K.E.G. Card Cipher

(Kolor Encryption Gate)

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Abstract. KEG is a playing card cipher designed for use with ordinary playing cards. It's motions resemble a rotor machine but play resembles a card game. It was designed to be resistant to modern attacks both by human and machine. It's key length and strength is 52 factorial (52!). Keg's key stream is designed to be non-periodic.

Design:

KEG is a non-linear stream cipher that fits in the palm of your hand. The discard of cards and pick up upon encountering the gate color provides non-linearity to what would seem like an ordinary rotor machine construction. KEG was designed to be easy to use and easy to remember for users who want strong encryption for A-Z messages.

KEG's output resembles an ideal cipher and in testing is not distinguishable from a truly random A-Z sequence.

Specification:

State = 52 cards
Key Length = 52 cards
Gate Color = color of the first card in the keyed deck

KEG is a hand held rotor machine that feels like a card game. It consists of an encryption deck pile and discard pile.

Operational setup:

Start by creating a lookup dictionary that converts a card into it's assigned number. Such a lookup dictionary should look like this:

AC	2C	3C	4C	5C	6C	7C	8C	9C	10C	JC	QC	KC	AS	2S	3S	4S	5S	6S	7S	8S	9S	10S	JS	QS	KS
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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

AH	2H	3H	4H	5H	6H	7H	8H	9H	10H	JH	QH	KH	AD	2D	3D	4D	5D	6D	7D	8D	9D	10D	JD	QD	KD
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Card values are used for modular addition of plaintext letters and as stepping values.

Example message: LETSPLAYKEGTOGETHER

Encryption Pile Stepping:

Before any encryption of plain text is done, the encryption pile is stepped.

The stepping card is always the second card in the encryption pile.

1. The stepping card's value is looked up in the key and the color is noted.

2. If the color of the card matches the gate color then the discard pile is picked up and placed at the rear of the encryption pile.

3. Discard the stepping card.

4. Step the encryption pile by removing the first card and placing it at the rear.

Finally, step the encryption pile by the noted stepping card's value (0-51). This means repeating step #4 by the value of the stepping card.

Encryption:

Step the encryption deck by using the Encryption Pile Stepping instructions.

Encryption of the first letter in the plaintext is performed by modular addition of the letter (0-25) with the card value of the first card in the encryption pile.

Decryption:

Step the encryption deck by using the Encryption Pile Stepping instructions.

Decryption of the first letter in the ciphertext is performed by modular subtraction of the letter (0-25) with the card value of the first card in the encryption pile.

Test Vector:

Key: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51

Example message: LETUSPLAYKEGTOGETHER
Example cipher text: ONONIANLXQHEYCNUGIAA