

# Fractionated Morse Cipher

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# Cipher

- 26-Letter Key
  - It should consist of each letter of the alphabet in any order
  - Ex: “ABCDEFGHIJKLMNOPQRSTUVWXYZ”
- Convert the plaintext to morse code with “x” between characters and “xx” between words
  - The length of the morse code should be a multiple of 3; If not, add “x” until it is
  - Ex: “A TEST” → “.-xx-x.x...x-xx”

## Cont.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
.	.	.	.	.	.	.	.	.	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x
.	.	.	-	-	-	x	x	x	.	.	.	-	-	-	x	x	x	.	.	.	-	-	-	x	x
.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-

- Each letter of the key corresponds to its respective block of three morse characters
- Convert the morse code to ciphertext by taking blocks of three morse characters and replacing it with its respective letter
  - Ex: “.-xx-x.x...x-xx” → “FXGCR”

# Decoding

- Convert ciphertext to morse code by using the key.
- Convert morse code to plaintext by using the general morse code chart

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
.	.	.	.	.	.	.	.	.	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x
.	.	.	-	-	-	x	x	x	.	.	.	-	-	-	x	x	x	.	.	.	-	-	-	x	x
.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-

- “FXGCR”→“.-xx-x.x...x-xx”→“A TEST”

# Advantages

- Encodes spaces and punctuations into letters, which will make the ciphertext much harder to decode
- The ciphertext will usually be of a slightly different length of characters than the plaintext

# Weaknesses

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
.	.	.	.	.	.	.	.	.	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x
.	.	.	-	-	-	x	x	x	.	.	.	-	-	-	x	x	x	.	.	.	-	-	-	x	x
.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-	x	.	-

- There can't be three x's in a row, therefore combinations like IT or RU are not possible
- Also, a combination like ABD is not possible because there are no x's.
- English frequency analysis

# Sources

- <http://practicalcryptography.com/ciphers/fractionated-morse-cipher/>
- <http://www.quadibloc.com/crypto/pp1323.htm>
- <https://medium.com/asecuritysite-when-bob-met-alice/the-fractional-cipher-f14614374f32>
- <https://www.cryptogram.org/downloads/aca.info/ciphers/FractionatedMorse.pdf>
- <https://www.wattpad.com/499161722-codes-and-ciphers-23-fractionated-morse-code>