

Kryptos

Kryptos is a distributed sculpture by the American artist Jim Sanborn located on the grounds of the Central Intelligence Agency (CIA) headquarters, the George Bush Center for Intelligence in Langley, Virginia.^[1]

Since its dedication on November 3, 1990, there has been much speculation about the meaning of the four encrypted messages it bears. Of these four messages, the first three have been solved, while the fourth message remains one of the most famous unsolved codes in the world. It is said that a fifth message will reveal itself after the first four are solved. The sculpture continues to be of interest to cryptanalysts, both amateur and professional, who are attempting to decipher the fourth passage. The artist has so far given four clues to this passage.


Description

The sculpture comprises four large copper plates with other elements consisting of water, wood, plants, red and green granite, white quartz, and petrified wood. The most prominent feature of the entire part is a large vertical *S*-shaped copper screen resembling a scroll or a piece of paper emerging from a computer printer, half of which consists of encrypted text, that is located in the northwest corner of the New Headquarters Building courtyard, outside of the agency's cafeteria. The characters are all found within the 26 letters of the Latin alphabet, along with question marks, and are cut out of the copper plates. The main sculpture contains four separate enigmatic messages, three of which have been deciphered.^[2]

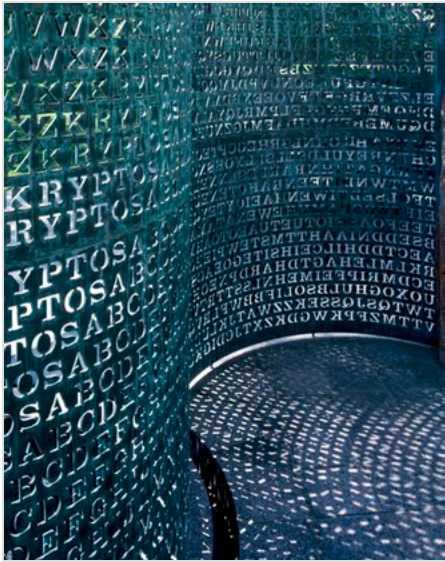
In addition to the main part of the sculpture, Jim Sanborn also placed other pieces of art on the CIA grounds, such as several large granite slabs with sandwiched copper sheets outside the entrance to the New Headquarters Building. Several Morse code messages are found on these copper sheets, and one of the stone slabs has an engraving of a compass rose pointing to a lodestone. The ciphers' increasing "complexity" through the entrance into the courtyard is intended to be as if it "were a fossil".^[3] Other elements of Sanborn's installation include a landscaped garden area, a fish pond with opposing wooden benches, a reflecting pool, and other pieces of stone, including a triangle-shaped black stone slab.^[1]

The name *Kryptos* comes from the ancient Greek word for "hidden", and the theme of the sculpture is "intelligence gathering". The cost of building the sculpture in 1988 was US\$250,000 (worth ~US\$660,000 in 2024).^[4]

Kryptos



| | |
|-------------------|--|
| Artist | <u>Jim Sanborn</u> |
| Year | 1990 |
| Dimensions | 11-12 feet × 20 feet |
| Location | <u>George Bush Center for Intelligence</u> , <u>Langley</u> , <u>Virginia</u> 38°57′08″N 77°08′45″W |



Close-up view of part of the text

Encrypted messages

The ciphertext on the left-hand side of the sculpture (as seen from the courtyard) of the main sculpture contains 869 characters in total: 865 letters and 4 question marks. In April 2006, Sanborn released information stating that a letter was omitted from this side of *Kryptos* "for aesthetic reasons, to keep the sculpture visually balanced".^[5] There are also three misspelled words in the plaintext of the deciphered first three passages, which Sanborn has said was intentional,^[5] and three letters ("YAR") near the beginning of the bottom half of the left side are the only characters on the sculpture in superscript.

The right-hand side of the sculpture comprises a keyed Vigenère encryption tableau, consisting of 867 letters. One of the lines of the Vigenère tableau has an extra character (*L*). Bauer, Link, and Molle suggest that this may be a reference to the Hill cipher as an encryption method for the fourth passage of the sculpture.^[6] However, Sanborn omitted the extra letter from the small *Kryptos* models that he sold.

