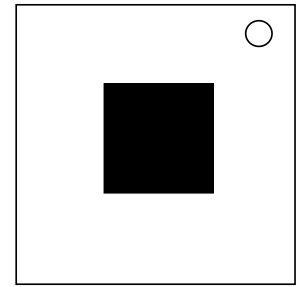# On the Subject of Faulty Colored Cube

*Even a cube has a cipher now...*

*See Appendix CLC-DLC from [Colored Cube](#) for identifying Colored Cube variants.*

This module contains a Colored Cube, which will be flashing multiple colors, which can be (R)ed, (G)reen, (B)lue, (Y)ellow, (M)agenta, (C)yan, (W)hite or Blac(K). The entire cube is selectable.

The module has two modes, Read Mode and Submission Mode. The module will initially be in Read Mode.

In Read Mode, the cube will be flashing through a sequence of six colours (which all cannot be black) and six numbers in range 3-10 (displayed in the top left corner of the cube's top face), with black and the number 0 flashing between the start and end of the sequence.

Note down each flash's color and number, then press the cube at any time to enter Submission Mode.

In Submission Mode, the cube will be flashing through a new sequence of six **unique** colors (with one color, excluding black, **missing**) and six numbers in range 1-26, with black and the number 0, again, flashing between the start and end of the sequence.

Convert each flash's number into a letter A1Z26 (1 = A, 2 = B... 26 = Z) to obtain the module's six-letter encrypted word.

The encrypted word has been encrypted through a simple Monoalphabetic Cipher, the Alphabet Key for which will be obtained in the section below using Read Mode's flashes.

## Obtaining Monoalphabetic Cipher's Key

Start with the name of the first flash's color as the keyword. Append the entire alphabet to it. Then, for each duplicate letter, only keep its first occurrence. This is your initial Alphabet Key.

Modify the Alphabet Key by following the process below for each flash:

- Keep appending "dummy" characters (#) to your key until its length is divisible by the current flash's number.
- Split the key into groups (left to right) of N characters, where N is the current flash's number.
- Use the modification from the table below depending on your current flash's color.
- Concatenate all groups together in order and remove the previously added "dummy" characters to obtain your new Alphabet Key.

| Flash's Color | Modification |
|---|---|
| Red | Cycle the characters in each group to the right once.<br>E.g.: ABC DEF GHI JKL → CAB FDE IGH LJK |
| Green | Swap adjacent pairs of groups.<br>(this modification can only appear if there is an even number of groups)<br>E.g.: ABC DEF GHI JKL → DEF ABC JKL GHI |
| Blue | Cycle the order of the groups to the right once.<br>E.g.: ABC DEF GHI JKL → JKL ABC DEF GHI |
| Yellow | Reverse the order of groups.<br>E.g.: ABC DEF GHI JKL → JKL GHI DEF ABC |
| Magenta | Cycle the order of the groups to the left once.<br>E.g.: ABC DEF GHI JKL → DEF GHI JKL ABC |
| Cyan | Cycle the characters in each group to the left once.<br>E.g.: ABC DEF GHI JKL → BCA EFD HIG KLJ |
| White | Reverse each group.<br>E.g.: ABC DEF GHI JKL → CBA FED IHG LKJ |

After following the process above for all six flashes, you will end up with the final Alphabet Key for the Monoalphabetic Cipher. Refer to the next section to decrypt the encrypted word.

## Example

Flashes: White-7, Green-8, Blue-6, Red-3, Cyan-10, White-8
Initial <u>Alphabet Key</u>: WHITEABCDFGJKLMNOPQRSUVXYZ

White-7:
WHITEAB CDFGJKL MNOPQRS UVXYZ## →
BAETIHW LKJGFDC SRQPONM ##ZYXVU →
New <u>Alphabet Key</u>: BAETIHWLKJGFDCSRQPONMZYXVU

Green-8:
BAETIHWL KJGFDCSR QPONMZYX VU###### →
KJGFDCSR BAETIHWL VU###### QPONMZYX →
New <u>Alphabet Key</u>: KJGFDCSRBAETIHWLVUQPONMZYX

Blue-6:
KJGFDC SRBAET IHWLVU QPONMZ YX#### →
YX#### KJGFDC SRBAET IHWLVU QPONMZ →
New <u>Alphabet Key</u>: YXKJGFDCSRBAETIHWLVUQPONMZ

Red-3:
YXK JGF DCS RBA ETI HWL VUQ PON MZ# →
KYX FJG SDC ARB IET LHW QVU NPO #MZ →
New <u>Alphabet Key</u>: KYXFJGSDCARBIETLHWQVUNPOMZ

Cyan-10:
KYXFJGSDCA RBIETLHWQV UNPOMZ#### →
YXFJGSDCAK BIETLHWQVR NPOMZ####U →
New <u>Alphabet Key</u>: YXFJGSDCAKBIETLHWQVRNPOMZU

White-8:
YXFJGSDC AKBIETLH WQVRNPOM ZU###### →
CDSGJFXY HLTEIBKA MOPNRVQW ######UZ →
Final <u>Alphabet Key</u>: CDSGJFXYHLTEIBKAMOPNRVQWUZ

## Decrypting the Monoalphabetic Cipher

Write the entire alphabet under the previously obtained <u>Alphabet Key</u>.

For each letter of the <u>encrypted word</u>, find it in the <u>Alphabet Key</u> and replace it with the letter directly below it.

If done correctly, you should end up with an English word – this is your <u>decrypted word</u>.

### Example

Alphabet Key: CDSGJFXYHLTEIBKAMOPNRVQWUZ

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

Encrypted Word: AHEKNP

A → P
H → I
E → L
K → O
N → T
P → S

Decrypted Word: PILOTS

Finally, refer to the next section for instructions on submitting the word into the module.

## Encoding and Submitting the Decrypted Word

To submit the <u>decrypted word</u> into the module, it first needs to be encoded into colors.

Note down the six unique colors of <u>Submission mode</u>'s flashes, in order, and append the **missing** color to the noted sequence. Write the entire alphabet (**not** the <u>Alphabet Key</u>) below the colors in reading order so that it fits in the columns of the colors.

For each letter of the <u>decrypted word</u>, replace it with the color of the column that it lies in. In the end, you will get a sequence of six colors that need to be submitted into the module.

## Example

<u>Submission Mode</u> Flashes' Colors: Red, Blue, White, Cyan, Yellow, Green
Missing Color: Magenta

| R | B | W | C | Y | G | M |
|---|---|---|---|---|---|---|
| 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 |   |   |

<u>Decrypted Word</u>: PILOTS
P → Blue
I → Blue
L → Yellow
O → Red
T → Green
S → Yellow

Encoded <u>Decrypted Word</u>: Blue, Blue, Yellow, Red, Green, Yellow

Pressing the cube while it is on one of the <u>Submission Mode</u>' flashes will cycle the corresponding flash's color through the color list (excluding black).

Set the flashes' colors, in order, to the encoded <u>decrypted word</u>, then press the cube while it is black to submit.

If the given sequence of colors is correct, the module will solve. Otherwise, a strike will be given, the module will go back to <u>Read Mode</u>, and your input from <u>Submission Mode</u> will be reset (but the answer to the module will not change).