
# THE CW MACHINE MARK II

EVERYTHING ELSE IS JUST A KEYER

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# Introduction

## Welcome

Thank you so much for purchasing the CW Machine Mark II ! It is a small computer with two main goals in mind:

- To let you run the perfect CW QSO with minimal effort
- To create a log of all your activities even for other modes like SSB, FM, AM, or digital modes

The Mark II builds on the experience which we have gained with our famous CW Machine which was released in March 2008. Now as then we have packaged state-of-the-art components into a compact device. But technology has progressed rapidly since 2008, and so have the technical specs of this new device:

- It measures about 4.5“ x 3.5“ x 1“ - about as much (or as little) as the original CW Machine
- It uses an 800x480 pixel color touch screen to control the device and to show the text that is being sent. **To pre-empt possible questions: like the original CW Machine, the Mark II is not a CW reader. It shows the text that you are sending, not what you are receiving.**
- It uses context-sensitive help screens, which pop up automatically and show you options which apply to the current state.
- It has a fast dual-core 32-bit processor with plenty of memory which allowed us to program the device in C++ without sacrificing performance (the original CW Machine was programmed in Assembler)
- It has solid-state storage for more than 100,000 QSOs. These QSOs can be exported to a Micro SD card in .adi or .adx format for exchange with logging programs or sites like LotW.
- It needs a computer connection only to update the firmware. Therefore, it is not dependent on a PC or a particular operating system.
- It lets you use any type of key or paddle or a USB keyboard to send text. Sending with the keyboard and the keys can be switched seamlessly in the same QSO. The CW Machine has two connectors for keys which are wired in parallel.
- The speed range is from 5wpm to 80wpm. It was calibrated to be within 1% of the display value throughout the range.

The CW Machine comes with a USB numeric keypad, but you may want to get a full **USB keyboard (US layout)** with a numeric keypad and arrow navigation keys..

We are hoping that you will enjoy this device as much as we did when developing it!

Ulrich, N2DE and John, WK2T

# A Look at the Hardware

## Connectors

tbd

## Connecting the CW Machine to your Radio

The CW Machine is a device which closes and opens a single contact at the **TX** output, i.e., it behaves just like a straight key connected to your radio. If your radio has configuration options or separate inputs for paddles and straight keys, just **connect the CW Machine like you would connect a straight key**. It can key positive voltages, like with all modern radios, or negative voltages, like with tube radios which use grid-block keying. The maximum voltage it can handle is 180V, so it should work with all but the most exotic radios.

## On the Air / Off the Air

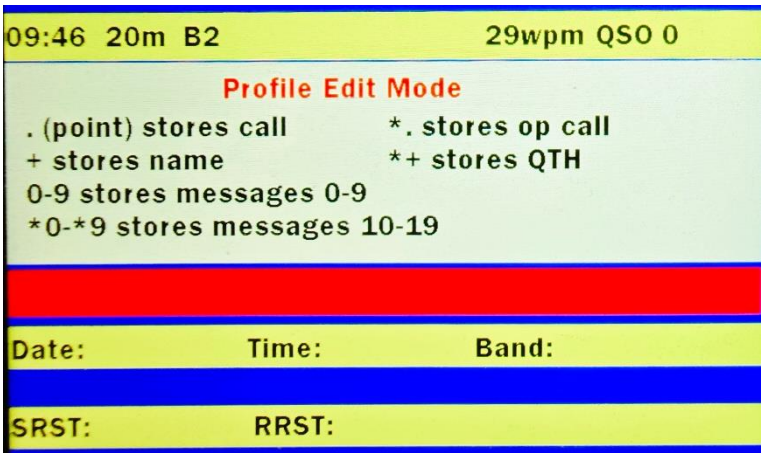
The CW Machine has two states which are indicated by the **red/green LED** on the device. "**On the Air**", indicated by a **red** LED, means that the CW Machine keys the radio that it is connected to and **creates no sound** because the radio would create a side-tone. "**Off the Air**", indicated by a **green** LED, means that the CW Machine does not key the radio. Since there is no side-tone from the radio, the CW Machine **creates the sound**.

In many situations the CW Machine will toggle on the air / off the air automatically. If you send your call with the . (point) key of the keypad, as explained later, the CW Machine will go on the air, However, if you want to, e.g., edit a logbook entry, the CW Machine will go off the air. You can toggle between on the air and off the air **explicitly** with the **NumLock** key of the numeric keypad, or with the **Shift-O** command of the keyboard, both explained later.

# Getting Started

When you start the CW Machine, you will see the blue ***Splash*** screen:


If this is the first time you power on the device, you will see a help screen. You are seeing an approach that we have used throughout this device: in many situations a context-sensitive help screen will pop up automatically which gives you some hints about possible actions in that particular situation.



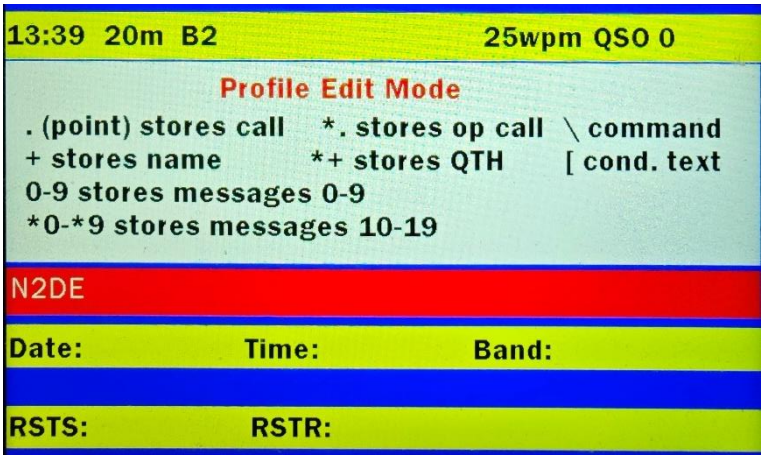

This is the ***Profile Editor*** screen, and we will revisit it several times in this document. The CW Machine needs at least your call sign for proper operation. But there are many other elements which make up a ***user profile***, as discussed in the next chapter.

## Correcting a Typing or Keying Mistake

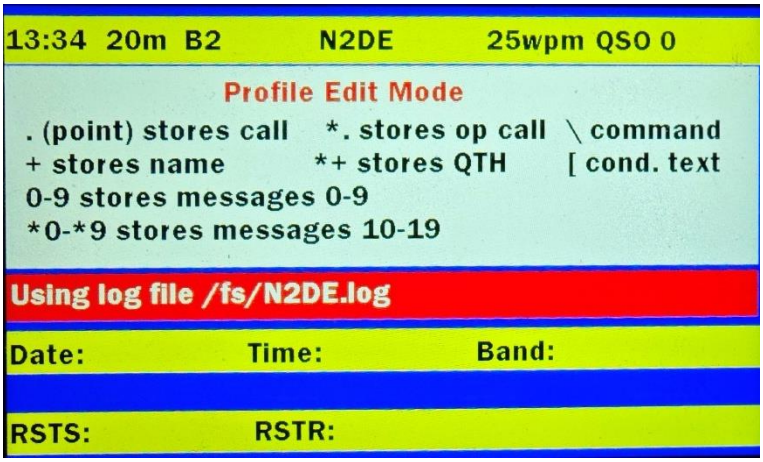
When you are filling in information for a user profile or editing a log record or a comment, you can use your key or a keyboard. If you are human, you may occasionally make a mistake. With a keyboard you can erase the **last letter with the backspace key**. The corresponding action for a key is the **error signal (8 or more dits).**

## Creating a Basic User Profile

The CW Machine supports 2 **user profiles**. A user profile is a collection of data elements which are associated with a user, and you can switch between user profiles with the **/** key on the keypad or by touching the user call sign in the top row of the main screen. (but so far we obviously have not established a call sign that can be shown in the top row). Enter the **station call sign** using either a keyboard or your key – it will be shown in the red row of the screen.




Then press the **.** (point) key on the keypad. The call sign will now appear at the center of the top row, the name of the **log file** that will be created for this user is shown in the red row, and we are back on the ***Profile Editor*** screen. If this is a shared call sign, e.g., for a special event station, you may want to enter your own **operator call sign** which will be shown in the log data that the CW Machine creates: just enter that call sign as before into the red row and press the ***** (asterisk) key on the keypad followed by the **.** (point). **The call signs can have a maximum of 12 characters.**




**The asterisk key on the keypad plays an important role in the operation of the CW Machine. It works similar to a shift key or a Ctrl key on a keyboard: it modifies the function of the next key or action.**

After you have entered your call, the minimum required for a profile, you could switch to the other user profile with the **/** key on the keypad, and fill that profile.

Now let's enter your **name** and your **QTH**. Like before, enter it with your key or keyboard, then press the **+** (plus) key on the keypad for the name, or ***** followed by **+** for the QTH. **Although they are not required, you should enter your name and QTH now because we'll use them in later tests.**

**The name and QTH can have more than one word (e.g. JEAN PAUL or LOS ANGELES), but the name cannot exceed 12 characters, and the QTH is limited to 15 characters.**

Much more data is automatically part of your profile, like the Morse speed, the pitch and volume of the tone that the CW Machine creates, the typing mode, etc. The 20 smart messages that a user can send at the press of a key on the keypad are also part of the profile. We'll discuss that later on. For now, let's exit the profile editor by pressing the **NumLock** key on the keypad, which brings us back to the main screen. **There is a simple function that shows you if your call has been properly stored: press the . (point) key on the keypad, and the CW Machine will send your call sign. This is a handy function if you are trying to enter a pile up …** You can also see that the text (the call sign) that was sent appears in the large blue ***Sent Text*** field on the screen. Use your key to send some more text which will also be shown – you see that I added „IS MY CALL".


As you saw, the point key has different functions, depending on the context. This is true for all keys on the keypad, which gives you great versatility with a few keys, but also a learning curve. Also, you often can accomplish the same function in different ways, and it is important that you „play around" (off the air 😉) with the CW Machine to discover what is most natural and convenient for you.

When you press the point key on the keypad to send your call, the CW Machine will automatically go "on the air", i.e., key the transmitter. So, it is good to not have the CW Machine connected to your radio at this time.