The encryptions that were ascribed

Left side, as seen from the courtyard^[a] Right side, as seen from the courtyard

| | |
|------------------------------------|----------------------------------|
| EMUFPHZLRFAXYUSDJKZLDRNSHGNFIVJ | ABCDEFGHIJKLMNOPQRSTUVWXYZABCD |
| YQTQUXQBQVYUULLTREVJYQTMKYRDMFD | AKRYPTOSABCDEFGHIJLMNQUVWXZKRYPT |
| VFPJUDEEHZWETZYVVGWHKKQETGFQJNCE | BRYPTOSABCDEFGHIJLMNQUVWXZKRYPT |
| GGWHKK?DQMC PFQZDQMMIAGPFXHQRLG | CYPTOSABCDEFGHIJLMNQUVWXZKRYPTO |
| TIMVMZJANQLVKQEDAGDVFRPJUNGEUNA | DPTOSABCDEFGHIJLMNQUVWXZKRYPTOS |
| QZGZLECGYUXUEENJTB JLBQCRBJDFHRR | ETOSABCDEFGHIJLMNQUVWXZKRYPTOSA |
| YIZETKZEMVDUFKSJHKFWHKUWQLSZFTI | FOSABCDEFGHIJLMNQUVWXZKRYPTOSAB |
| HHDDDUVH?DWKB FUFWPNTDFIYCUQZERE | GSABCDEFGHIJLMNQUVWXZKRYPTOSABC |
| EVLDKFEZMOQQJLTTUGSYQPFEUNLAVIDX | HABCDEFGHIJLMNQUVWXZKRYPTOSABCD |
| FLGGTEZ?FKZBSFDQVGOGIPUFXHDRKF | IBCEFGHIJLMNQUVWXZKRYPTOSABCDE |
| FHQNTGPUAECNUVPDJMQCLQUMUNEDFQ | JCEFGHIJLMNQUVWXZKRYPTOSABCDEF |
| ELZZVRRGKFFVOEEXBDMVPNFQXEZLGRE | KDEFGHIJLMNQUVWXZKRYPTOSABCDEF |
| DNQFMPNZGLFLPMRJQYALMGNUVPDXVKP | LEFGHIJLMNQUVWXZKRYPTOSABCDEF |
| DQUMEBEDMHDAFMJGZNUPLGEWJLLAETG | MFGHIJLMNQUVWXZKRYPTOSABCDEF |
| ENDYAHROHNLSRHEOCPT E OIBIDYSHNAIA | NGHIJLMNQUVWXZKRYPTOSABCDEF |
| CHTNREYULDSL L SLLNOHSNOSMRWXMNE | OHIJLMNQUVWXZKRYPTOSABCDEF |
| TPRNGATIHNRARPESLNNELEBLPIIACAE | PIJLMNQUVWXZKRYPTOSABCDEF |
| WMTWNDITEENRAHCTENEUDRETNHAE OE | QJLMNQUVWXZKRYPTOSABCDEF |
| TFOLSEDTIWENHAEIOYTEYQHEENCTAYCR | RLMNQUVWXZKRYPTOSABCDEF |
| EIFTBRSPAMHHEWENATAMATEGYEERLB | SMNQUVWXZKRYPTOSABCDEF |
| TEEFOASF IOTUETUAEOARMAEERTNRTI | TNQUVWXZKRYPTOSABCDEF |
| BSEDDNIAAHTT M STEWPIEROAGRIEFEB | UQUVWXZKRYPTOSABCDEF |
| AECTDDHILCEIHSITEGOEAO SDDRYDLORIT | VUVWXZKRYPTOSABCDEF |
| RKLMLEHAGTDHARDPNEOHMGFMFEUHE | WVWXZKRYPTOSABCDEF |
| ECDMRIPFEIMEHNL SSTRTRTVDOHW?OBKR | XWXZKRYPTOSABCDEF |
| UOXOGHULBSOLIFBBWFLRVQQPRNGSSO | YXZKRYPTOSABCDEF |
| TWTQSJQSSEKZZWATJKLUDIAWINFBNYP | ZZKRYPTOSABCDEF |
| VTTMZFPKWGDKZXTJCDIGKUHUAUEKCAR | ABCDEFGHIJKLMNOPQRSTUVWXYZABCD |

