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TECHNICAL REPORT 1937-213

THE SPYCLIST CIPHER CLOCK

Prepared for
OFFICE OF THE DIRECTOR,
BUREAU OF SECURITY AND SIGNALS INTELLIGENCE

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1. DESCRIPTION OF THE SPYCLIST CIPHER CLOCK ~~DEVICE~~ DEVICE

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The device resembles a small clock. On the face of the device are not numbers, but there are two sets of characters running around the edge in two concentric circles. There are two hands, like a clock. One is longer and points always to one of the characters in the outer circle. The other hand is shorter and always points to a character in the inner circle.

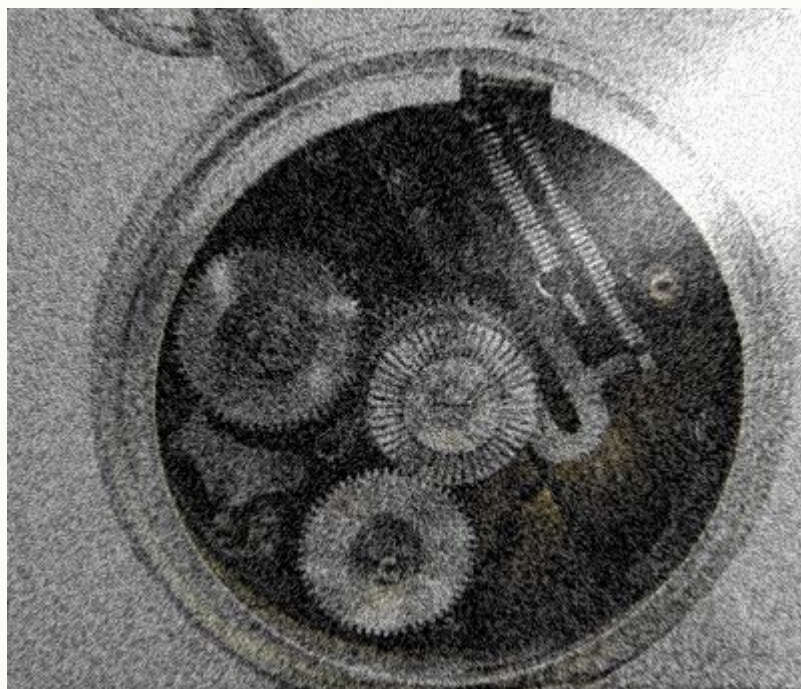
The inner circle of characters is the plaintext alphabet. It is fixed to the device and cannot be altered. The characters in this alphabet are the standard twenty-six letters of the English alphabet, in their standard order: ABCDEFGHIJKLMNOPQRSTUVWXYZ. The letters are equally spaced around the circle, so that each occupies one twenty-sixth of the full circle.

The outer circle of characters contains the ciphertext symbols. They are written onto a paper ring that can be removed and replaced on the device. There are twenty-eight places for the twenty-eight symbols. The full character set includes the twenty-six letters of the English alphabet, plus two additional characters: * and +. The arrangement of these characters is the key of the cipher, with the start of the key being the character immediately radially adjacent to the 'A' of the plaintext alphabet.

The shorter hand of the device always points to one of the letters in the inner circle of characters. The longer hand always points to one of the characters in the outer circle. Gearing inside the device insures that the hands move in increments of one character each, in its respective character set, and that each hand points to the middle of a character. Since there are twenty-six plaintext symbols and twenty-~~six~~eight ciphertext symbols, the gearing allows the shorter hand to turn twenty-eight complete turns while the longer hand turns twenty-six. During encipherment or decipherment, the two hands always move the same number of steps, albeit not through the same angle. The hands are advanced by means of a turning knob. There is also a special lever that moves the two hands independently and realigns them to the twelve o'clock position, where 'A' is located in the inner circle.

Photographs of the device can be found in the file in the Director's office, [REDACTED] and on the following page.

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Photos of spyclist cipher clock. Above: outer view, unkeyed.
Below: interior, showing gearworks.