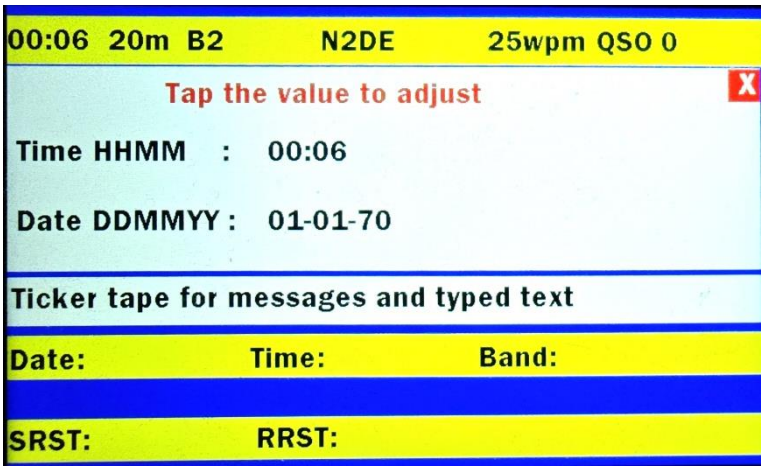
## Basic Settings

In the top row of the main screen, you have touch points for various settings. When you touch them, an adjustment panel will open for the corresponding parameter. While that adjustment panel is open, only the touch points for that panel are active – you cannot, e.g., change to another setting from the top row before you have closed the adjustment panel. These settings are required to create correct logbook entries.

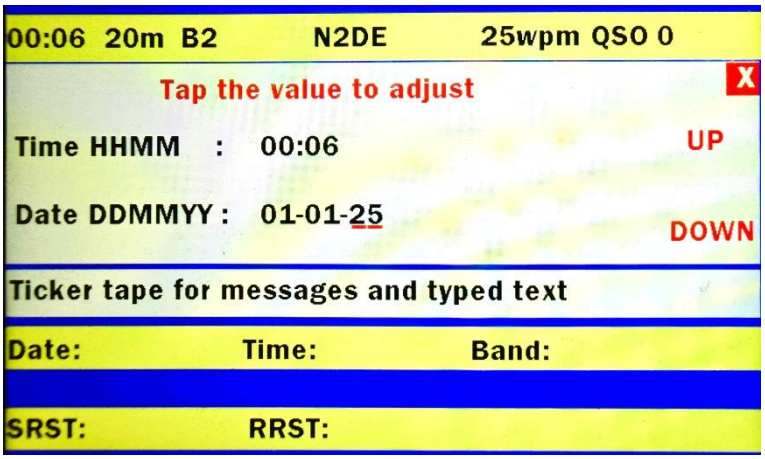
## Date and Time Adjustment

In the upper left corner of the display, you see an hour:minute clock. It is used to create the date/time stamps for a QSO, so, it would usually be set to UTC (GMT) time. Since the clock has a backup battery, you normally won't have to do this frequently.

When you touch the clock, the date/time adjustment panel will open. If you open it for the first time, it will be set to January 1st 1970, the beginning of the UNIX time epoch. Internally the clock counts the number of seconds since mid-night oft that date - I am writing this at second 1,765,362,410.



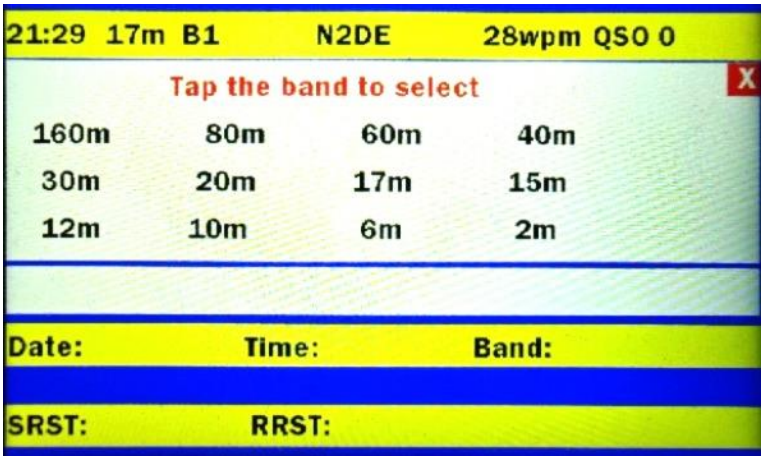

Touch the value that you want to change, say the year. When you do that, a red underline appears under the year, and on the right side of the adjustment panel you see UP / DOWN touch points. Using UP / DOWN you can adjust the value. (Just a hint: when you keep our finger on UP or DOWN, the corresponding value will keep changing – you don't have to use single taps.) In this case I selected the year and set the value to 25 (=2025): [on the next page …]




When you have entered the complete current UTC date and time, just touch the X in the upper right corner of the adjustment panel, which returns you to the main screen with a clock that is now set correctly and will show the time in the upper left corner of the screen.

## Band Selection

Next to the clock in the top row is the band. Just touch it to open the band selection screen. Touch the band that you want to select, and make sure it appears in the top row of the screen right next to the time. I have selected 17m in this case. During actual operation there are also faster ways to change the band with your key or the keyboard without going to a menu item. Like with the time adjustment panel, just touch the X in the upper right corner of the selection panel, which returns you to the main screen.



## Keying Mode Selection

The final information for a basic setup is the keying mode. The touch point for the keying mode selection screen is next to the band in the top row. Like with the band, just touch the mode, and it will appear in the top row of the screen next to the band. In this case I have selected my personal favorite mode, Iambic B1. We will discuss the various iambic modes later on.

The **MK** **Manual Key** is used for all keys with a single pole: Straight keys, Cootie (side swiper) keys, and mechanical bugs.

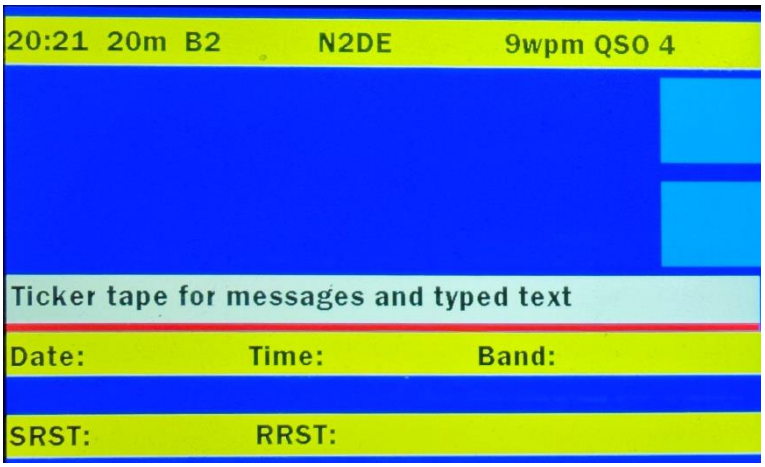

If you look closely, you see a “keying mode” **SSB / FM**. The CW Machine is designed to let you create **log book entries for all operational modes**. If you select SSB/FM for bands up to 6m, it will be shown as SSB in the log book. On 2m it would be shown as FM. Actually, the CW Machine can create log book entries for any mode you like, including all digital modes, as we’ll see later in this document when we talk about the logging functions.

Again, just touch the X in the upper right corner of the selection panel to get back to the main screen.

## Keyer Speed

Since this is a keyer, you obviously want to adjust the speed. It is shown in the top row of the screen – in the previous screen shot it was set to 27wpm, in the next to 9wpm. The range of the CW Machine is 5wpm to 80wom. The speed was calibrated to be within 1% of the display value using the PARIS standard word. There are two ways to adjust the speed:

- Press the plus and minus keys on your keypad to increase/decrease the speed. This works **only if you are not in a QSO** – the plus/minus keys have different functions in that context.
- Always available are two hidden touch points on the screen, which I have highlighted in light-blue here. If you leave your finger on the touch point, the speed will keep going up/down:

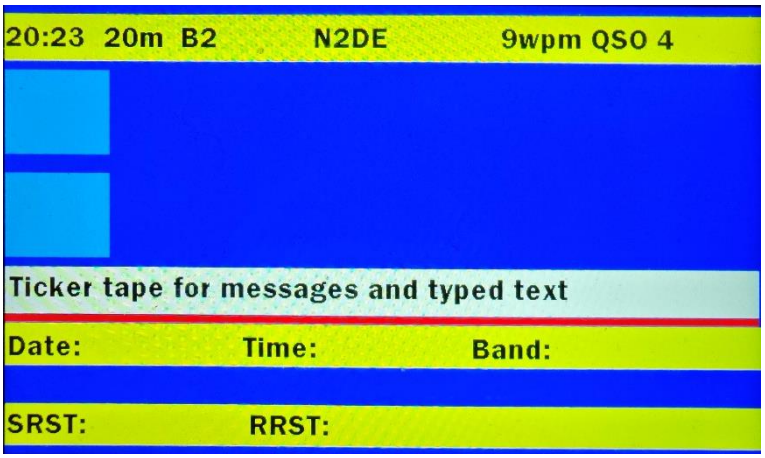



## Display Brightness

The backlight adjustment uses the same touch points as the speed adjustment above. However, you have to press the * (asterisk) on the keypad first. Like with the volume, just leave your finger on the touch point, and the brightness will go up/down in discrete steps **Press the * key again to disable backlight adjustment!**

## Audio Volume

Similar to the speed adjustment, there are two hidden touch points which let you adjust the audio volume up or down in 10 discrete steps:




Activate your paddle (one or both sides), listen to the audio, and adjust the volume up or down with the touch points. If you leave your finger on a touch point, the volume will keep changing.

## Audio Pitch (Frequency)

The pitch adjustment uses the same touch points as the volume adjustment above. However, you have to press the * (asterisk) on the keypad first. Like with the volume, activate your paddle, and adjust the pitch up or down. **Press the * key again to disable pitch adjustment!**

The frequency can be adjusted in 12 discrete steps. To please your ears and you music lovers, we have chosen well-tempered tones, and the range is from F4 (349Hz) to C6 (1047Hz, white keys only).

You saw another example here how pressing the * (asterisk) key changed the following action – the touching of the touch point. Actually the * key modified its own action, too: the second press disabled the pitch adjustment function!

