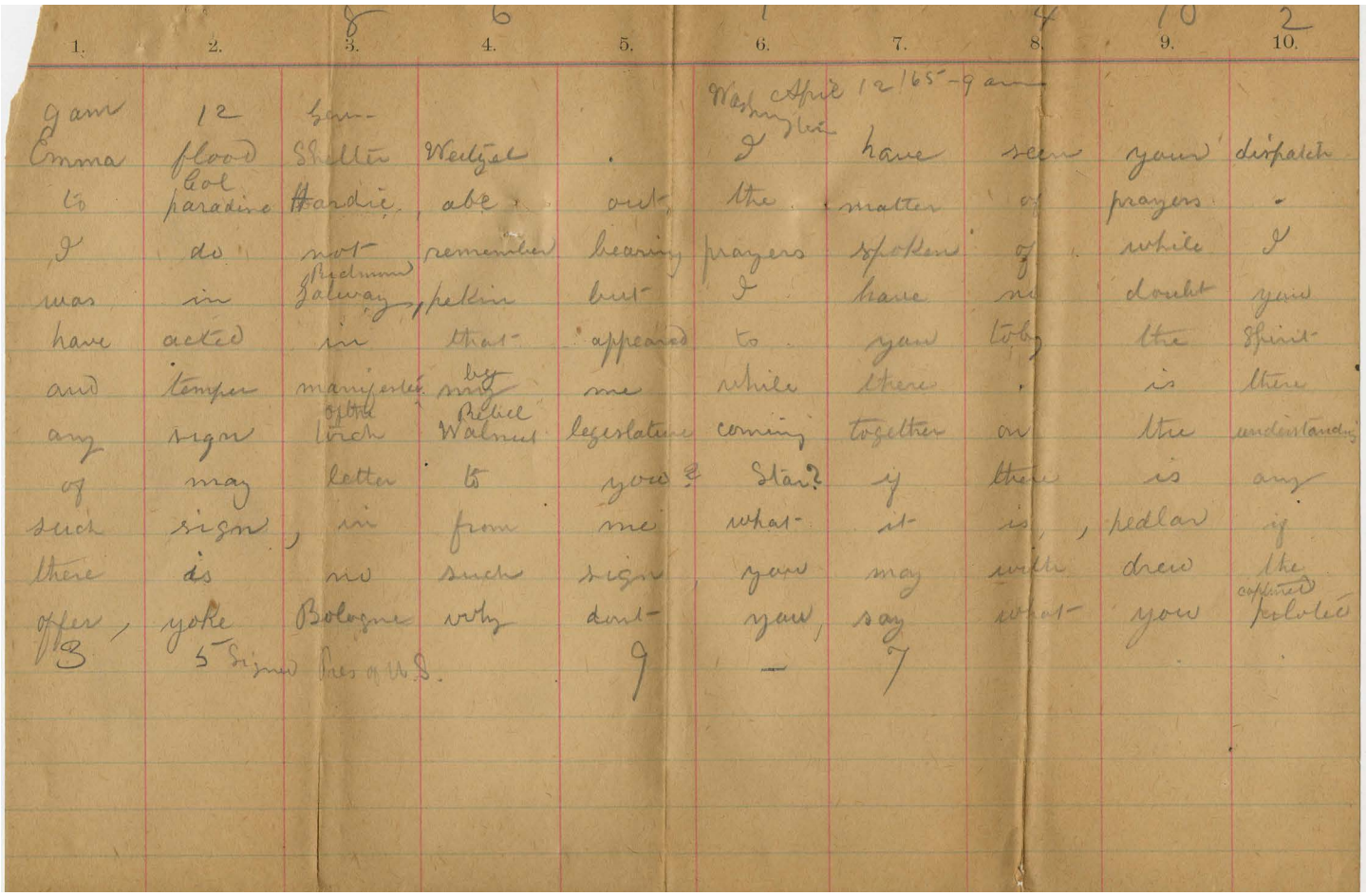