2. INSTRUCTIONS FOR USING THE SPYCLIST CIPHER CLOCK DEVICE

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A. ENCIPHERMENT

The encipherment of a message follows these steps:

1. The key is loaded into the device by placing the paper ring so that (a) the first character of the key is radially adjacent to the 'A' of the plaintext alphabet, and (b) the key runs clockwise around the outer circle of the device.
2. The device is aligned so that both hands point in the "twelve o'clock" position. In this position, the shorter hand points directly to 'A' in the plaintext alphabet, and the longer hand points to the first character of the key.
3. For each letter in the message, the turning knob is rotated so that the shorter hand turns clockwise until it points to that letter. If it already points to that letter, then it is turned through a full circle until it points to it again. The gearing of the device turns the longer hand as the shorter hand turns. The ciphertext character is the character in the key to which the longer hand now points.

It is essential that the letters in the message is enciphered in order, and that the device is always advanced clockwise.

B. DECIPHERMENT

Decipherment proceeds similarly to encipherment.

1. The key is loaded into the device by placing the paper ring with key symbols in clockwise ~~dis~~order around the outer circle, so that the first character of the key is radially adjacent to the 'A' of the inner circle.
2. The device is aligned into its initial position in which both hands point in the "twelve o'clock" direction. The 'A' of the inner circle marks that direction.
3. For each character in the ciphertext, the turning knob is turned so that the longer hand turns clockwise until it points to that character in the outer circle of the device. While it turns, the gearing inside the device advances the shorter hand, so that it will point to the corresponding letter of the message.

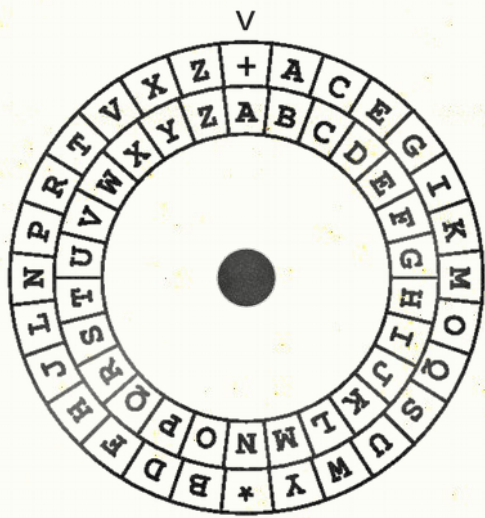
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3. AN EXAMPLE OF USING THE SPYCLIST CIPHER CLOCK DEVICE

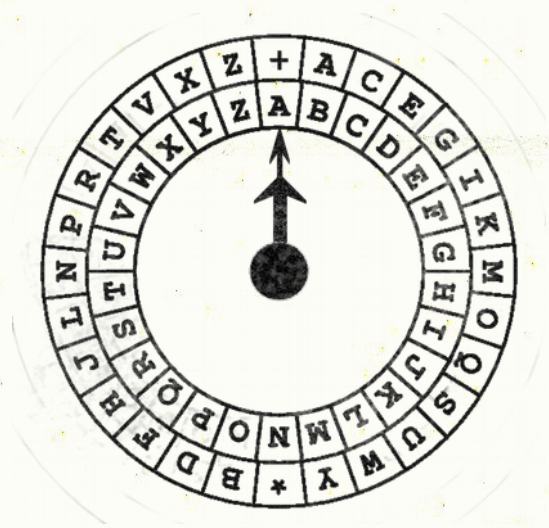
For our example, we will use the key +ACEGIKMOQSUYWY*BDFHJLNPRTVXZ and encipher this short message:

KEEP YOUR KEYWORDS SAFE FROM PRYING EYES

The key must be written onto the paper ring in clockwise order and loaded into the device's outer circle, so that the first letter of the key is at the position adjacent to the 'A' of the inner circle (marked in the diagram below). To save on expensive photographic film, all expositions in this report are by way of diagram rather than of photograph.

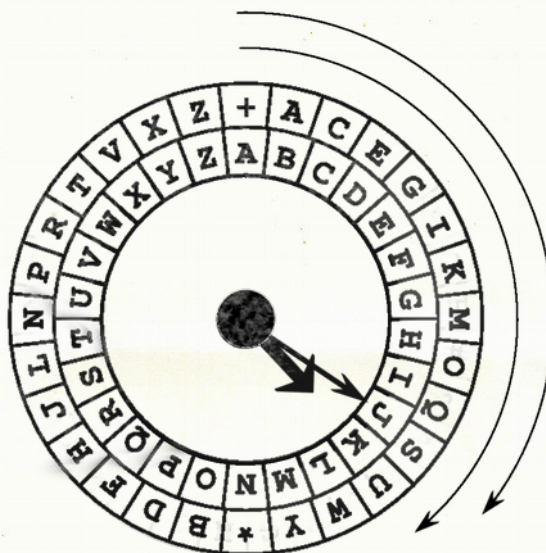


The device is aligned to its initial position. The shorter hand points to 'A' in the ~~outer~~ inner circle, and the longer hand points to '+' in the outer circle ('+' is the first character of the key).

