

# Quick Reference Guide for Short Weather Cipher (Wetterkurzsignal)

## Encrypting/Decrypting a Kriegsmarine Short Weather Cipher (WKS) Message

Note: The Kriegsmarine Enigma machines were used by U-boats and converted fishing trawlers to relay weather information from the north and west, the directions from which Germany's weather came, to B.d.U. (U-boat Headquarters). After Feb 1942, weather messages were being sent using version 3 of the WKS. This version was used almost exclusively by U Boats. It was designed for use with the M4 version of the Enigma.

**Note: If you have not already printed off copies of these documents from the webpage, please return to the webpage procedure and do so now.**

The Quick Reference Guide for Short Weather Cipher (Wetterkurzsignal) (This document)  
Kriegsmarine Weather Short Signal cipher machine settings (Schlüsseltafeln M – Wetterkurzsignal)  
Daily Cipher Key for the Enigma  
Short Weather Cipher Tables (A, C, DDD, E, G, K, L, M, PPP, R, T, V, W, and Z)  
Table BB - Sea Area Grid Map  
Table Recording Sheet - (Blank)

Note: Sample values from the tables will be used for an example message preparation. To send an Enigma-encrypted Short Weather Cipher message, you may, of course, choose any table settings or values you wish.

(Note: Using a blank "Table Recording Sheet", encrypt a message following as an example.)

- 1. Find Map, "Table BB - Sea Area Grid Map."** The table gives the identification letters for the weather observation location of the U-boat. For example, if U-boat is at 48° (degrees) 10' (minutes) north latitude, and 8° 15' west longitude, it is located in Weather Quadrat IO. For the example insert the letter 'I' into box #3 and the letter 'O' into box #4 on the Short Weather Cipher "Table Recording Sheet."
- 2. Find Table R, "Change in Wind Direction during the last 3 hours."** The first part of table R's title ("Change in Wind Direction during the last 3 hours") is self-descriptive. The second part of table R's title, "/Anlage (grid unit)," requires clarification.
  - A. Place your finger on the column (up and down) on the Sea Area Grid Map that matches the letter that you wrote-down in box 4 on the Table Recording Sheet. In our example, this is column "O."
  - B. Carefully run your finger down column O until you get to the bottom of the column where the "Anlage" numbers are located. Our example Anlage number is 15.
  - C. Since our example Anlage number is 15, we look at column "15/17" on the "Anlage" table. (You look at the Anlage column corresponding to your Anlage number on the Sea Area Grid Map.)
  - D. Let's say that our example wind was blowing from the north at 2000 hours (8:00 PM), but it is now blowing from the northwest three hours later at 2300 hours (11:00 PM). The direction has moved (rotated) to the left. Using the Anlage chart, the "15/17" column, we see that letter "V" signals a wind shift to the left. E. Write the letter "V" into box #2 on the Table Recording Sheet that you are using for our example message. For your own message, enter the appropriate letter into box 2.
- 3. Find Table PPP, "Barometric Pressure in Two Millibars."** Table PPP reports barometric pressure in two-millibar increments. For example, assume the barometric pressure is 1014.9 mb (millibars). The rule for using the "Barometric Pressure in Two Millibars" chart is: "Round-off barometric pressure to the closest even-numbered whole unit value."

Example: 1014.9 = 1014.0 because 4.9 is closer to 4.0 than it is to 6.0

  - A. Using the barometric pressure numbers on the chart, the example 1014 is found combining the row with 1010 and the column with 4. For the example, 1014, the code is 'HRB'.

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B. In this example, the letters 'H', 'R', and 'B' would be inserted into boxes #5, #6, and #7 on the Table Recording Sheet.

4. **Find Table A, "Barometric Pressure During Last Three Hours."**

A. Find or choose the letter from Table A that represents the recent barometric pressure changes in the area around your location.

B. For the example message, presume that the barometric pressure over the last 3 hours has fallen steadily from 1018.2 millibars (mb) to 1014.9 mb. Choose the letter 'I' from the table since the barometer has fallen quite strongly by 3.3 millibars. Insert this letter into box #8 on the Table Recording Sheet?

5. **Find Table C, "Clouds."** Table C, and its accompanying "Notes" page show standard cloud abbreviations, to report the cloud covering. Find or choose the letter from Table C that is appropriate to represent the cloud covering.