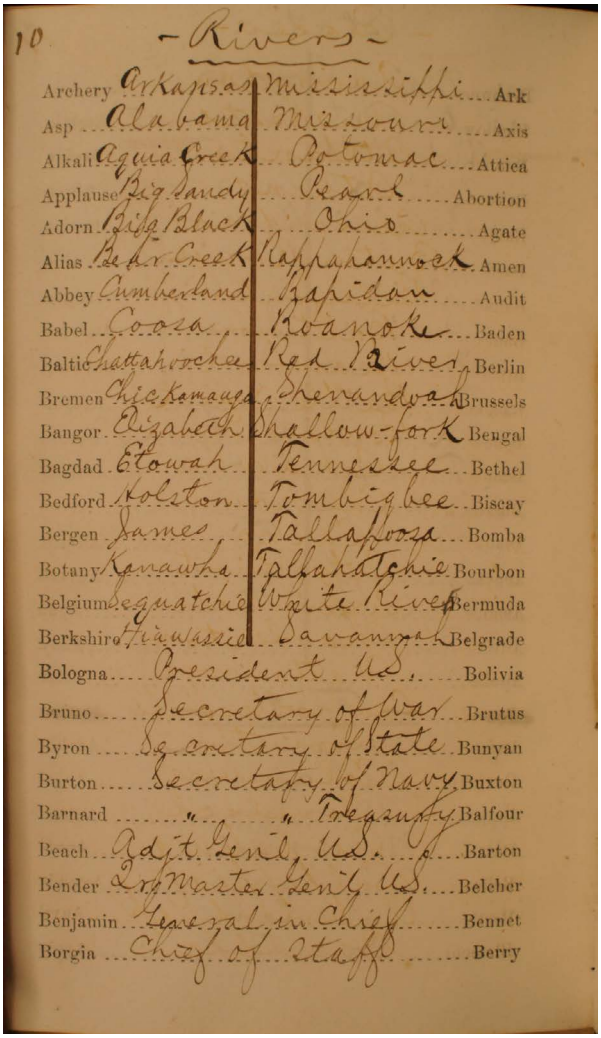
A. Lincoln