Sanborn worked with a retiring CIA employee named Edward Scheidt to come up with the cryptographic systems used on the sculpture.^[7] Edward Scheidt stated that the difficulty of the encryption was around nine out of ten. He said that his intention was for it to be solved in five to ten years. He also said that there was an intentional "change in the methodology" of the encryption.^[8] Sanborn has also stated that should he die before the entire sculpture is deciphered, someone should be able to confirm the solution.^[9] In 2020, Sanborn stated that he planned to put the secret to the solution up for auction once he died.^[10]

Sanborn had stated that the sculpture contains a riddle within a riddle, which will be solvable only after the four encrypted passages have been deciphered.^[7] He has given conflicting information about the sculpture's answer, saying at one time that he gave the complete solution to the then-CIA director William Webster during the dedication ceremony, but later, he also said that he had not given Webster the entire solution. He did, however, confirm that a passage of the plaintext of the

second message reads, "Who knows the exact location? Only WW."^{[11][b]}

Solvers

The first person to announce publicly that he had solved the first three passages was Jim Gillogly, a computer scientist from southern [California](#), who deciphered these passages using a computer, and revealed his solutions in 1999.^[12] After Gillogly's announcement, the CIA revealed that their analyst David Stein had solved the same passages in 1998 using pencil and paper techniques, although at the time of his solution the information was only disseminated within the intelligence community.^{[13][14]} No public announcement was made until July 1999,^{[15][16]} although in November 1998 it was revealed that "a CIA analyst working on his own time [had] solved 'the lion's share' of it".^[17]

The NSA claimed that some of their employees had solved the same three passages but would not reveal names or dates until March 2000, when it was learned that an NSA team led by Ken Miller, along with Dennis McDaniels and two other unnamed individuals, had solved passages 1–3 in late 1992.^[18] In 2013, in response to a [Freedom of Information Act](#) request by [Elonka Dunin](#), the NSA released documents that show these attempts to solve the *Kryptos* puzzle in 1992, following a challenge by [Bill Studeman](#), then Deputy Director of the CIA. The documents show that by June 1993, a small group of NSA cryptanalysts had succeeded in solving the first three passages of the sculpture.^{[19][20]}

All previous attempts to solve *Kryptos* found that passage 2 ended with "WESTIDBYROWS". However, in 2005, Nicole Friedrich, a [logician](#) from [Vancouver](#), Canada, determined that another possible plaintext was "WESTXLAYERTWO".^[21] On April 19, 2006, Sanborn contacted an online community dedicated to the *Kryptos* puzzle to inform them that he made an error in the sculpture by omitting an *S* in the ciphertext (an *X* in the plaintext), and he confirmed that the last passage of the plaintext was "WESTXLAYERTWO", and not "WESTIDBYROWS".^[22]

Solutions

The following are the decryptions of passages 1–3 of the sculpture.^[23] The texts were added with blank spaces, but misspellings present in the text are included verbatim.

Morse code

The translations of the [International Morse code](#) (sometimes called *K0*) that are ascribed to the copper slabs when read facing the south:^{[24][c]}

E E VIRTUALLY E | E E E E E INVISIBLE

DIGETAL E E E | INTERPRETATIT

E E SHADOW E E | FORCES E E E E E

LUCID E E E | MEMORY E

T IS YOUR | POSITION E

SOS

RQ

Solution of passage 1

- Method: Vigenère
- Keywords: "Kryptos" and "palimpsest"

BETWEEN SUBTLE SHADING AND THE ABSENCE OF LIGHT LIES THE NUANCE OF IQLUSION

Iqlusion was an intentional misspelling of *illusion* by the creator, Jim Sanborn, that was intended to throw people off.^{[19][10]}

Solution of passage 2

- Method: Vigenère
- Keywords: "Kryptos" and "abscissa"

IT WAS TOTALLY INVISIBLE HOWS THAT POSSIBLE ? THEY USED THE EARTHS MAGNETIC FIELD X THE INFORMATION WAS GATHERED AND TRANSMITTED UNDERGRUUND TO AN UNKNOWN LOCATION X DOES LANGLEY KNOW ABOUT THIS ? THEY SHOULD ITS BURIED OUT THERE SOMEWHERE X WHO KNOWS THE EXACT LOCATION ? ONLY WW THIS WAS HIS LAST MESSAGE X THIRTY EIGHT DEGREES FIFTY SEVEN MINUTES SIX POINT FIVE SECONDS NORTH SEVENTY SEVEN DEGREES EIGHT MINUTES FORTY FOUR SECONDS WEST X LAYER TWO