# Using a Key

The CW Machine supports single-pole (straight) keys and 2-pole keys (paddles). The distinction is whether your key closes and opens a single contact, or if it has two distinct contacts. A mechanical bug or a side-swiper are just special types of single-pole keys, and on your radio you would connect them like a straight key. (**Remember that, for your radio, the CW Machine acts as a single pole device like a straight key.**)

The most common type of key today are dual-lever paddles. They allow high speeds with minimal finger movement and hand fatigue, but they require an electronic keyer. Straight keys and bugs are still used very much although their design is more than 100 years old and they require distinct manual skills.

## National Language and Special Characters

National Language Characters can only be created with a key. (remember, **your keyboard has to have a US layout!**).. They are **strings of dits and dahs** which are unfamiliar to many people outside the particular region. The **CH (4 dahs)** is the international shortcut for sending CH. The error signal of 6 or more dits erases the last character on the screen. Here is the list of national language and special characters supported by the CW Machine, and their Morse equivalent:

| | | | | | |
|---|---|---|---|---|---|
| **Ä = .-.-** | **Æ = .-.-** | **À = .--.-** | **Å = .--.-** | **Ö = ---.** | **Ø = ---.** |
| **Ü = ..--** | **Ñ = --.--** | **Ç = -.-..** | **È = .-..-** | **É = ..-..** | **Đ = ..--.** |
| **Þ = .--…** | **CH = ----** | **Backspace = …… (8 or more dits)** | | | |

You can see that the encodings in the first row are not unique. A German **Ä has the same code as a Scandinavian Æ.** The CW Machine offers you a choice of the representation when you create your profile. When you are in profile edit mode (remember: Enter-NumLock gets you there) and you send ---. (DAH-DAH-DAH-DIT), the display will initially show **Ö** in the red line. When you send ---. again, **but preceded by an * asterisk on the keypad, it will show Ø** and beep**. Whatever you send last will be your setting: either the Nordic characters Æ, Å, Ø, or the German/French characters Ä, À, Ö.** You can toggle between the two sets in profile edit mode with a preceding asterisk. There are more national characters, but since the display of the CW Machine cannot render them properly, I have decided to leave them out. If you come across a speed wizard on the bands, just throw in a couple of Islandic Thorn characters and German Umlauts, and they will slow down 😉

# Keying Modes

## Iambic Modes

Iambic keying is often referred to as “squeeze” keying. You need a paddle with two contacts, one for dits and one for dahs. A single-lever paddle is in that category, although it cannot be used for squeeze keying. The special feature of squeeze keying is that, if you close both contacts (press both paddles) simultaneously, the electronic keyer will produce an alternating sequence of dits and dahs.

The CW Machine supports 4 iambic modes called A, B1, B2, and B3 with distinct behavior that we’ll discuss here. Let’s start with the B modes which were originally introduced with the Curtis keyer chip, developed by Jack Curtis, K6KU,SK, in 1973. In the CW Machine, B2 mode is similar to the action of a Curtis 8044 chip. The iambic modes are distinguished by their behavior when you squeeze two paddles simultaneously. The best way to describe this is using the letter K (dah-dit-dah) as an example. You produce a K by pressing and holding the dah paddle, and a split-second later tapping the dit paddle. As described above, an electronic keyer like the CW Machine, will produce an alternating string of dahs and dits when both paddles are pressed simultaneously – but for a K we want to insert just one dit between the two dahs. So, the question is, when do we have to release the dit paddle to **not** get another (trailing) dit after the second dah. That is where the iambic modes differ. Set your speed to 5wpm to try this out.

In the original (Curtis) **B2 mode**, if you release the dit paddle before the middle of the second dah, no trailing dit will be produced. So, you can leave your finger a little longer on the dit paddle even after the second dah has started.

In (AccuKeyer) **B1 mode**, you have to release the dit paddle before the second dah starts, otherwise you’ll get a trailing dit. This is the fastest mode for your finger movements, but it requires more careful timing than B2 mode. You would produce a K by pressing and holding the dah paddle, and as soon as the first dah has started, you briefly tap the dit paddle. The keyer memorizes the dit and inserts it between the two dahs.

In **B3 mode**, which is specific to the CW Machine and not an “official” designation, you can leave your finger even a little longer on the dit paddle. If you release it before 2/3 of the second dah, no trailing dit will be produced.

Finally, in **A mode**, you will not get a trailing dit as long as you release the dit paddle before the second dah is over. In other words, if you want to produce a C (dah-dit-dah-dit) you have to leave your finger on the dit paddle until the second dah is over.

## Ultimatic

Ultimatic mode, historically, was introduced before the iambic modes. It is very economical in terms of finger movements, for many letters requiring fewer than the iambic modes, but for letters with alternating dit-dah sequences it requires more. It is not frequently used these days – undeservedly so, I think. Unlike with the iambic modes, you cannot easily produce alternating dit-dah sequences. If you squeeze the paddles, the paddle that you touched last will remain active until you release it. For the letter K that we discussed above, the finger movements are identical to the iambic modes. But if you want to produce an X (dah-dit-dit-dah) things become simpler than with iambic: you press and hold the dah paddle, during the first dah you press and hold the dit paddle until it has produced two dits, then the dah paddle, that you have still held, produces the final dah. In other words, letters like X or P or <bt> (=) are produced with a single squeeze movement, while the iambic modes require

three finger movements.  On the other hand, a letter like C, which requires a single squeeze movement in iambic modes, requires three finger movements in Ultimatic (press and hold dah, tap dit, wait for the second dah, release the dah paddle, tap dit again)  Try Ultimatic, you may like it, although the finger movements differ significantly from iambic A/B keying.

## Bug Emulation

In Bug Emulation mode the CW Machine produces dits and dahs similar to a mechanical bug:  the dits are timed electronically, and you create a string of dits by pressing and holding the dit paddle.  The dahs, however, have to be timed manually.  If you press and hold the dah paddle, you will get a constant tone as long as you hold it.  To produce two dahs, you have to release the dah paddle and press it again.  **If you press the dah paddle for significantly less than the duration of a dah at the speed that you set, it will be interpreted as a dit.**

## Manual (Straight) Keys

In this category we have all single-pole keys: straight keys, side-swipers, and mechanical bugs. The timing of the dahs and dits is entirely up to you (or to the mechanical pendulum of a bug).  To let the CW Machine decode your transmission, you have to set it to the approximate speed that you are sending at.  This does not have to be absolutely precise – if you are an experienced operator, you might  want to start with a speed setting of 15wpm, which gives you a fair decoding range above and below 15wpm.  Just try out what works best for you.

# The Keypad Cheat Sheet

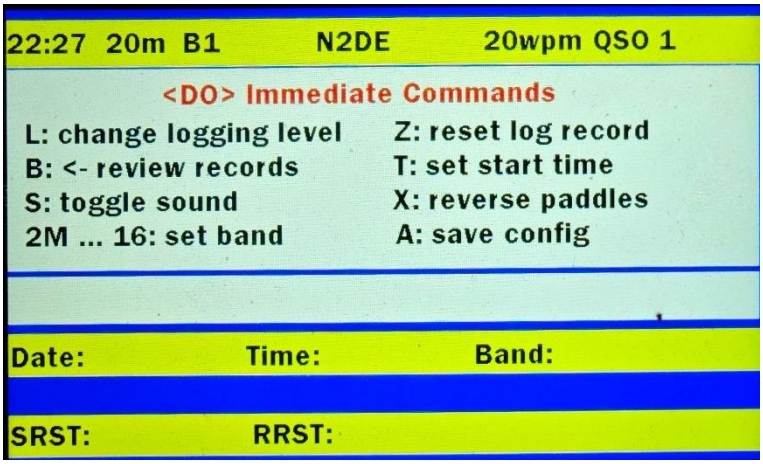
The keypad is essential for the operation of the CW Machine, and it is included with the device. If you connect a keyboard, make sure that it has a separate numerical keypad. If you are using a key as your input device, **place the keypad close to your "other" hand**, so that you can press the keys while you are sending with a key.

The keypad has literally dozens of functions, using combinations of keys. They will be mentioned throughout the text. I will list them all here, although the purpose of most commands will only become clear as you learn more about the CW Machine. You can print this out and keep it as a "cheat sheet" while you are exploring the CW Machine.

TBD

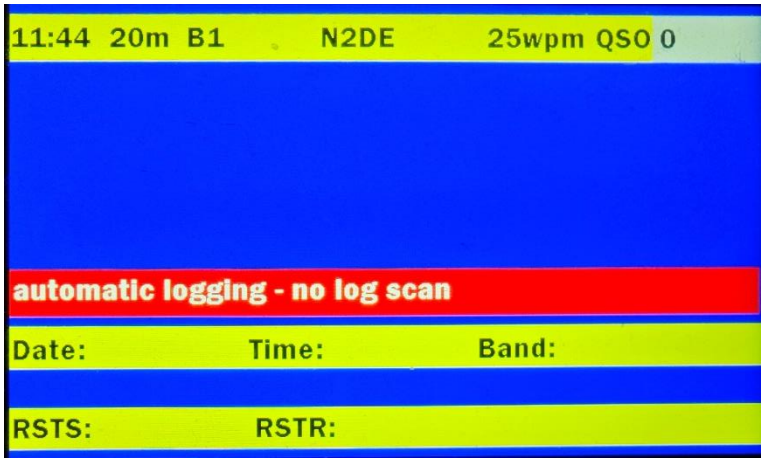
# Using Key <do> Commands

Key commands are issued with your key and are executed immediately. They **are started by sending the pseudo prosign <do> (-..---) with your key, followed by a command letter.** As soon as you send <do>, you will get a list of commands which are available in the current context. (The <do> D command to delete a record, e.g., is not shown if we are not displaying a record in the log.) The use of some of these commands will become clearer when we talk about the logging functions. **Not all of these commands will be available all the time – the list changes with the context:**




## <do> L

Log records can be created automatically, using the parser of the CW Machine, or they can be created manually using keypad keys. Also, the function to scan the log for a previous QSO with a station, may be turned on or off. With <do> L you can cycle through these combinations, and they will be indicated by a color background for the QSO counter in the upper right corner of the screen. We'll discuss this in more detail in the logging section.



