

# ULTRA

## Report on the Lomonosov Ridge Weather Station Fialka Machine - Eyes Only

The machine looked to me a lot like a prototype based on an Enigma machine. It has a keyboard with the 36 alpha-numeric characters and two rotors which turn in opposite directions. Each rotor carries contacts labelled 0, 1, 2, ..., 9, A, B, C, ..., Z. Each rotor has two sets of contacts one on each face and these are connected by a wiring maze within the rotor so that each contact on the front is connect to one contact on the back. I enclose photos of the wiring mazes. In principle at least there are  $36!$  ways they could have wired each rotor giving  $36! \times 36!$  possibilities, but the photos cut this down considerably.

I noticed that the wiring maze can be removed from the rotor and replaced back to front or the right way up in any of the 36 possible rotations, so each maze can be inserted in 72 ways giving a total of  $72 \times 72$  possibilities. What is more the rotors can be inserted in either order and each can start in one of 36 positions giving a total of  $2 \times 36 \times 36$  possibilities. My notes on board the weather station were hurried and I am taking a while to decipher my own handwriting, but If I can give any info about the insertions of the wiring mazes into the rotor I will forward it.

As with the Enigma there is a reflector which has 36 contacts on its face and these are wired together in pairs as shown on the enclosed photograph. Again there are 36 ways to insert this component.

In place of the Enigma plugboard they use a punchcard. This has holes to allow the input wires from the keyboard to be crossed with the input wires to the first rotor in any one of  $36!$  ways. Luckily I found the current card next to the machine and there is a photo of it enclosed. I'm not sure which way it goes in, but I think the idea is that if there is a hole in the  $i$ th row and  $j$ th column then input character  $i$  from the keyboard is seen as  $j$  by the first rotor, and output character  $j$  from the rotor/reflector assembly will light the bulb corresponding to the  $i$ th character.

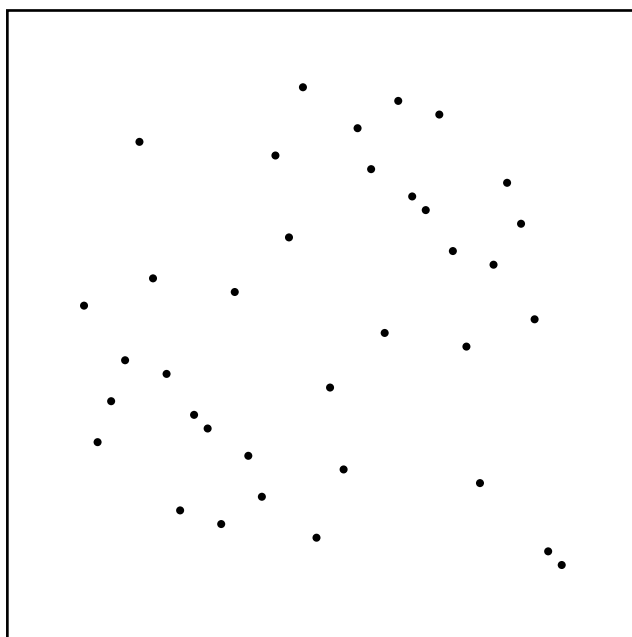
Any further intelligence concerning the machine will be recorded in the boats' log.

Harry

This photo of the reflector is very clear.



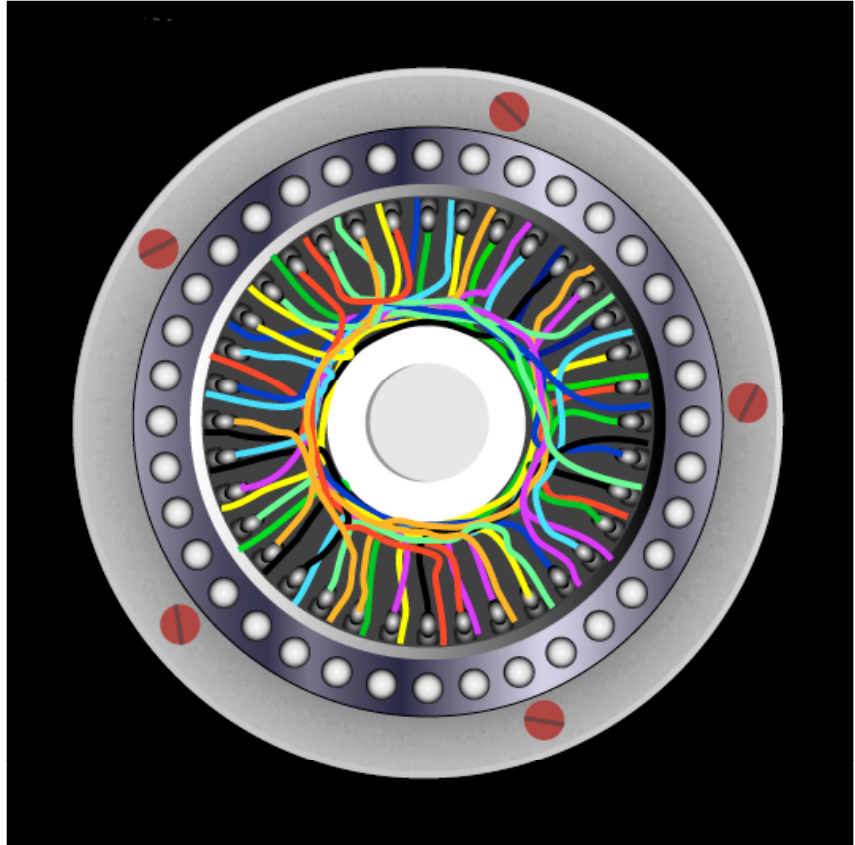
This is a photo of the punch-card used in place of the plugboard on a classical Enigma machine.



Осматриваете с другой стороны!

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This photo of the first rotor is pretty clear. It is hard to disentangle the wiring maze, but the colour coding helps and cuts down the possibilities. I will examine it closely and try to write up the connections as I uncover them.



This photo of the second rotor suffers badly from lens flare. We'll try and get specialists to clean it up, but it gives us something to be going on with.