The coordinates mentioned in the plaintext, 38°57′6.5″N 77°8′44″W, have been interpreted using a modern Geodetic datum as indicating a point that is approximately 174 feet (53 meters) southeast of the sculpture.^[2]

Solution of passage 3

- Method: Transposition

SLOWLY DESPARATLY SLOWLY THE REMAINS OF PASSAGE DEBRIS THAT ENCUMBERED THE LOWER PART OF THE DOORWAY WAS REMOVED WITH TREMBLING HANDS I MADE A TINY BREACH IN THE UPPER LEFT HAND CORNER AND THEN WIDENING THE HOLE A LITTLE I INSERTED THE CANDLE AND PEERED IN THE HOT AIR ESCAPING FROM THE CHAMBER CAUSED THE FLAME TO FLICKER BUT PRESENTLY DETAILS OF THE ROOM WITHIN EMERGED FROM THE MIST X CAN YOU SEE ANYTHING Q ?

This is a paraphrased quotation from Howard Carter's account of the opening of the tomb of Tutankhamun on November 26, 1922, as described in his 1923 book *The Tomb of Tutankhamun*.^[25] The question with which it ends is asked by Lord Carnarvon, to which Carter in the book replied, "wonderful things". Field notes from the expedition, however, show his reply as, "Yes, it is wonderful".^[26]

Clues given for passage 4

When commenting in 2006 about his error in passage 2, Sanborn said that the answers to the first three passages contain

clues to the fourth passage.^[5] In November 2010, Sanborn released a clue, publicly stating that "NYPVTT", the 64th–69th letters in passage 4, become "BERLIN" after decryption.^{[27][28]}

Sanborn gave *The New York Times* another clue in November 2014: the letters "MZFPK", the 70th–74th letters in passage 4, become "CLOCK" after decryption.^[29] The 74th letter is *K* in both the plaintext and ciphertext, meaning that it is possible for a character to encrypt to itself. Sanborn further stated that in order to solve passage 4, "You'd better delve into that particular clock", but added, "There are several really interesting clocks in Berlin."^[30] The particular clock in question is presumably the Berlin Clock, although the Alexanderplatz World Clock and Clock of Flowing Time are other candidates.^[30]

In an article published on January 29, 2020, by *The New York Times*, Sanborn gave another clue: at positions 26–34, ciphertext "QQPRNGKSS" is the word "NORTHEAST".^[10]

In August 2020, Sanborn revealed that the four letters in positions 22–25, ciphertext "FLRV", in the plaintext are "EAST". Sanborn commented that he "released this layout to several people as early as April".^[31]



The *Mengenlehreuhr* (Berlin Clock) may be the "Berlin Clock" the encrypted message references.

Related sculptures

After producing *Kryptos*, Sanborn's first cryptographic sculpture, he went on to make several other sculptures with codes, including an "Untitled Kryptos Piece" and *Cyrillic Projector*, which contain encrypted Russian Cyrillic text that includes an extract from a classified KGB document. The cipher on one side of Sanborn's 1997 sculpture *Antipodes* repeats part of the text from *Kryptos* with slight differences.

In popular culture

The dust jacket of the US version of Dan Brown's 2003 novel *The Da Vinci Code* contains two references to *Kryptos*—one on the back cover (coordinates printed light red on dark red, vertically next to the blurbs) is a reference to the coordinates mentioned in the plaintext of passage 2, except the degree digit is off by one. When Brown and his publisher were asked about this, they both gave the same reply: "The discrepancy is intentional". The coordinates were part of the first clue of the second *The Da Vinci Code* WebQuests, with the first answer being *Kryptos*. The other reference is hidden in the brown "tear" artwork—the upside-down text "Only WW knows" is another reference to the second message on *Kryptos*.^{[4][32]} *Kryptos* was also featured in another of Dan Brown's novels, *The Lost Symbol* (2009).^[2]

A small version of *Kryptos* appears in the season 5 episode of *Alias* "S.O.S.". In it, Marshall Flinkman says he has cracked the code just by looking at it during a tour visit to the CIA office. The solution he describes sounds like the solution to the first two parts. It was also mentioned as "Kryptos Donuts" in the sixth episode of *The Recruit*'s Season 1, "I.N.A.S.I.A.L.".