## <do> Z

This clears all fields in a (partially) filled log record. You use this function if you don't want to save the information that you may already have entered, e.g., because the contact was lost before the QSO ended.

## <do> B

This lets you back in your log, one record at a time . You can review an existing log record, delete it, or make changes. This will be explained in more detail in the logging section.

## <do> S

The sound of the CW Machine is normally off when you key your radio because the radio will create the audio. However, when you are testing messages, and the CW Machine is not connected to the radio, you may want to **hear the tone even when the CW Machine goes into "on the air" status, as indicated by the red/green LED on the device**. This command lets you toggle this function.

## <do> T

If you are chasing a rare station, you may already have prepared the whole log record with call, name, QTH, etc. (more about that in the logging section), before you ever had a chance to actually get a confirmed contact. When you finally get through the pile up and get a confirmation, the log record would contain the start date/time when you created it, which would be incorrect. This function lets you set the start time to the current moment. The function is identical to the **\T** message command, and the **Shift-T** keyboard command, both explained later, and the *** (asterisk) . (dot)** combination of the keypad. You can use whatever is most convenient for you.

## <do> X

The standard wiring scheme of the CW Machine assumes that you have wired the **dot contact to the tip** of the stereo connector, or, if you are using a straight key, that the **hot wire is connected to the tip**. If your key wiring is reversed, the <do> X commend toggles the function of tip and sleeve of the stereo connector:

## <do> A

We saw earlier that the CW Machines has user profiles which store user preferences, e.g., the keying mode, and user messages. There is also a keyer profile which stores technical parameters, e.g., the display brightness. These profiles change when you adjust the CW Machine, but they are not always stored automatically in non-volatile memory. The <do> A command does just that, **it stores all profiles in non-volatile memory, so that the same profile is in effect when you restart the CW Machine after a power down.** If you want to make sure that settings of the CW Machine are retained after a power-down, just use the <do> A commend.

## <do> 2M…16

The logger needs to know the band which you are using to create an accurate log record. We have seen earlier that there is a band selection panel on the screen to choose a band, but there is also the <do> command which lets you change the band without touching the screen. **If you use the <do> prefix with a 2-character specifier, you can change the band using your key.** The specifier for most bands is just the band designation, like 80, or 20, or 17. **A 0 can be abbreviated as a T.** So, **<do> 2T** changes the band to 20 meters. Since the 160m band has three digits, you just send **<do> 16**. The bands with one digit, 6m and 2m, are set by **<do> 2M** and **<do> 6M**, respectively.

## <do> B

This command lets you go back by one record at a time in your log book to make changes or just view it. We'll talk about this in the logging section of this document.

## <do> F

This command is the opposite of <do> B – it lets you go forward in the log. It is only available when you are reviewing log records.

## <do> C

This commend lets you enter or modify a comment in a log record. It is only available when you create a new log record or are reviewing log records. It is equivalent to typing **// (forward slash-forward slash)** on the keyboard.

## <do> D

This command lets you delete or undelete a log record. Log records are never physically deleted and remain visible in the log. However, when you export the log data, deleted records will not be included. Deleted records are also skipped when the CW Machine searches for pre-existing log entries for a station. When a log record is deleted, **the call sign is shown in red, and the first character of the call sign changes to a – (minus) If you use the <do> D command with a deleted record, it will be un-deleted.**

# Using a Keyboard

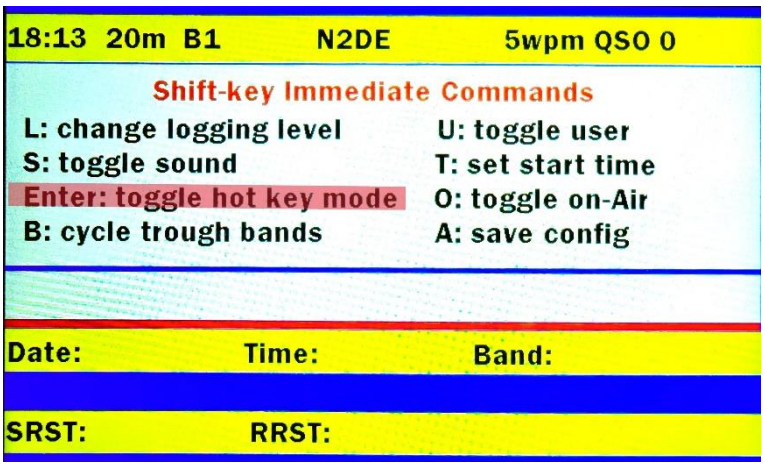
The CW Machine lets you attach a USB keyboard **with a US layout.** It should have a numeric keypad and arrow keys for navigation. A ubiquitous model like this is inexpensive and perfect for our purposes:

You can type far faster than the actual sending speed of the CW Machine, and your key strokes will be buffered for a smooth transmission. **The keyboard will produce only capital letters – you should not press the Shift keys since they are used for other functions of the CW Machine. Use the Backspace key to correct a mistake.**

You can use **message commands** and **prosign substitutions** (described later in this document). You can type, e.g., MY NAME IS \M, and in my case the CW Machine would send MY NAME IS ULRICH. **The keyer command has to be complete when the CW Machine goes to send it**, in other words, in the above example, you cannot type the \ and wait until the actual transmission reaches that point, and then type the M – the result would be just the letter M.,

The CW Machine has two typing modes, called **pre-typing** and **hot key** mode, described below. You can toggle between the two modes by pressing Shift-Enter (both keys simultaneously) on your keyboard. While you are in hot key mode, there is a red line under the white **Keyboard Line**. You also see the context-sensitive help of the CW Machine in action: when you press the shift key, you immediately get an automatic help screen which tells you what the possible actions are at this time:

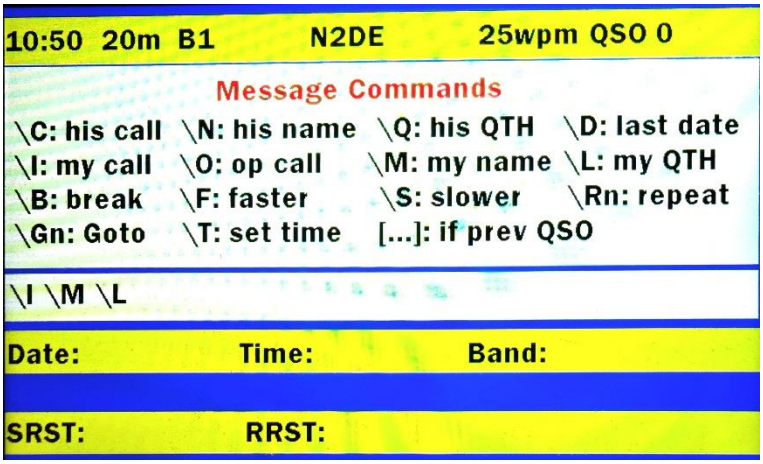
(I have manually highlighted the choice I made to turn on the red line for hot key mode)



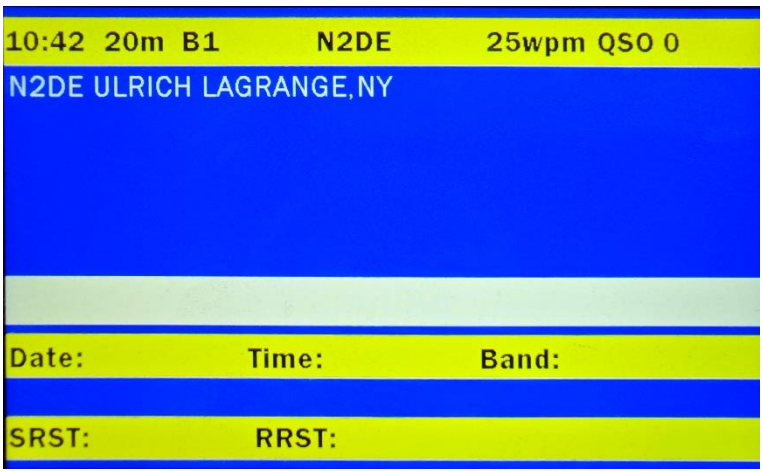
## Pre-Typing Mode

In pre-typing mode text is entered into the **Keyboard Line**. While you are typing, you can make corrections by erasing the last character with the backspace key on your keyboard. When the text is complete, you press **the Enter key on the keyboard (not the numeric keypad!)**, and the text will be sent. While the text is being sent you can keep typing, and that new text will be appended to the text that is being sent. You can follow this in the keyboard line: it scrolls left as each character is sent.

This is also a good way to test messages by inserting message commands (explained later in this document). If you have added your name and QTH when you created the basic profile during the initial setup, enter **\I \M\L** (back slash, not / !) into the keyboard line. As soon as you enter**** you will see the context-sensitive help screen described earlier:



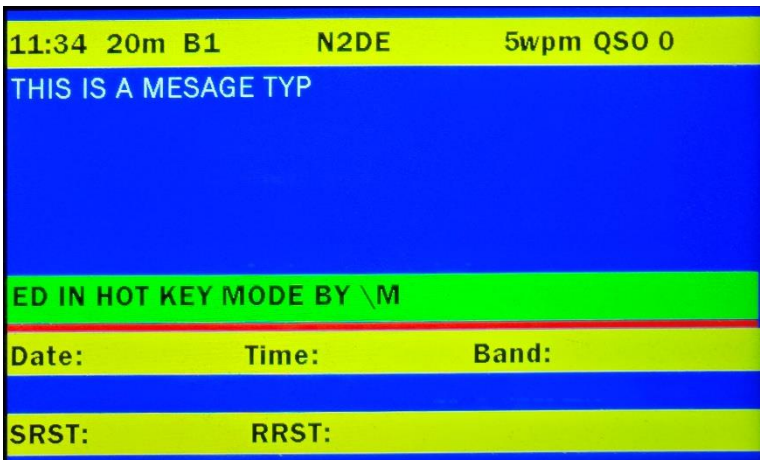

Then press Enter, and the CW Machine will send your call, name, and QTH:




When the complete line has been sent, the CW Machine is back in pre-typing mode. **You can pause and resume a transmission with the Enter key. When you type during a pause, the characters will be sent immediately before you resume the paused message with the Enter key. During the pause the keyboard line will turn light purple.**