Abraham Lincoln to Godfrey Weitzel[8]
12 April 1865

		8	6		1		4	10	2
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
9 am Emma	12 flood	Gen. Shelter	Weitzel	.	Washington I	April 12 /65 have	-9 am seen	your	dispatch
to	Col paradise	Hardie	abe	out	the	matter	of	prayers	.
I	do	not	remember	bearing	prayers	spoken	of	while	I
was	in	Richmond Galway	, pekin	but	I	have	no	doubt	you
have	acted	in	that	appeared	to	you	toby[10]	the	spirit
and	temper	manifested	by my	me	while	there	.	is	there
any	sign	of the torch	Rebel Walnut	legislature	coming	together	on	the	understanding
of	may	letter	to	you?	Star?	if	there	is	any
such	sign	, in	from	me	what	it	is ,	pedlar	if
there	is[9]	no	such	sign	you	may	with	drew	the
offer,	yoke	Bologne	why	dont	you,	say	what	you	captured piloted
3	5 Signed	Pres of U.S.		9	-	7			

Key: Text in Lincoln's original; Arbitraries substituted for specific words; Arbitraries substituted for punctuation; Null words with no meaning; Commencement words; Text added by telegraphers

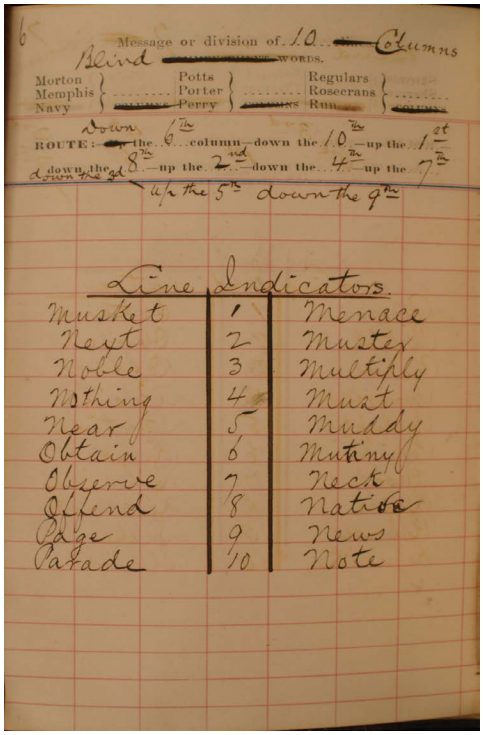




10 — Rivers —

Archery	Arkansas	Mississippi	Ark
Asp	Alabama	Missouri	Axis
Alkali	Aquia Creek	Potomac	Attica
Applause	Big Sandy	Pearl	Abortion
Adorn	Big Black	Ohio	Agate
Alias	Bear Creek	Rappahannock	Amen
Abbey	Cumberland	Rapidan	Audit
Babel	Coosa	Roanoke	Baden
Baltic	Chattahoochee	Red River	Berlin
Bremen	Chickamauga	Shenandoah	Brussels
Bangor	Elizabeth	Shallow-fork	Bengal
Bagdad	Etowah	Tennessee	Bethel
Bedford	Holston	Tombigbee	Biscay
Bergen	James	Tallapoosa	Bomba
Botany	Kanawha	Tallahatchie	Bourbon
Belgium	Sequatchie	White River	Bermuda
Berkshire	Hiawassee	Savannah	Belgrade
Bologna	President U.S.		Bolivia
Bruno	Secretary of War		Brutus
Byron	Secretary of State		Bunyan
Burton	Secretary of Navy		Buxton
Barnard	" " Treasury		Balfour
Beach	Adjt Genl U.S.		Barton
Bender	Ir Master Genl U.S.		Belcher
Benjamin	General in Chief		Bennet
Borgia	Chief of Staff		Berry

No. 1 Cypher Arbitraries



6

Message or division of 10 Columns

Blind [redacted] WORDS.

Morton, Memphis, Navy ..... Potts, Porter, Perry ..... Regulars, Rosecrans, Run .....

ROUTE: Down the 6th column—down the 10th—up the 1st down the 8th—up the 2nd—down the 4th—up the 7th

up the 5th down the 9th

Line Indicators.

Musket	1	Menace
Next	2	Muster
Noble	3	Multiply
Nothing	4	Must
Near	5	Muddy
Obtain	6	Mutiny
Observe	7	Neck
Offend	8	Native
Page	9	News
Parade	10	Note

No. 1 Cypher Commencement and Route

The telegrapher wrote out Lincoln's message on specially columned paper and used Cipher No. 1 to encode this message.

In the No. 1 Cipher, code words, or "arbitraries," for the "President of the United States" included "Bologna" and "Bolivia." Other arbitraries for President Lincoln in the No. 1 Cipher included "Ida," "Ink," "Irving," "Ingress," "Ingrate," and "Ingot." "Emma" meant 9:00 a.m., and "flood" meant "12" or "12th" for April 12. The telegrapher substituted key words with other "arbitraries" such as "Galway" for "Richmond," "Walnut" for "Rebel," and "yoke" for "signature." He replaced punctuation with other arbitraries, such as "pekin" or "pedlar" for a comma, "Star" for an interrogation or question mark, and "unity," "Zodiac," and "zebra" for periods. After the signature, the final line was filled with a brief message to complete the grid of ten columns of eleven lines each.[11]