See also

- Copiale cipher
- History of cryptography

Notes

1. The left-side encryptions are often divided into four sections: K1, K2, K3 and K4.

K1:

"EMUFPHZLRFAXYUSDJKZLDKRNSHGNFIVJ
YQTQUXQBQVYUULLTREVJYQTMKYRDMFD"

K2: "VFPJUDEEHZWETZYVGWHKKQETGFGJNCE

GGWHKK?DQMCQFQZDQMMIAGPFXHQRLG
TIMVMZJANQLVKQEDAGDVFRPJUNGEUNA
QZGZLECGYUXUEENJTBQLBQCRTBJDFHRR
YIZETKZEMVDUFKSJHKFWHKUWQLSZFTI
HHDDDUVH?DWKBFUFPWNTDFIYCUQZERE
EVLDKFEZMOQQJLTUGSYQPFEUNLAVIDX
FLGGTEZ?FKZBSFDQVGOGIPUFXXHHRKF
FHQNTGPPUAECNUVPDJMQCLQUMUNEDFQ
ELZZVRRGKFFVOEEXBDMVBNFQXEZLGRE
DNQFMPNZGLFLPMRJQYALMGNUVPDXVKP
DQUMEBEDMHDAFMJGZNUPLGEWJLLAETG"

K3: "ENDYAHROHNLSRHEOCPTEOIBIDYSHNAIA

CHTNREYULDSLLSLLNOHSNOSMRWXMNE
TPRNGATIHNRRARPESLNNELEBLPIIACAE
WMTWNDITEENRAHCTENEUDRETNAEAOE
TFOLSEDTIWENHAEIOYTEYQHEENCTAYCR
EIFTBRSPAMHHEWENATAMATEGYEERLB
TEEFOASFOTUETUAEOTOARMAEERTNRTI
BSEDDNIAAHTTMSTEWPIEROAGRIEWFEB
AECTDDHILCEIHSITEGOEAOSSDDRYDLORIT
RKLMLHAGTDHARDPNEOHMGFMFEUHE
ECDMRIPFEIMEHNLSSTTRTVDOHW?"

K4:

UOXOGHULBSOLIFBBWFLRVQQPRNGKSSO
TWTQSJQSSEKZZWATJKLUDIAWINFBNYP
VTTMZFPKWGDZXTJCDIGKUHUAUEKCAR"

"OBKR

2. "WW" has been speculated to be a reference to William Webster.
3. Sources might write "INTERPRETATIT" as "INTERPRETATIU" or "INTERPRETATIO[N]" due to the presumed dash that is consistent with *O* in International Morse code. (anonymous) (May 17, 2009). "Kryptos – Beyond K4" (<https://kryptosfan.wordpress.com/morse-code/>). Photos by Jim Gillgoly. Morse Code. Archived (<https://web.archive.org/web/20151226160921/https://kryptosfan.wordpress.com/morse-code/>) from the original on December 26, 2015. Retrieved May 6, 2024. And the *E* after "POSITION" is sometimes not present. Wilson. "Morse Code" (<https://www.elonka.com/kryptos/mirrors/daw/MorseCode.txt>) (TXT). Contributions by Eric Hall. Archived (<https://web.archive.org/web/20230513083326/https://www.elonka.com/kryptos/mirrors/daw/MorseCode.txt>) from the original on May 13, 2023.

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External links

- Jim Sanborn's official *Kryptos* webpage (<http://jimsanborn.net/main.html#KRYPTOS/>)
- *Kryptos* (<http://www.elonka.com/kryptos>) website maintained by Elonka Dunin (includes *Kryptos* FAQ (<http://www.elonka.com/kryptos/faq.html>), transcript (<http://www.elonka.com/kryptos/transcript.html>), pictures and links)
- *Kryptos* photos (<http://www.voynich.net/Kryptos/>) by Jim Gillogly
- The Central Intelligence Agency *Kryptos* webpage (<https://www.cia.gov/legacy/headquarters/kryptos-sculpture/>)