## Hot Key Mode

HotKey Mode is for you if you are a much better typist than I am. As soon as you press a key on the keyboard, the CW Machine switches to **active mode** (the keyboard line turns light green) and the character will be sent. You just keep typing, and you can even insert message commands (see above) if your fingers are fast enough. Like in pre-type mode, you can pause and resume a transmission with the Enter key. Characters which you type during the pause will be sent immediately, and then you can resume the paused message with the Enter key. You **toggle between pre-type and hot key mode** with the Shift-Enter key combination. (This is harder to explain than it actually is – just try it out):




(you can see that, in order to keep up with my glacial typing, I went to 5wpm 😉)

## Prosign Substitution Characters

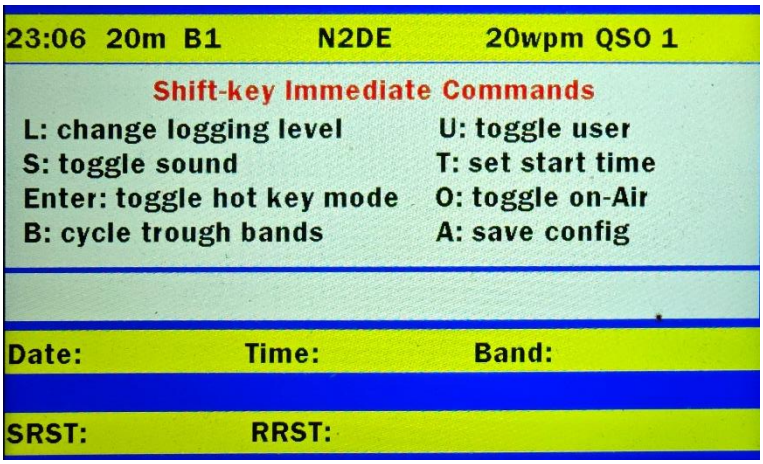
Transmission use many prosigns, i.ie., two characters merged together without an intervening character space. As a notation for prosigns we will use <..> with the two merged characters in lower case in the middle. A typical example is the <sk> prosign that is used to end a QSO. (mnemonic: **s**ilent **k**ey) You have to have some way to properly produce these prosigns with a keyboard, and that's where the substitution characters come in. The substitution character for <ar>, e.g., is +, meaning that, if you type +, the CW Machine will send <ar> Here is the full list:

| | | | |
|---|---|---|---|
| **+ = <ar>** | **# = <sk>** | **& = <as>** | **> = <bk>** |
| **= : <bt>** | **% = <ka>** | **( = <kn>** | **^ = <ve>** |

**The # <sk> has a special function that is important to remember. It stores the log record but not actually sends <sk>, unless no log record is waiting to be stored. To actually send <sk>, you would use ## at the end of a message: the first # silently stores the log record, the second # sees that there is no log record waiting to be stored and sends <sk>**. When you work rare DX stations with short exchanges, it is unusual to actually send <sk>.

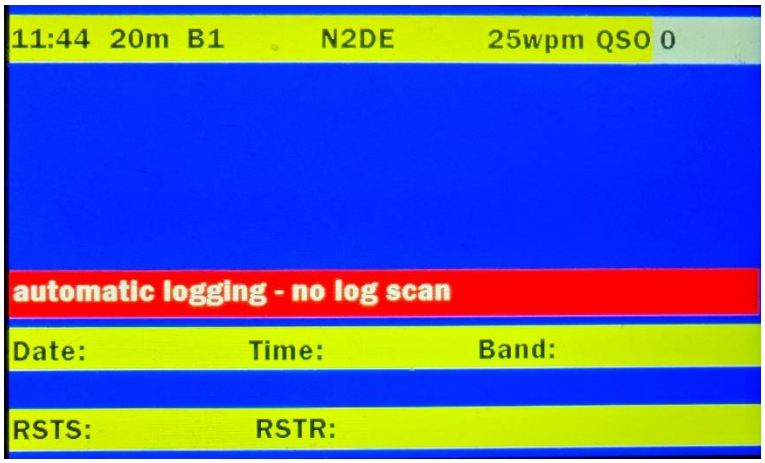
# Using Keyboard Commands

Keyboard commands are issued with your keyboard and are executed immediately, similar to the Key commands explained earlier. .  They are meant for keyboard users, and they are similar to the key commands explained earlier. They **are started by one of the Shift keys on the keyboard, followed by a command letter.** As soon as you press either Shift key, you will get a list of commands which are available in the current context. Like with the <do> commands, not every command will be available in al situations. The use of some of these commands will become clearer when we talk about the logging functions:




## Shift-L

The CW Machine has **4 different logging levels**: automatic logging + log scan, manual logging only, manual logging + log scan, and automatic logging without log scan.  These logging levels are also shown by a color background for the QSO counter in the top row of the screen. We'll discuss this in more detail in the logging section of this document. Here I have chosen automatic logging without log scan: (**The Shift-L keyboard command is, of course, the "twin" of the <do> L key command**, which we looked at earlier)



## Shift-U

Shift-U lets you change the active **user profile**, just like the **/ (forward slash) key** on the keypad.

## Shift-S

Shift-S toggles the **sound** of the CW Machine when it is “on the air”, just like the **<do> S** key command.

## Shift-T

Shift-T sets the start time in the log record, just like the **<do> T** key command or the ***. (asterisk-dot)** key combination on the keypad. This works only if the log record has not yet been stored.

## Shift-Enter

We explained this command earlier: it **toggles between the hot key and pre-type modes** of the keyboard

## Shift-O

Shift-O lefts you **toggle between the on-the-air and off-the-air** states of the CW Machine, similar to the **Numlock key** of the keypad.

## Shift-B

Shift-B is the keyboard way to change bands: if you press it repeatedly, it will **cycle through the bands** of the CW Machine. There is no equivalent to the <do> command which lets you specify the band directly. You can, of course, always use the band selection panel in the top row of the screen.

## Shift-A

Shift-A is the “twin” of the key command <do> A explained earlier to store the active profiles in non-volatile memory.

# Clearing the Screen

As you send with your key, the text is shown in the large blue **Sent Text** box, and it scrolls up as the text box is filled. Text that you type with your keyboard is shown in the **Keyboard Line** below the Sent Text box. The text "migrates" from the Keyboard Line to the Sent Text line as it is being sent. The Keyboard Line can be far longer than the visible part on the screen. When you start a new QSO, as explained later in this document, the screen is cleared automatically. However, you may want to clear it manually, and this can be done in several ways:

- In the center of the blue Text Sent box is an invisible touch point. When you touch it, the text box is cleared.
- The Keyboard line is touch sensitive. When you touch it, it will be cleared. **If a transmission from the keyboard is in progress, it will be stopped.**
- If you are **in a QSO**, press the **– (minus) key on the keypad**: at the **first** press, the keyboard line will be cleared. If a transmission from the keyboard is in progress, it will be stopped. At the **second** press of the minus key, the Text Sent box will be cleared. **Remember: if you are not in a QSO, the minus key will decrease the keyer speed and not clear the screen !**
- If you have started a QSO and a log record has been (partially) filled, the log record can be cleared and the QSO terminated by **pressing * (asterisk) on the keypad followed by – (minus).**

We'll talk again about that last function again in the context of the logger.

# Creating Messages

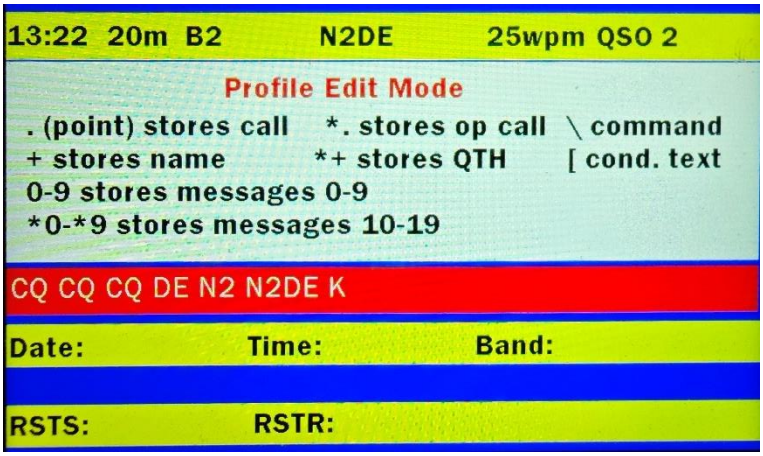
Messages are pre-recorded transmissions which you can start by pressing a key on the keypad. Every user profile has twenty messages: 0 – 19. Messages 0-9 are started by the corresponding 0-9 keys on the keypad. Messages 10-19 are started (you guessed it?) by first pressing the * (asterisk) key on the keypad followed by 0-9.

The messages of most memory keyers are static. The messages of the CW Machine can contain keyer commands which can modify the resulting text. Message number 1, started by the 1 key on the keypad, could, e.g. send a different text when you have a pre-existing QSO with the same station in the log. The combination of inline keyer commands with the logbook can create messages which adapt to the situation.

## Creating and Playing a Simple Message

Messages are attached to a user profile. So, we enter the **Profile Editor**, which we saw at the beginning of this document when we created our profile. You do this by pressing **and holding** the **Enter key** of the keypad and then simultaneously pressing the **NumLock key** of the keypad. The keyboard line will turn red, and you see the general help screen for the **Profile Editor**.

Let's enter something very simple, either with your key or with the keyboard. When you make a mistake you can back off one character at a time with the **Backspace key** of the keyboard or by sending the **error signal with your key, 8 or more dits,** which has the same effect:




Now let's assign that CQ message to the 0 key on the keypad by just pressing that key. The CW Machine will beep, and the message on the red line disappears.

Let's exit the Profile Edit mode by pressing (only!) the **NumLock** key on the keypad. The red edit line will disappear, and we are back in operational mode.

Now let's see if that message works - press the 0 key which we used for that message:


The result is probably what you expected: the message appears in the Keyboard Line, the Keyboard Line turns **green for Active Mode,** the message is sent and appears letter by letter in the **Sent Text** box. This is about as far as many memory keyers go, except that creating and storing the message may be more complicated…

If you press the message key several times, you see that additional copies are tacked to the end of the first one. If you type, that text will also be added to the tail of the message. In a sense, these messages are like a keyboard shortcut. Using your key while the message is running has a different effect as we'll see in the next section.