After preparing the message in grid form, the telegrapher prepared the message for transmission by rewriting it according to the route dictated by the selected format. The first words, "Whats next news," formed a "commencement" code that indicated to the receiving telegrapher the number of columns and lines, as well as the route through the resulting matrix. The handwritten instructions at the beginning of the No. 1 Cipher explain that "After having written the message in columns commence by writing any one of the 'Blind words' after this, two of the Line Indicators taken from the same page as the route used will be used, the numbers set opposite to them being added together will indicate the no of lines & it is these two words that indicate the no of column & route." Apparently, the telegraphers added "Whats" as a blind word for a ten-column message after the initial publication of the No. 1 Cipher. The Line Indicator "next" meant 2 lines, and the Line Indicator "news" meant 9 lines; added together, these words indicated an 11-line message.[12]

The telegrapher reordered the message by reading down column 6, down column 10, up column 1, down column 8, up column 2, down column 4, up column 7, down column 3, up column 5, and down column 9. This encryption process also added "null" words at the end of each column to disguise the message further. The null words at the end of each column are underlined—"mean," "your," "never," etc. Doing so produced the following enciphered message that could be sent by telegraph without detection.

Abraham Lincoln to Godfrey Weitzel[13]
12 April 1865

U.S. MILITARY TELEGRAPH.

Apr 12 1865

By Telegraph from War Dept 1865

To J. H. Emerick[14]

Whats next news I the prayers I to while coming star what you you mean dispatch zebra I you spirit there understanding any if the piloted your offer there such of any and have was I to Emma never seen of of no toby[15] Zodiac on there is with what remains yoke as sign my sign temper acted in to paradise flood over weitzel abe remember pekin that my walnut to form such why not say may it if together there you have spoken matter have senses shelter bardie[16] not galway in manifested torch letter in no bologne plenty dont sign me you legislature (2) me appeared but bearing out unity in your prayers while doubt the is the is pedlar draw you down

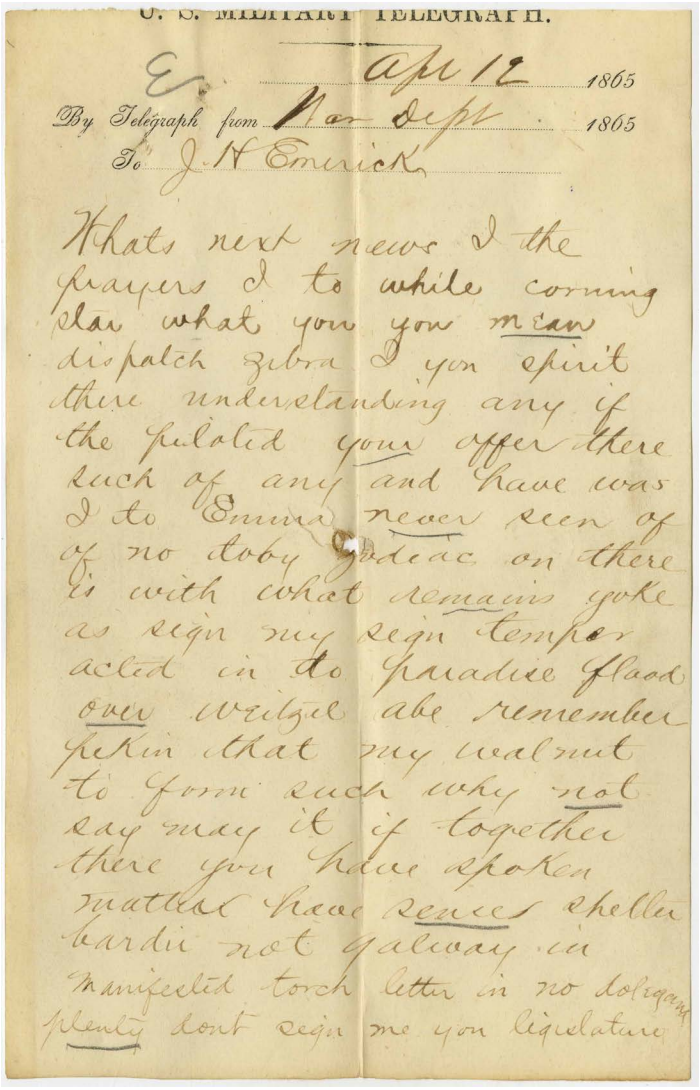
T. T. Eckert

123[17]

Key: Text in Lincoln's original; Arbitraries substituted for specific words; Arbitraries substituted for punctuation; Null words with no meaning; Commencement words; Text added by telegraphers

This telegram was the penultimate message sent by Abraham Lincoln via telegraph, appropriately in cipher, as so many had been over the previous four years. The last telegram Lincoln sent was another on the same day, also to General Weitzel in Richmond and also in cipher.