A. For example, assume the observation is "cumulus and depth torn bad weather clouds FCU (fractocumulus) or FST (fractostratus)". The letter 'S' represents these cloud conditions in this example.

B. The observer would then insert the letter 'S' into box #9 on the Table Recording Sheet.

6. **Find Table W, "Sky Covering and Rainfall."** Table W reports the sky covering if there are just clouds or the type of precipitation, if any is falling.

A. For example, the weather observer notes a light drizzle is falling. Referring to the table, a light drizzle falling corresponds to the code letter 'J'. For this example, insert the letter 'J' into box #10 on the Table Recording Sheet.

7. **Find Table Z, "Weather Change During the Last 12 Hours."**

A. This table identifies weather changes or none for the previous 12 hours. For example, a storm that continues from N to E with persistent precipitation would be identified by the code 'Q'.

B. For this example, the code 'Q' should be inserted into box #11 of the Table Recording Sheet.

8. **Find Table V, "Horizontal Visibility and Fog Conditions."** Determine the estimated visibility in nautical miles. Additionally, the observer should further qualify if there is fog, dust or mist as part of the visibility report.

A. For example, you are a member of the watch on our example U-boat, and you observe visibility that has moderate fog, and you can see about ½ sea mile, and the fog has increased over the last hour.

B. Insert the letter 'S' into box #12 on the Table Recording Sheet.

9. **Find Table DDD, "Wind Direction and Strength."**

A. For example the wind is coming from the west southwest and blowing at a force factor of 6.

B. Find "WSW" in the first column (English), which just also happens to correspond with the German abbreviation for west southwest: "WSW."

C. Now, read to the right until you reach column number 6, the wind's force factor. You read the letters 'nrv.'

D. Insert the letters 'NRV' correspondingly into boxes #13, #14, and #15 on the Table Recording Sheet

10. **Find Table K, "Changes of Wind Strength, Swell, and Height of Swell."**

A. At the time of the weather observation, a measurement estimate of swell height and corresponding relative wind is to be reported. For example, the wind has abated and the swell is less than 2 meters.

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B. Derive the appropriate condition from Table K and insert the code value 'I' into box #16 of the Table Recording Sheet.

11. **Find Table L, "Length and Direction of Swell."** Table L asks the observer for the approximate distance from the top of one wave crest to the top of the next wave crest, and the direction these wave crests are moving.
  - A. The observer notes for example that swells are 75 meters apart and coming from the NW.
  - B. Looking at the table the correct value to insert into box #17 of the Table Reporting Sheet is 'W'.
12. **Find Table T, "Air Temperature in Whole Degrees Celsius."**
  - A. A temperature measurement should be obtained by the weather observer. For reporting purposes the observer should round the recorded value up or down to the nearest degree. That is for example  $-17.3^{\circ}\text{C}$  should be rounded down to  $-17^{\circ}\text{C}$ . In like fashion,  $-16.6^{\circ}\text{C}$  should be rounded up to  $-17^{\circ}\text{C}$ . For this example, insert 'U' into box #18 of the Table Recording Sheet.
13. **Find table M, "Difference Between Air and Water Temperature in Degrees Celsius."**
  - A. In this example, the observer is in the Caribbean Sea hunting oil tankers leaving south Texas ports. The air temperature is  $32.2^{\circ}\text{C}$  ( $90^{\circ}\text{F}$ ) and the water temperature is  $29.4^{\circ}\text{C}$  ( $85^{\circ}\text{F}$ ).  $32.2$  minus  $29.4 = 2.8$ , air temperature higher and is = G in the table.
    - B. Insert the letter 'G' into box #19 on the Table Recording Sheet.
14. **Find Table G, "Time of Observation in Complete Hours After DGZ (GMT)."**
  - A. Table G records the time that the weather observation was taken, rounded to the nearest complete hour DGZ (GMT, Greenwich Mean Time). For example, the weather observation is completed at 1828Z.
  - B. Insert the code value 'S' into box #20 of the Table Recording Sheet.
15. **Find Table E, "Ice Conditions."** Table E, "Ice Conditions," is only used if an ice report is specifically requested by a higher reporting authority or if ice is in sight. If ice is **not** a factor, box #21 of the Table Recording Sheet is used as the first letter of the **"UUU Signature of U-boat."**
16. **UUU, "Signature of U-boat"**
  - A. Boxes #21, #22, and #23 are used for the three-letter encoded signature of the U-boat if **no ice is present**. Determine the U boat signature from the Naval Radio Callsign List (Marinefunknamenliste). Otherwise, use boxes #22, #23, and #24 for the three-letter encoded signature of the U-boat if **ice is present**. In this example, say there is small ice floes covering less than  $\frac{1}{4}$  of the sea surface. Insert the code 'D' into box #21. Otherwise, insert the derived U boat trigraph obtained from the Naval Radio Callsign List (Marinefunknamenliste)(this example 'BWC'.