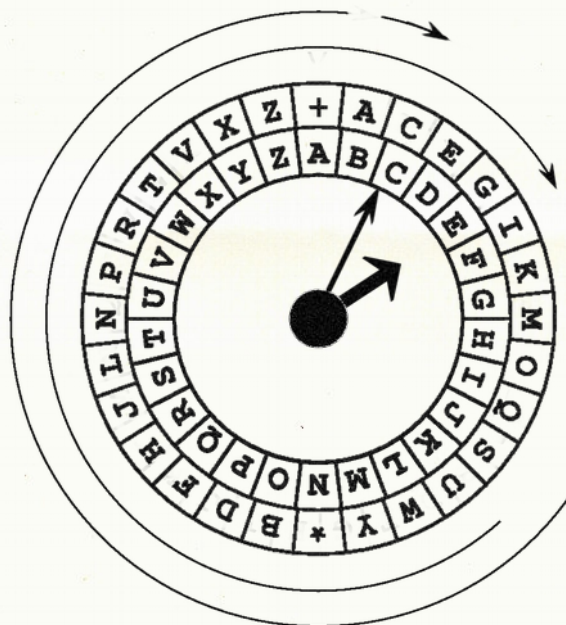


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The first letter of the message is 'K'. The device is advanced ten steps clockwise, so that the shorter hand now points to 'K' in the inner circle. The longer hand points to 'S' in the outer circle. The first character of the enciphered message is therefore 'S'.

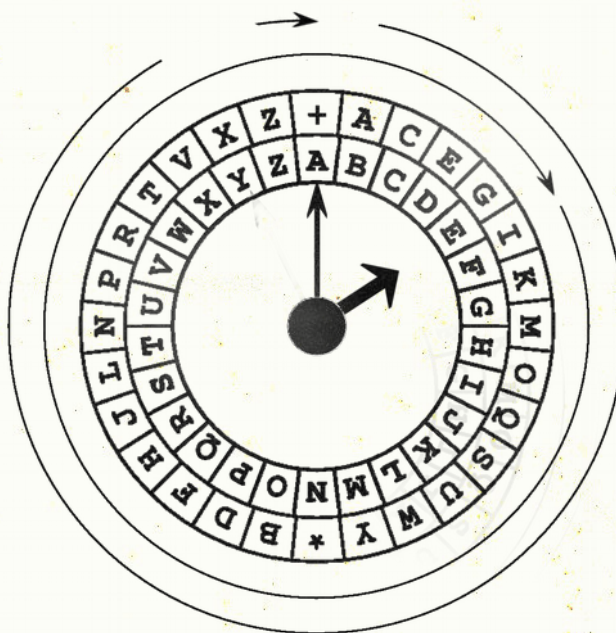


The second letter of the message is 'E', so the device is advanced clockwise (always clockwise) twenty steps until the shorter hand points to 'E' in the inner circle. The longer hand advances twenty steps also, and now points to 'C' in the outer circle. The second character of the ciphertext is therefore 'C'.



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The third letter of the message is a repeated 'E'. Therefore, the shorter hand is advanced one full turn (twenty-six steps) around the circle, while the longer hand also advances twenty-six steps (but not a full turn). Now the longer hand points to '+' on the outer circle, and the next character in the ciphertext is '+'.
+.



The reader should practice using the device by finishing the encipherment. When the message is completely enciphered, the resulting ciphertext is

SC+ULO*Q+LWOXAY+XKUOQNDWBFTKUCXHTS

Decipherment runs similarly. We load the key into the outer circle of the device and align it into its initial "twelve o'clock" position. We turn the longer hand until it points to the first character of the ciphertext, 'S'. At the same time, the gearing inside the device moves the shorter hand to 'K', which is the first letter of the message. We continue, always turning the hands clockwise, until the message is fully deciphered.