By Daniel W. Stowell
Director/Editor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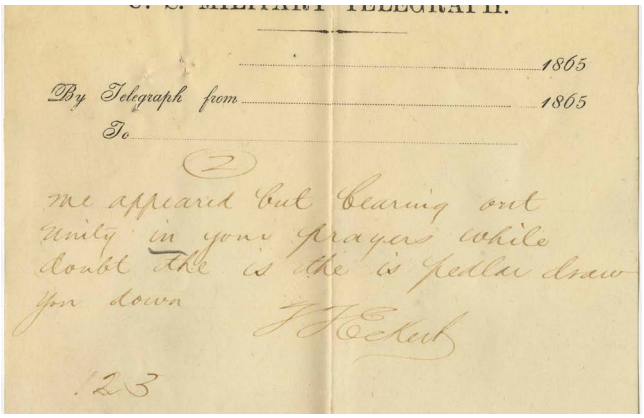
1865

By Telegraph from 1865

To

(2)

me appeared but bearing out unity in your prayers while doubt the is the is pedlar draw you down

T. T. Eckert

123

Notes:

[1] Anson Stager (1825-1885) was a printer's apprentice while still a teenager and had learned telegraphy by the time he was 20. He became a telegraph operator in 1846 and managed the Pittsburgh office of a telegraph company by 1847. By 1856, he was the general superintendent of the Western Union Telegraph Company, with headquarters in Cleveland, Ohio. John A. Garraty and Mark C. Carnes, eds., *American National Biography*, 24 vols. (New York: Oxford University Press, 1999), 20:526-27.

[2] Robert Luther Thompson, *Wiring a Continent: The History of the Telegraph Industry in the United States, 1832-1866* (Princeton, NJ: Princeton University Press, 1947), 385-86; William R. Plum, *The Military Telegraph during the Civil War in the United States*, 2 vols. (Chicago: Janson, McClurg, & Co. 1882), 1:44.

Thomas T. Eckert (1825-1910) became a telegraph operator in the 1840s and became a superintendent for the Western Union Telegraph Company in Ohio. He served as superintendent of the military telegraph for the Department of the Potomac in 1862, but in September 1862, he went to Washington to administer the War Department's military telegraph with the rank of major, a position he held until the end of the war. Garraty and Carnes, *American National Biography*, 7:280-81.

[3] J. Emmet O'Brien, "Telegraphing in Battle," *Century Illustrated Monthly Magazine* 38 (September 1889), 784. See also David W. Gaddy, "Internal Struggle: The Civil War," in Ralph E. Weber, *Masked Dispatches: Cryptograms and Cryptology in American History, 1775-1900*, 2d ed. (Fort George G. Meade, MD: Center for Cryptologic History, National Security Agency, 2002), 105-20.

[4] Plum, *Military Telegraph during the Civil War, 2:320-22*.