If you want to **change the message** associated with a key, just assign a different message to the same key. If you want to **delete the message** just assign an empty red line to the message key..

## Interrupting and Restarting Messages

When a message is being sent, either a stored message or something that you typed, you may want to interrupt it. You either may want to cancel it completely, or to just pause it temporarily to send something with your key or keyboard, and then resume the message.

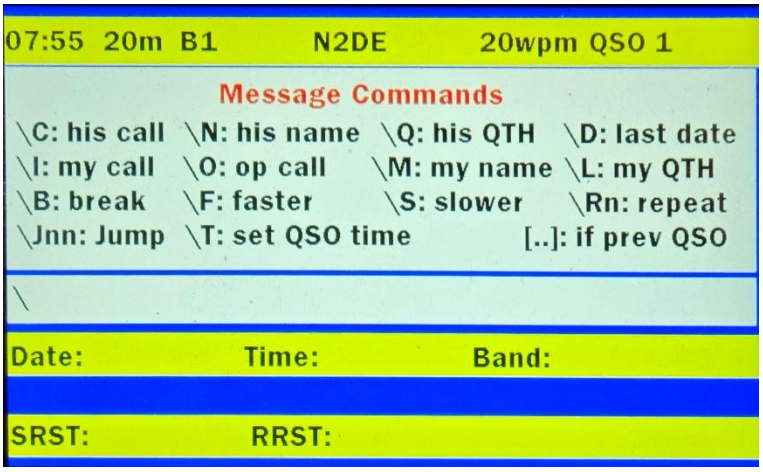
**Stopping** a message with your key is simple: just start sending with your key, and the message will enter **stopped state**, as shown by the light purple background of the keyboard line. You can also press the **.** (dot) on the keypad or the Enter key on the keyboard for the same effect. Finally, further down, I'll explain why you may want to use a **\B (break)** message command to stop a message. To **resume** a stopped message, just press the **.** (dot) or Enter key again, and it will restart at the point of interruption. If you type something on your keyboard during stopped state, it will be sent immediately and not be appended to the end of the message as it would in **active state** (green line) or **ready state** (white line). If you press a message key during stopped state, the stopped message will be cancelled and the new message starts transmission. (= active state, green line)

To completely **cancel** a message, you have various options in addition to starting a new message: you can use the NumLock key on the keypad or the Esc key on the keyboard. You can also touch the keyboard line on the screen, which clears the line and ends the message.

## Using Message Commands

We encountered message commands before, when I suggested you enter **\I \M\L** to send call, name, and QTH from your profile. Message commands are arguably one of the most powerful features of the CW Machine, and it is time well spent if you learn how to use them. Typically, they are used to tailor your stored messages, but they can also be typed in directly. Message commands are a simple programming language which lets you create specific messages "in flight".

You can display all message commands by pressing the **** (back slash) key on your keyboard:




When you enter **messages for your profile using a key,** they obviously contain symbols which do not have an equivalent in Morse code: the backward slash \ and the square brackets […]. You can probably already guess how we produce them: press the * key on your keypad and send a forward slash / **-..-.** with your key to produce a back slash. Press the * key and follow it with the Morse code for open round bracket ( -.--. or close round bracket ) -.--.- to produce [ or ].

Let us analyze a typical message which, I think, you want in your repertoire (usually my message #0):

**CQ CQ CQ DX DE \I \S\I K \R6**

**CQ CQ CQ DX DE** is obvious. We have seen the \I command before: it sends the station call that has been entered into your profile. If the station call changes, say, because someone wants to try your new keyer 😉, the \I inserts the correct call without you having to change the message. There is another \I preceded by \S. The \S will double the character space of the next word, your call, so that it is easier to copy. The \R6 means repeat the message after a break of 6 seconds. During those 6 seconds you can listen to see if someone answers your call. If yes, you just interrupt the message as described above – if you are sending with a key, just start sending. Otherwise, you just let the message go through another cycle.

Let's look at the **Message Commands** one by one, starting with the simpler commands

\I = send my call

We have seen the \I command before. If you insert it into a message, it will be replaced by your call as it is stored in your profile. If your call changes, you won't have to change the message to use the new call.

## \M = send my name

Similar to \I, a \M in a message will be replaced by the name that is stored in your profile.

## \L = send my QTH

\L in a message will be replaced by your QTH as it is stored in your profile.

## \O = send operators call

\O in a message will be replaced by the operator call that is stored in your profile

## \F = speed up 1.5 times for following word

Speed up the following word in a message by 1.5 times. A typical use is for a **\F599** report. **Make sure that you put no space after \F, because that would end the word before it has begun.**

## \S = double character space for following word

Slow down the following word in a message by doubling the character spaces. A typical use is to have \F in front of your name or your call to make sure the other station can copy it, like **\S\I** or **\S\M.** As with \F, make sure that you put no space after \S

## \B = enter stopped state (break)

When the CW Machine encounters a **\B** in a message it will enter **stopped state** (the keyboard line is light purple), and you can resume the message later with the **Enter key of the keyboard or the . (dot) key of the keypad**. A typical use would be a message segment like **… UR RST\B= MY NAME …**

The CW Machine will send **UR RST** and enter stopped state to let you send the report with your key or keyboard, and then resume with **= MY NAME …** if you press the Enter or dot keys.

With \B you can break up a long message into pieces and even abort a message with **Esc or NumLock** during a break to not send the remaining part of it at all.

**The following commands are important in combination with the logger.**

## \C = fetch last word as call or send his call

This command has actually two functions. If you are in a QSO, i.e., the call of the other station has already been recorded (we'll talk about this in the Logging section), the command will send the call of the other station. If you use the command at the beginning of a message, and the call sign of the other station has not yet been recorded, the CW Machine will "look at" the last word that you sent with your key or keyboard. If that word has the pattern of a call sign, it will be recorded as the call sign of the other station. Look at a simple message that everybody should have, in my case typically assigned to the number 4 key: **\C DE \I.**

If you are WK2T and you have called CQ, and I send your call with my key or keyboard **WK2T** and then press the number 4 on the keypad, the transmission would be **WK2T DE N2DE,** but also, your call sign has been recorded by the CW Machine. (the \C has "grabbed" it). From now on I just have to press number 4 to send **WK2T DE N2DE.** If I have not copied your call correctly, and you are really WK2M, I can just send WK2M DE N2DE with my key or keypad in the next round, and the **corrected** call sign is now recorded.

When I **am** a DX station, say 3DA0US in Eswatini, I usually have a message like \C \C DE \I in my arsenal. When I respond to your call in the pile up, I will send your call **WK2M** and press the message key**.** It will "grab" and send your call and immediately repeat it:. **WK2M WK2M DE 3DA0US.** That way you can hear in the pile up that I am really responding to you, and for me it's confirmation that I entered your call correctly.

## \N = send his name or OM if unknown

If the CW Machine has found a previous QSO with the current station in your log book, \N will insert the name of the other operator if it was recorded in the log. If the name was not recorded or if no previous QSO was found, \N will send **OM**. If you don't want to send OM to an unknown station, use the square brackets explained next, like **[\N].**

## [ ] square brackets for conditional text

Message text which is enclosed in square brackets is only sent, if a previous QSO with the current station is already in the log, otherwise the text in square brackets is skipped. This lets you send different messages for operators who you have met before, compared to brand new contacts. The following \Q and \D commands will illustrate this. \N is also often used with square brackets, although it sends a neutral OM if there is no previous log record.

## \Q = send his QTH or UR QTH if unknown

If the CW Machine has found a previous QSO with the current station in your log book, \Q will insert the QTH if it has been recorded, otherwise **UR QTH. I'll give you an example after the \D command.**

## \D = last QSO date (year / month)

If the CW Machine has found a previous QSO with the current station in your log book, \D will insert the date of the last QSO if that QSO is more than a month ago. If the QSO is less than a year ago, \D will be replaced by the (English) **name of the month**, JANUARY, FERUARY, etc. If the QSO is more than a year ago, \D will be replaced by **the 4-digit year**, like 2024.

Let's take a look at a typical snippet of a message:

**TU \N FOR [ANOTHER ]QSO = [OUR LAST QSO WAS IN \D = HOW ARE THINGS IN \Q?]**

If this is a new contact which is not in the log, the message would be:

**TU OM FOR QSO =**

**If don't want to send OM, just use [\N] and the command will be skipped for a new contact.**

However, if this is my old friend Piero from Brescia, who I last talked to in August this year, the message would be:

**TU PIERO FOR ANOTHER QSO = OUR LAST QSO WAS IN AUGUST = HOW ARE THINGS IN BRESCIA?**

As you can see, pressing the same message key in different situations can produce different results.

## \Jnn = conditional jump to message nn

As mentioned before, messages are numbered 0 – 19 and are started by number keys on the keypad 0 – 9, and *0 - *9. If you use a \Jnn in a message (**nn has to have 2 digits!** ) , e.g. **J09, and if the current station is a new contact without a previous entry in the log, the CW Machine will continue at that point with message 9.**

If message 9, e.g., has a description of your station equipment, which your friends already know, you could use it for the new contact, while your known contacts receive some other text. In a sense \Jnn is similar to the square brackets: both leave the normal linear progression of a message if the other station is new in your log: with \Jnn it "jumps" to message nn, with [..] it skips the text in the square brackets. **It is important to note that \Jnn will NOT return to and continue the message which contained the \Jnn command.**

## \T set new start time in log record

If you are chasing a rare station, you may already have prepared the whole log record with call, name, QTH, etc. (more about that in the logging section), before you ever had a chance to actually get a confirmed contact. When you finally get through the pile up and get a confirmation, the log record would contain the start date/time when you created it, which would be incorrect. In such a case you would have a message like: **\I QSL ES TU \T#.** If you are W3ABC, it would send **W3ABC QSL ES TU,** set the start time of the log record to the current time, and store the log record. (# is the prosign for <sk> discussed above, which just stores the record without sending <sk>)

**\T is identical to the <do> T and Shift-T commands explained earlier.**

## Messages Everybody Needs

There is one “message” which every CW Machine has without programming:

- **Pressing the dot key on the numeric keypad in READY mode sends your call sign.**

Another message, usually assigned to key 0 on my CW Machine is a CQ loop with a 5 second break:

- **CQ CQ CQ DE \I \I CQ CQ CQ DE \I K \R5**

It just repeats this message, and when you hear a response, just start sending with your key, or press the **Esc** on your keyboard to cancel the message, and then use your keyboard.

