

Kriegsmarine

M4-UKW = B

M4-UKW = C

## **BASIC PROCEDURE**

### Encrypting and Sending a Kriegsmarine 4-rotor Message

Note: The Kriegsmarine 4-rotor Enigma machines (M4) are more complex than the 3-rotor Wehrmacht versions. This procedure takes for granted that you already know the basic Enigma operating steps that are used with the 3-rotor machines and that you are ready to advance to a more challenging level of Enigma activity. We have selected certain Enigma machine settings as examples in this procedure. You will, of course, select your own settings when you send your own messages.

1. Print-out a paper copy of all of these documents:

Inner Settings

Outer Settings

Bigram Tables

2. Using the "Inner Settings" table, scan down the "Date" column and select the correct date for today. For example, let's say that today is the 27<sup>th</sup> day of our month. Note the matching "Key Ind." (Key Indicator): PIZ.
3. The "UKW" column shows "B," which means that we will be using the Kriegsmarine M4-UKW = B reflector machine. If you will be using a key indicator that has a "C" in this column, select the M4-UKW = C reflector machine.
4. Open the cover of the Enigma simulator. Click on the letter "B" located at the left end of the rotor shaft until it shows either "Kriegsmarine M4-UKW = B" or "Kriegsmarine M4-UKW = C", depending on which machine reflector you are using.
5. Remove rotors I, II, and III from the rotor shaft and store them in the box, in order.
6. The "Inner Settings" column on the "Inner Settings" sheet gives you the rotor settings you will use. Click on the Beta or Gamma rotor (depending on which machine reflector you are using) in the box, check the end of the rotor to ensure it shows the letter "A," then install the rotor on the left end of the rotor shaft.
7. Then select the next rotor, set it to the correct letter, and install it next to the Beta or Gamma rotor on the shaft.
8. Working from left to right, set and install the last two rotors onto the shaft. Close the Enigma cover.
9. Click on the Stecker plugboard. You will notice that the plugboard is numbered, not lettered.
10. Using the "Outer Settings" table, scan down the "Key Ind." (Key Indicator) column until you have located the Key Indicator and date of the month you are using. We are using Key Indicator PIZ for our date, the 27<sup>th</sup>.
11. Set the Stecker plugs as indicated. Return to the Enigma top view.
12. The last column on the "Outer Settings" table is labeled, "Basic Start Position." Dial-in the "Basic Start Position" letters into the 4 rotors, in order, from left to right. Our "Basic Start Position" letters are "TCXK."
13. Select a random trigram. Let's use VRM.

14. Add a random letter to the end of this trigram. We will use Q in our example message.

VRM(Q)

15. Using the Enigma keyboard, slowly type-in VRMQ. As each letter is typed, a letter will illuminate on the Enigma light panel. Write-down the four letters as they illuminate, in order. For our practice message, they should read KKZW.

16. Set these four illuminated letters, KKZW, into the four rotors, from left to right.

Note: This next section is the part that elevates the Kriegsmarine 4-rotor Enigma to a higher order of security. It is complicated. Admiral Donitz wanted it that way! Please follow the steps exactly, in sequence, and keep your scratch paper and pen handy. You will need them.

17. Write-down the "Key Ind." from Step 2. Ours was PIZ.

PIZ

18. Add a random letter to the front of this trigram.

(L)PIZ

19. Write-down the random-letter quadgram that you made-up in Step 14.

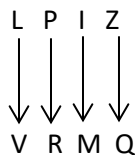
VRM(Q)

20. Write these two new "quadgrams," in order, one on top of the other.

L P I Z

V R M Q

21. Pair-up the letters by drawing short arrows, like this:



22. Now write-out the pairs of letters, like this:

LV =      PR =      IM =      ZQ =

23. Get out your printed-out bigram tables. Read the instructions on how to use them.

24. Using the bigram tables, encrypt the pairs of letters you have just written, like this:

LV = KI      PR = BL      IM = KC      ZQ = LH

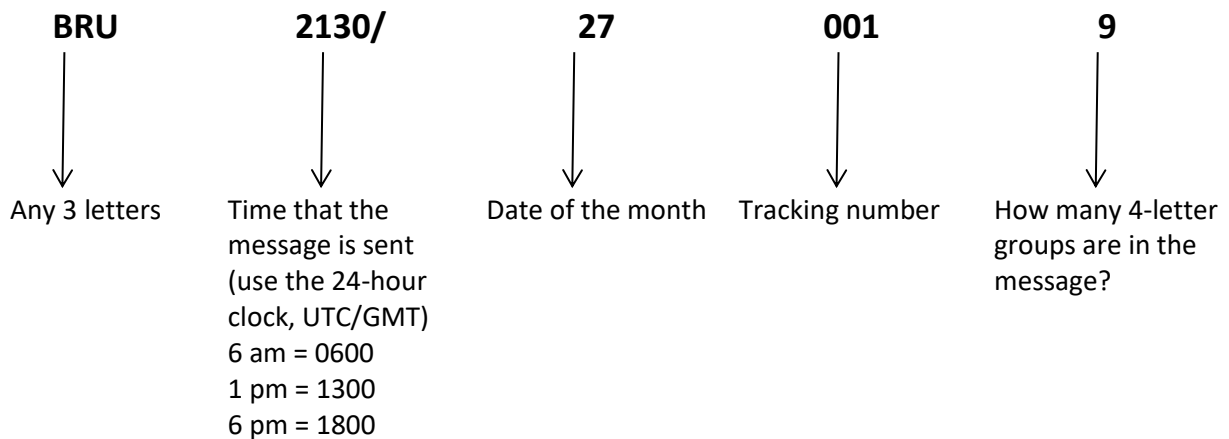
25. Combine the encrypted letters as follows:

KI-----BL      KC-----LH

26. Write-out the new quadgrams (Message Indicators) like this:

KIBL KCLH

27. Go back to your Enigma keyboard. Click on the small metal plate at the bottom of the Enigma that displays, "Show Textbox."
28. The two quadgrams from Steps 14 and 15 will already be in the textbox. Ignore these for now. Type your message on the Enigma keyboard.
29. When you are finished typing your message, hover over the textbox until, "Click here to Copy Output to Clipboard" displays. Click on it.
30. Your encrypted message will appear in a box called "Enigma Smart Clipboard." Highlight, right click, and copy the entire message.
31. Right click and paste the document into a new email message box.
32. Delete the first four letters of the text. This is your quadgram from Step 15.
33. Using the computer keyboard, not the Enigma keyboard, prepare the Kriegsmarine "header" for your message. This header is placed above the beginning of your message on a new email message page.



34. Use the computer keyboard, not the Enigma keyboard, to type-in the two quadgrams (Message Indicators) at the beginning of the message and at the end of the message. Type your message. Our sample message looks like this:

KIBL KCLH BWPU PJZH YGXT SQLO CEPU KIBL KCLH

35. To be truly authentic, your message should be entirely in 4-letter groups. This may require you to go back and do some regrouping, if you choose. If not, the content of the message will remain the same.
36. Send it!