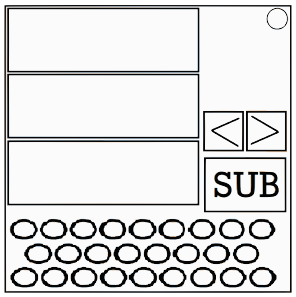
On the Subject of the Gray Cipher



This cipher might seem gray and bleak and boring. Well, I must say... you're not wrong.

On the module, you will see 3 screens, a keyboard, 2 arrows, and a submit button that displays the current page you're on.

Pressing the right arrow takes you to the next page. Pressing the left arrow takes you to the previous page. There is a total of 1 page.

On page 1, the top screen shows a 6 letter encrypted word, the middle screen shows a word, the bottom screen shows a 6 digit binary string.

Follow the mechanics down below to decrypt your word:

Step 1: Ragbaby Cipher

For this, you're going to need the encrypted word on the top screen, and the word on the middle screen.

Using the word from the middle screen, remove any duplicate letters from it, getting rid of all 2nd or more occurrences. Next, take the entire alphabet and remove all the letters that are shown in the key.

If the number of unlit indicators is even, put the alphabet at the end of the key. Otherwise, place it in front of the key. This will be your Ragbaby key.

Starting with an offset of 1, follow the directions below for each letter:

- 1: Find the letter in the Ragbaby key.
- 2: Go to the left a X number of times where X is the offset.
- 3: Replace that letter with the letter you end up on.
- 4: Add 1 to the offset.

After that you should now have a new encrypted word.

Example

Encrypted Word: QJAGVI
Ragbaby Key: WAXYBCDEFGHIJKLMNOPQRSTUVZ (Unlit is even)

Q -> P
J -> H
A -> V
G -> C
V -> Q
I -> C

Step 2: Bit Switch Cipher

For this, you will need the encrypted word you got from step 1, and the 6 digit binary string on the bottom screen.

First determine the scrambler that will be used by using the first character of the serial number:

0	21453	9	23154	I	24513	R	24531
1	21534	A	25134	J	25413	S	25431
2	31524	B	24153	K	34512	T	34521
3	31452	C	34152	L	35214	U	35421
4	41523	D	35124	M	35412	V	43251
5	41532	E	45123	N	43512	W	43521
6	51234	F	45132	O	45213	X	45231
7	51423	G	54123	P	53412	Y	53421
8	51432	H	54132	Q	54213	Z	54231

Next turn each letter of the encrypted word you have so far into it's alphanumeric position (A = 1, B = 2...Z = 26). If the binary bit (bottom screen) at the letter's position is a 1, add 26 to the number. Then turn each number into it's binary sequence using the table below:

1	00001	8	01000	15	01111	22	10110	29	11101
2	00010	9	01001	16	10000	23	10111	30	11110
3	00011	10	01010	17	10001	24	11000	31	11111
4	00100	11	01011	18	10010	25	11001		
5	00101	12	01100	19	10011	26	11010		
6	00110	13	01101	20	10100	27	11011		
7	00111	14	01110	21	10101	28	11100		

For each binary sequence, run it through the scrambler so that the number in each position turns into that position of that number in the binary. Ex: 35124: 10011 -> 01101. Convert each binary sequence back into its number using the table above.

Finally turn each number back into a letter by treating the number as its alphanumeric position.

Example

Encrypted Word: PHVCQC
Scrambler Used: 24153
Bottom Screen Binary: 000100

P -> 16 + 0 -> 16 -> 10000 + 24153 -> 00100 -> 4 -> D
H -> 8 + 0 -> 8 -> 01000 + 24153 -> 10000 -> 16 -> P
V -> 22 + 0 -> 22 -> 10110 + 24153 -> 01101 -> 13 -> M
C -> 3 + 1 -> 29 -> 11101 + 24153 -> 10111 -> 23 -> W
Q -> 17 + 0 -> 17 -> 10001 + 24153 -> 00110 -> 6 -> F
C -> 3 + 0 -> 3 -> 00011 + 24153 -> 01010 -> 10 -> J

Step 3: Portax Cipher

For this, you're going to need the encrypted word you got from step 2.

Below, you will see 4 rows of letters, divided into 2 subgroups of 2 rows:

ABCDEFGHIJKLM
NOPQRSTUVWXYZNOPQRSTUVWXY

ACEGIKMOQSUWYACEGIKMOQSUW
BDFHJLNPRTVXZBDFHJLNPRTVX

The top row of this mechanism can be shifted to create a key. Shift the top row so that the letter A aligns with the letter on the 3rd/4th row that is the same letter as the second letter of the serial number.

You can get rid of the excess letters that doesn't fall under the top row for they won't be used. Any letters that fall under the top row will be used to decrypt the encrypted word.

Split the encrypted word in half so you have 2 3 letter strings. Place the 2nd half under the 1st half. Each column is treated like a letter pair reading top to bottom. For each letter pair, do the following:

- Find the 1st letter in the pair in the 1st/2nd row.
- Find the 2nd letter in the pair in the 3rd/4th row.
- If the 2 letters are in the same column, the 1st letter will be replaced with the letter in the 1st/2nd row and the 2nd letter will be replaced with the letter in the 3rd/4th row.
- Otherwise, replace the 1st letter with the letter in the same row as the 1st but in the same column as the 2nd. And replace the 2nd letter with the letter in the same row as the 2nd but in the same column as the 1st.

Read the letters by taking the 1st letter in each letter pair in reading order, then the 2nd letter to get your decrypted word.

Encrypted Word: DPMWFJ -> DW-PF-MJ
2nd Letter in SN: E

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

DW -> JK
PF -> AE
MJ -> CD
JK - AE - CD -> J A C K E D