Usually, I have an almost identical message for DX calls, assigned to the *0 key;

- **CQ CQ CQ DX DE \I \S\I CQ CQ CQ DX DE \S\I K \R8**

If you heard a (rare) DX station calling, you can just press the dot key to send your call, or you send his call followed by;

- **\C DE \I \I K**

Here we are using a nice feature of the \C command: if no call sign has been recorded yet, as is the case in our scenario, \C will “grab” the last word you sent, his call, and, if it has **the usual pattern** of a call sign it will start a new log record for that call. From then on, \C will send the call.

The initial response in a QSO is always pretty much always similar the same:

- **\C DE\I = TU FOR [A NEW]QSO \N = UR RST \B= MY NAME IS \M \S\M ES QTH IS \L \S\L = SO HW? \C DE \I (**

With the information presented in this document, you should be able to decipher what this message does. The following exchanges are probably more customized, and this is a handy opener:

- **> DE \I**

Which just sends <bk> DE your_call

# The Logger

The CW Machine has a built-in logging program, which can get the information for a log record from your own transmission or, **"off-the-air",** from your key or keyboard. This makes it possible to use the logger for any mode, not just CW. You could use the logger without the keyer function, just as you could use a keyer without the logger function – but the combination of both is what makes the CW Machine such a versatile device. The CW Machine can store more than 100,000 log records in non-volatile memory, i.e., they are **retained when the CW Machine is powered off**. The log records are stored in files which are created individually for every call sign that has or had a user profile. So, if you have a home QTH and a /P weekend location, they will have different log files. If you lend the CW machine to a friend, and she creates a profile with her call, name, etc., a new log file will be created for her without affecting your log file. When the CW Machine is eventually returned, you just recreate your profile, and your logfile will still be there, ready for new records to be added.

A log record has this layout in C++ notation:

```
char call[13]          // call of the other station
char op[13]            // call of the operator of your station
char via[13]           // QSL via call
uint8_t flags
uint8_t band           // internal number of the band
time_t startTime       // UNIX time stamp
time_t endTime         // UNIX time stamp
char name[13]          // name of the other operator
char qth[16]           // QTH of the other station
short rsts = 599       // report sent
short rstr = 599       // report received
char comment[156]      // general comments and indicator for
                       // transmission modes other than CW, SSB, FM
```

The numbers in square backets, e.g. [13], are important for you, because they show the **maximum length** that a character field can have. One byte is always used for a delimiter, so the actual capacity of a character field is one less than the number in square brackets. This means, e.g., that a call can have a maximum length of 12 characters, or the QTH can have up to 15 characters, and there are 155 bytes available for comments and a possible transmission mode indicator.

This data structure is never directly visible to you. When you export your log, the fields are translated into the corresponding fields in ADIF (.adi or .adx) format, e.g., <CALL:4>N2DE for .adi.

When you start a new QSO, the **scanner** will "look at" **every** record in the log to determine if you had one or more previous QSOs with that station, and what the data for the last QSO was. If it finds one, it will fill the name and the QTH fields of the new log record, and you can reference information from the last QSO in your messages, as was explained further up. Although the scanner can look through 30,000 QSOs in less than one second, you can turn it off when selecting the logging level if you cannot tolerate that delay (**see the L commands explained earlier**) - but, of course, you would not know if there was a previous QSO, and every QSO is treated as a new contact.

The following chapters will explain how you actually get contents into a log record and how to make changes to existing log records.

# The Logging Modes

The two logging modes differ in the way a QSO element, say the name, is detected in your transmission. They are **not mutually exclusive**, i.e., you can use the keypad keys of manual logging mode during automatic logging. A typical example is the detection of a call: the CW Machine uses rules to determine if a word is a valid call, e.g., it cannot end with a number, it cannot have more than two / (forward slash), it must have at least one numeric character, etc. Some special call signs may not be considered valid by the automatic logging function. In my life-long log at least two call signs would have been rejected: RAEM, Ernst Krenkel, and JY1, King Hussein of Jordan. For these rare situations there is a manual key combination that tells the CW Machine to accept a word as a call sign although it does not match the rules.

## Automatic Mode

**Both logging modes "look" at your Morse code and/or the text that you type**. In automatic mode it uses certain keywords which you must include to detect log elements. As mentioned above, **if these keywords are missing, you can still use keypad keys to mark these elements.** Let's go over these keywords with some examples how they are used. (in the following, a "word" is a sequence of characters enclosed by spaces)

### cccc DE your-call

If the CW Machine detects the word **DE followed by your call sign**, in my case DE N2DE, it will analyze the word before DE to find out if it has the pattern of a callsign. (words like TEST or CQ are obviously not call signs.) If the word matches the rules for a call sign, it is considered the call sign of the station you are communicating with. If no QSO is in progress, i.e., no log record has been created yet, a **new log record is created**, and the call is copied into that new record and into the log record section at the bottom of the screen. The current date and time are recorded as the start time. The band and the operating mode (CW, SSB, FM) are taken from the keyer state at the top of the screen. The sent and received reports are set to 599, or to 59 for the voice modes. And, finally, the country for the call sign is determined and shown in the log record area. (The **\C command** in a message would now send the call. ) **You can correct a call sign during a QSO by just sending the same pattern again**. In this example I sent: **7P8US DE N2DE**

At this time also, if the **scanner** is enabled, the CW Machine searches all log records for a pre-existing QSO with that station. If one is found, and the **name** or the **QTH** were recorded, they are both copied to the newly created log record and shown at the bottom of the screen. A possibly existing **comment** is also copied and shown at the center of the screen. If there are several QSOs with that station in the log, the information is taken from the **last QSO** that was found.

The internal state of the CW Machine changes to "**QSO in progress**". **All the following keywords are only searched if a QSO is in progress. A "word" in this context is a group of at least 2 alpha-numeric characters**. **The ? (question mark) character is considered an alphabetic character.**

## DR aaaa

If the CW Machine detects the word **DR, followed by a word that contains only alphabetic characters,** that word is taken as the name of the other operator. In some parts of the world, operators are reluctant to use DR for an unknown station. They would use a keypad key, described later, to tell the CW Machine that the last word they sent is the name. The keypad keys are also used to record **a name that has two words**, like JEAN PIERRE. The complete name, however, cannot have more than 12 characters including the space.

## FROM aaaa

If the CW Machine detects the word **FROM, followed by a word that contains only alphabetic characters,** that word is taken as the QTH of the other operator. The keypad keys are also used to record **a QTH that has two words**, like LOS ANGELES. The complete QTH, however, cannot have more than 15 characters including the space.

## OK VIA cccc

If the CW Machine detects the pattern **OK VIA, , followed by a word that contains only alphabetic characters,** that word is taken as the QSL route, like, MY QSL OK VIA DJ5US.

## UR nnn / FR nnn / ALSO nnn

If the CW Machine detects a "word" which has the pattern of a RST report, i.e., the first character is **1-5 followed by two characters 1-9 or N,** it is considered a potential report. (in SSB/FM it checks only 1-5 + 1-9/N). The CW Machine then looks at the word preceding this group. If that word is **UR** it is considered ther eport for the other station. If that word is **FR,** the group is considered the report that you received. If that word is **ALSO**, the group is considered both, the report you received and the report you are giving.

Lets look at an , admittedly contrived, example that contains all the information for a log record:

**7P8US DE N2DE = FB DR ULRICH ES TU FR 56N FROM ROMA = UR 57N 57N UFB = QSL IS OK VIA DJ5US …**

This creates a complete log record that looks like: (the first part of my message is not shown because the blue sent text box is cleared when a new QSO starts)


**When I eventually send <sk> with my key or # with my keyboard, the time will be recorded as the end time of the QSO, and log record will be stored in my log file.**

## Modifying Elements

During the QSO you may realize, that some of the information you entered is incorrect. Changing the **call, name, QTH, reports, and QSL route** is straight forward: just use the same keyword or keyword pattern with the correct information. DR JOHN, e.g., will overwrite the name that you have in the log record.

You can **change the band** using the Band selection screen, the Shift-B keyboard command, or the <do> key command described above. The band change will affect **only the log record**, not the band setting of the keyer.

To set the **start time** in the log record to "right now", you would use ***. (asterisk-point) on the keypad** or the **Shift-T command** of the keyboard, or **<do> T,** all described above. This, of course, can only be done for a log record which has not yet been stored.

## Deleting Elements

You may realize, that you entered some information into the log record which you actually don't have. Deleting the contents of name, QTH, and QSL route is straight forward: just use the same keyword and a **? (question mark) for the element**. DR ?, e.g., would delete the name, or OK VIA ? would delete the QSL route**. The call and the reports cannot be deleted, only changed**.

# Manual Mode

Every keyword of the automatic mode has an equivalent key or key combination. The keypad also lets you pinpoint **elements which have no equivalent keyword**. **Like with automatic mode, a call sign must first haven entered before the other elements can be recorded.** After you have sent an element, e.g., the call, you use that key combination to tell the CW Machine: "the **last word(s)** I sent is the …"

## Call Sign

After you send the call sign, you press the **Enter** key on the keypad. The last word is checked for a valid call sign pattern, recorded as the call sign, and a QSO is started as described in the Automatic Mode section above. If the last word does not match the normal rules for a call sign, just press ***Enter (asterisk-Enter, one after the other)**, and it will be recorded as the call sign anyway. You can **correct the call sign during an ongoing QSO** by just sending the correct call sign followed by the Enter key.

## Name

After you send the name, which may contain **only alphabetic characters**, press the **+ (plus)** on the keypad to record it. If the name consists of two words, press ***+ (asterisk-plus, one after the other),** and the last two words will be recorded as the name. . **This is the same key combination that is used to record the QTH, and the target field is marked by the name/QTH pointer as described below.**

Before you press the + (plus) on the keypad, make sure that the **red underline name/QTH pointer** on the screen is in the correct position. We are using the + key in a **round-robin** fashion to first record the name, then the QTH. The name/QTH pointer moves automatically between the name and QTH fields, but you can move it manually by pressing ** (asterisk-asterisk).