Godfrey Weitzel (1835-1884) was born in Germany or in Cincinnati, Ohio, where he grew up and was educated. Weitzel graduated second in his class at the United States Military Academy in 1855 and later returned as a professor of engineering. In 1861, he was transferred to Washington, DC, to construct defenses. He served on the staffs of

Major Generals George B. McClellan and Benjamin F. Butler, and was promoted to Brigadier General in August 1862. He commanded a division under Major General Nathaniel P. Banks in Louisiana. Reassigned to the East, he commanded a corps of United States Colored Troops. Lieutenant General Ulysses S. Grant placed Weitzel in command of all Union troops north of the Appomattox River in the final operations of the war, and Weitzel's forces took possession of Richmond on April 3, and Weitzel made his headquarters in Jefferson Davis's home. Garraty and Carnes, *American National Biography*, 22:917-18; Whitelaw Reid, *Ohio in the War: Her Statesmen, Generals, and Soldiers*, 2 vols. (Columbus, OH: Eclectic Publishing, 1893), 1:789-95; *Ohio History Central*, s.v. "Godfrey Weitzel."

[5] Abraham Lincoln to Godfrey Weitzel, 12 April 1865, RG 107, Entry 34: Records of the Secretary of War, 1789-1889, Telegrams Sent and Received by the War Department Central Telegraph Office, 1861-1882, Vault, National Archives, Washington, DC.

[6] "5" written over printed "4"

[7] Charles A. Tinker (1838-1919) had been a telegraph operator for railroads in Illinois before entering the United States Military Telegraph Corps. He served as telegraph operator for several generals in Virginia. Later in the war, Major Thomas T. Eckert appointed him as cipher operator in the War Department in Washington. Jacob G. Ullery, comp., *Men of Vermont: An Illustrated Biographical History of Vermonters and Sons of Vermont* (Brattleboro, VT: Transcript Publishing, 1894), part III, p. 156.

[8] Abraham Lincoln to Godfrey Weitzel, 12 April 1865, RG 107, Entry 36: Records of the Office of the Secretary of War, Records of the Secretary of War, Record Series Originating During The Period 1789-1889, Telegrams, Telegrams Sent by the Field Offices of the Military Telegraph and Collected by the Office of the Secretary of War, 1860-1870, National Archives, Washington, DC.

[9] "as" changed to "is"

[10] "to be" is converted to "toby"

[11] Anson Stager, *Cipher for Telegraphic Correspondence; Arranged Expressly for Military Operations, and for Important Government Despatches* (Washington, DC: 1861-62) (No. 1 Cipher), 10, 14, 19, 21, 24, Thomas T. Eckert Papers, Series 7: United States Military Telegraph, Code Books, EC 52, Huntington Library, San Marino, CA.

[12] *Ibid*., facing title page, 6; Plum, *Military Telegraph during the Civil War*, 1:56. Throughout the Civil War, the United States Military Telegraph developed ten cipher systems, numbered 1 through 12 (numbers 8 and 11 were never used).

The following table provides the approximate dates of use for each cipher, according to Plum (left) and the documents in the Eckert Papers (right):

Cipher	Dates of Use	Dates of Use
1	Feb-Sep 24,1864	Jun 1863-Apr 1865
2	1864	Mar-Nov 1864
3	Dec 25,1864-Mar 23, 1865	
4	Mar 23, 1865-Jun 20, 1865	Mar 1865
5	Not used	Not used
6	1861?-Aug 1862	
7	1861?-Aug 1862	
9	Jan 1863-Feb 1864?	Sep 1862-Jun 1864
10	Spring 1863-Feb 1864?	
12	1862-Aug 1864	

Plum, *Military Telegraph during the Civil War*, 1:44-59.

[13] Abraham Lincoln to Godfrey Weitzel, 12 April 1865, RG 107, Entry 36, National Archives, Washington, DC.

[14] John H. Emerick (1843-1902) entered the military telegraph service in 1861 at the age of seventeen, and he became the youngest cipher clerk in the United States Army. By the Spring of 1865, Emerick was the chief telegraph operator with the Army of the James and was at that army's headquarters in Richmond until the telegraph corps was disbanded. *Brooklyn Eagle* (NY), 12 May 1902; Plum, *Military Telegraph during the Civil War*, 2:345.

[15] "to be" is converted to "toby"

[16] "bardie" is perhaps an intentional corruption of "Hardie"

[17] This number refers to the number of words in the enciphered text.

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