## Encoding and Deciphering the Short Weather Signals

The weather forecast messages and the U Boat signature are to be encrypted/deciphered using the standard daily Cipher Key M – General (Schlüsseltafel M – Allgemein) inner settings (Innere Einstellung) and plugboard (Steckerverbindungen) settings for the day for which the message is prepared. The ground setting (Grundstellung) is to be ignored.

The rotor settings are to be taken from the valid outer machine settings for Weather messages ("Spruchschlüsseltafel für Wetterkurzschlüssel"). This special key sheet is provided to identify the single character Message Key (Sp) indicator and the rotor settings.

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NOTE: It should be noted that U Boat weather messages enciphered this way using the M4 machine (since Feb. 1942) will be incompatible with the weather messages enciphered on the M3 machine and previous versions of the Weather Short Key.

General Encoding/Deciphering Format Example:

Set up the Enigma machine properly with the Key M – General (Schlüsseltafeln M – Allgemein) Inner settings and the plug board (Stecker) configured correctly. Set up an Enigma Cipher machine for the encryption of Short Weather Messages (Wetterkurzsignals).

Using the Cipher Key Table M – Weather Short Signal (Schlüsseltafeln M – Wetterkurzsignal), scan down the Date column and select the correct date. Select the single character from the Sp column for the correct date. This single character is the “Message Key.”

Write the “Message Key” letter in box #1 on the Table Recording Sheet.

Set the rotors of the Enigma machine to the values associated with the Sp message key.

Prepare the Kriegsmarine Short Weather Cipher “header” for the message. This header is placed above the beginning of the message page. Note the header begins with ‘QQ’. An example is shown below.

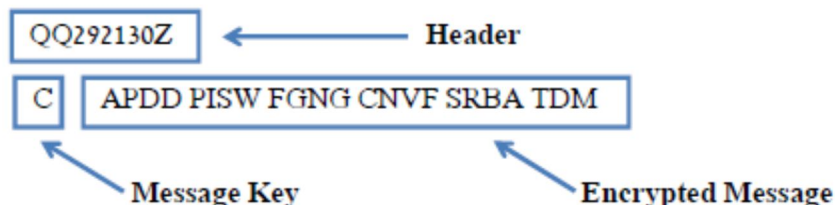
## Sample Header

QQ292130Z

(QQ = weather report, 29 = date, 2130 = time report sent, Z = using Greenwich Mean Time)

Write the Sp (Message Key) letter, found in box #1 on your Table Recording Sheet, in-the-clear (not encrypted), as the first letter in the message. Note: **If you do not type the Message Key letter in-the-clear as the first letter in your message, the receiver of the message will be unable to determine the start positions of the rotors and be unable to read the message.**

Encrypt each letter in each box of the Book Groups column except box #1. As each lamp lights for each letter pressed write down the encrypted result. The following shows an example of a ready to transmit Short Weather Signal message.



Deciphering is essentially the reverse. Verify that this is a weather message by noting the ‘QQ’ in the header. Look up the first character of the message (the Sp) with the Cipher Key Table M – Weather Short Signal (Schlüsseltafeln M – Wetterkurzsignal), for the date specified in the header. Set up the Enigma using the Key M – General (Schlüsseltafeln M – Allgemein) Inner settings and the plug board (Stecker). Then set the rotors to those related to the single character ‘Sp’ message key. Take a blank Table Recording Sheet, and starting with box #2, record the lighted letters as each key is pressed on the Enigma (ex. the letter ‘A’ in the above). The last 3 characters will be the U Boat signature and can be looked up in the Naval Radio Callsign List. When all characters have been deciphered, review the resulting weather forecast data.