## QTH

After you send the QTH, which may contain **only alphabetic characters**, press the **+ (plus)** on the keypad to record it. If the QTH consists of two words, press ***+ (asterisk-plus, one after the other),** and the last two words will be recorded as the QTH. **This is the same key combination that is used to record the name, and the target field is marked by the name/QTD pointer as described above.**

## QSL Route (via)

The + (plus) key actually has a third function: if you press it, and the last word that you entered has the pattern of a call sign, it will be recorded as the QSL route (via) call sign.

## Received RST

After you have sent the RST with your key or keypad, press the **/ (forward slash)** on the keypad, and it will be recorded as the received RST in the log record. In voice modes **(SSB, FM)** the report would, of course, have only **two digits for RS**. Usually, with manual logging, you wouldn't repeat your received RST, so this would probably be done off the air.

## Sent RST

After you have sent the RST with your key or keyboard, press the ***/ ( asterisk-forward slash)** on the keypad, and it will be recorded as the **sent RST** in your log record. . In voice modes **(SSB, FM)** the report would, of course, have only **two digits for RS**.

## Modifying Elements

As with automatic mode, changing the **call, name, QTH, and reports** is straight forward: just send the correct information and press same key (combination) that was used to record it. For the name and QTH you have to make sure that the **name/QTH pointer** is in the correct position (see above)

## Deleting Elements

As in automatic mode, deleting the name or QTH is straight forward: just enter a **? (question mark),** make sure that the **name/QTH pointer** is in the correct position, and press the + (plus) key on your keypad. **The call and the reports cannot be deleted, only changed**.

For the **QSL route (via)** we obviously cannot enter a question mark and press the + (plus) key, because that would delete the name. To delete the QSL route, just **enter the same call** that is already in there and press the + (plus) key.

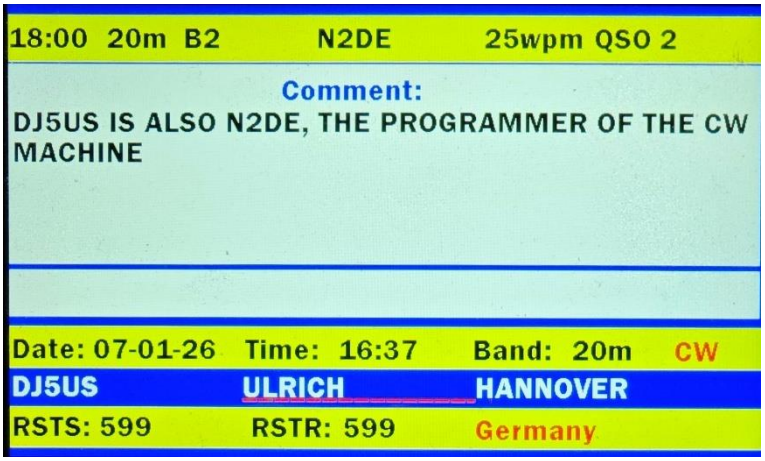
## Adding a Comment

Every log record in the CW Machine has room for a **comment of up to 155 characters**. You can add a comment to a QSO while it is still in progress, or later on, when it is already stored in the log. To enter a comment, you would send the **<do> C** command with your key, or press **// (slash-slash)** on your keyboard, which opens the **comment screen**:


Like I have done here, you can now enter text with your key or keyboard up to the maximum of 155 characters. If you make a mistake, the **Backspace** key of the keyboard or the error signal of the key **(8+ dits)** lets you back-off by one character at a time**. You can also completely delete the comment by touching the center of the white comment field.** (in addition to the X this is the only touch field that is active during comment entry!) When you have finished, you can **close the comment screen** in a number of ways:

Send **<ar>** with your key, press the **Enter** key of your keyboard or keypad, or touch the X on the screen. The comment is now part of the log record.

If at a later time you have another QSO with DJ5US, the name, the QTH, and the comment will be copied into the new log record, and the comment is displayed in **read-only mode** (**blue** comment title). You will have the same view **when you navigate the log,** as described in the next chapter:



This screen will **close automatically** as soon as you start sending. If you send <**do> C or press //**, as described above, you will enter the edit mode shown at the top of this page, and can amend or change the existing comment.

## Reviewing and Editing the Log

You can move backward and forward in your log with the **left and right arrows** in the navigation block of your keyboard, or by using the **<do> B** (back) and **<do> F** (forward) commands, or by **touching the left or right edge of the QSO information** at the bottom of the screen. You can go as far back as you like. To return back to operational mode, **touch the center of the QSO information, or press NumLock on your keypad, or press the ESC key of the keyboard.** Any modifications you may have made (see next paragraph) are discarded.

### Editing a Log Record

When a QSO is displayed in the log record section of the screen, you can modify it with the same keypad actions or keywords that you would use for a QSO that is still in progress. **You cannot change the date/time or the CW/SSB designation of a QSO in the log.** To **save** a modified log record, send **<sk>** with your key, or press the **. (point) key** on the keypad, or press the **down arrow key** of the navigation block. To discard all changes see previous paragraph.

### Deleting a Log Record

When you review your log, you may come across a QSO that should be deleted. You can do that with the **<do> D** key command or the corresponding **Shift-D** keyboard command**.** The call sign will be displayed in red in the log record, and the first character changes to a – (minus). That log record will not be physically deleted, but it will not be exported in .adi or .adx files (see next section**). If you made a mistake or change your mind, you can un-delete the record using the same command.**

## Important Logger Note

It important to realize that log record which you are filling, using the methods decribed above; is **not automaticall stored** in permanent memory. You have to send **<sk>** with your key or **#** with the keyboard, or use the **down arrow** of the navigation block on your keyboard, or press the **. (point) key** of the keypad to commit the log record to non-volatile memory. This gives the possibility of: : …

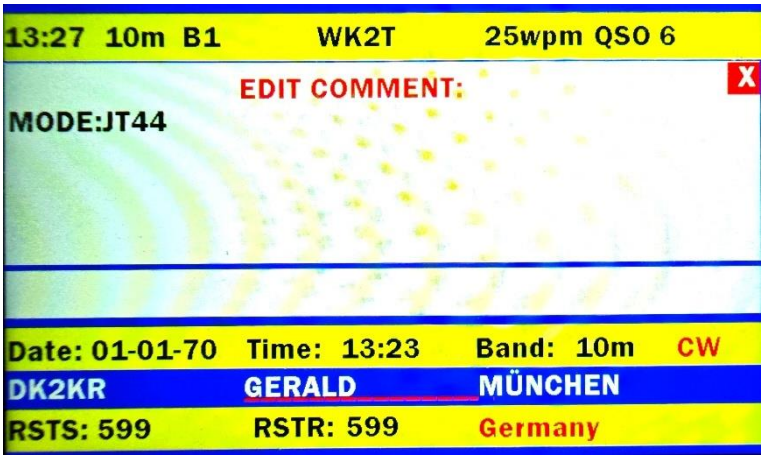
## Discarding a Log Record

If a contact breaks off before you can call it a QSO, but you have already filled the log record without storing it, you can discard (not store) the log record with the **ESC key** of your keyboard, or the ***-(atsriak-minus)** key combination of your keypad.

# Specifying a Modulation Mode

The **Comment field** that we described above has an additional function: it lets you specify the modulation mode, overriding the choice that was made in the **Keying Mode screen,** which is shown at the top of the screen (**B1, B2, …,SSB, FM**), and use that specification **for the data export** in .adi or .adx format. Without an explicit specification, the mode is **CW** if an actual keying mode is selected, **SSB** for bands up to 6m if SSB/FM is selected, and **FM** for the 2m band if SSB/FM is selected.

If you are using another mode than these standard choices, you can use the **MODE:** keyword in the comment field:




There must be **no space after the MODE: keyword or in the mode itself.** If you are using a mode that has more than one word, just use a hyphen or an underscore instead of the space. The CW Machine does **not check** if the mode that you are specifying is actually a defined mode according to the ADIF specification, and that special mode is **not shown at the top of the screen.** However, in the example above, an exported ADIF record would contain:

**<MODE:4>JT44**

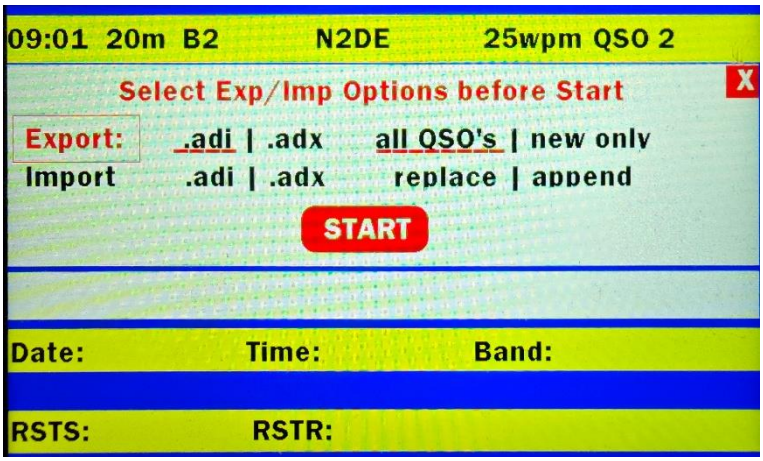
When you import log data from another program which contains a mode that differs from the standard choices of the CW Machine, a corresponding Comment field will be created.

The selection of the keying mode in the CW Machine is still important, even if you use a special mode: it determines how many digits the signal report can contain.

The CW modes will use a 3-digit report, e.g. 569, while SSB/FM will use 2 digits, e.g. 59.

# Data Exchange

You can store your log records on the **micro-SD card** in formats which can be imported by logging programs or the ARRL Logbook of the World. Using the micro-SD card, you can also import data from logging programs. If you touch the QSO number in the upper right corner of the screen, you will get the **Export-Import screen** with a number of options:




## Exporting the Log Data

tbd

## Importing Data from Logging Programs

tbd

# Putting it All Together

## A QSO that You Start

## Answering a CQ

## Working a Rare Station