# QRPworks

# Ham Central Terminal™

# User Manual

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# Overview

Thank you for your purchase of the Ham Central Terminal (HCT).

Its purpose is to enhance your experience with the Elecraft KX3, KX2, K3, or K3s by making it easier to send and receive data using either the PSK31, RTTY, or CW modes, all without the use of a computer. Plus provide an electronic log, so you can leave the paper at home.

The rigs include two wonderful Elecraft features:

- It decodes received text according to the mode set (PSK, RTTY, or CW)

- It has a serial interface which allows external software program control of a wide variety of the rigs' features.

The HCT takes advantage of these Elecraft features to enhance your operating experience.

The idea was hatched after using the K3 for PSK31 without a computer (mode:PSK-D , text decode: On).  It worked wonderfully, but found when receiving, we couldn't take our eyes off of the 8 character scrolling display much, lest we miss some characters, never to be seen again.

And while we enjoy CW to send text (really, we do!), there were times when we'd just rather type on a keyboard.

For the KX3 or KX2, we enjoy QRP hiking and use the HCT for full featured data operations without lugging a computer along.


73,

Shel Radin, KF0UR              Steve Silverman, KB3SII

# Applicability

The HCT works equally well with the Elecraft KX3, KX2, K3, or K3s. When this document refers to a "rig", it means either of these two fine rigs.

This version of the manual applies to HCT versions 2.2.x

# What it does

The primary functions of the HCT are:

- It displays rig's decoded text on an 80 character screen

- It transmits text by typing on a keyboard or sending stored text messages

- It stores and sends command macros to the rig, to control the rig.

- It provides operational shortcuts so managing the rig is easier

- It contains a log for 1000 QSOs.

# What's new

## Release 2.2.x

The new functions of the HCT 2.2.x are:

- Support of Summits on the Air (SOTA), IOTA, Grids, vacations, etc.  Actually, a QSO can be associated with any reference you like, and be exported as a group.

- A Transmit Buffer, which allows you to backspace when in PSK31, RTTY, or CW to correct typos, *before* the text gets transmitted by the rig.

- Sending pre-canned messages without a keyboard. Load the HCT at home with a keyboard, and send those messages by using the Mode 2 button.  Leave the keyboard at home if you want to travel lighter.

## Release 2.3.0

The new functions of the HCT 2.3.0 are:

- | at the end of a PSK31 or RTTY  message terminates transmission, instead of waiting ~4 seconds.
- ENTER will send a CR-LF.

## Release 2.3.1

- ENTER is allowed/saved in PSK31 and RTTY messages, and will send a CR-LF when the message is sent.

## Release 2.5.0

- Small accommodation to recognize the KX2

### Release 2.5.1

- ADIF Export improved

# Displaying Text

For displaying text, the HCT takes advantage of the innovative feature whereby the rig decodes incoming data and displays the decoded text on a scrolling 8 character display at the bottom right of the rig's screen.  The data could be PSK, RTTY, or CW.  It doesn't matter. The HCT captures these characters as they are decoded and displays them on an 80 character screen for easier reading.

The HCT also stores the characters as they are received, 480 of them. That's 24 lines of 20 characters each.  So once a line scrolls off of the screen, it is still readable by scrolling back.

By displaying 80 characters at a time, you can read words and sentences, and not worry about missing characters if you take your eyes off of the rig's screen for a short time.

# Transmitting Text

By plugging a PS2 keyboard into the HCT, you can send text simply by typing on the keyboard.  The rig will transmit the text in whatever mode it is set to.  In other words,
- if the rig is set to PSK-D, it will send PSK31 or PSK63.
- if it is set to FSK-D, it will send RTTY.
- If it is set to CW, it will send CW

You just type and the HCT and the rig will take care of the rest.

As is common with many PC programs, you can store messages so you don't have to type the same thing over and over. The HCT allows you to do the same thing and store 10 text messages, 80 characters each. Typical uses include calling CQ, contest exchanges (599 CO), brag files, etc.

# Storing and Sending Rig Macros

Using the Elecraft "K3 and KX3 Programmers Reference" (download-able from the Manuals and Downloads section of the Elecraft website), you can write and store one or more commands to the rig.

These sets of commands, or "macros" as they are called, can be used to command the rig to do just about anything and are very handy.

For instance, you could set up a macro to:
- Go to a frequency, mode, set the power level, turn off RIT and XIT, say for PSK31 or RTTY
- Put the rig into Split mode, with VFO B 1 Khz above VFO A

For the K3, the macros can be written in the K3 Utility, then sent to the rig and then assigned to a front panel button.

For the KX3 and KX2, the macros can be written in the KX3 / KX2 Utility, and two of the macros can be assigned to the PF1 or PF2 buttons. The HCT expands that by allowing you to create and store 10 macros, 80 characters each in the HCT, and executing them with a simple keystroke.

The HCT comes with 2 stored rig macros to get you started. Both can be edited as desired:

- Alt-F1: used for PSK31

- go to 14.070, PSK-D mode, power at 5 watts

- Alt-F2: used for RTTY
  - go to 14.080, FSK-D mode, power at 5 watts

# Operational Shortcuts

The HCT provides handy shortcuts, such as:

- The HCT allows you to quickly QSY just by typing the frequency desired.  The desired mode can be optionally requested as well.

- See the rig's voltage, current, and PA temp at a glance.

Status LED

HAM CENTRAL TERMINAL

QRPWORKS

MODE 2

MODE 1

80 Character Display

Mode 2

Mode 1

PC

ON

RADIO

KEYBOARD

POWER

Serial Port
to PC

Serial Port
to Rig

8-15 VDC
(center positive)

On/Off

PS2
Keyboard
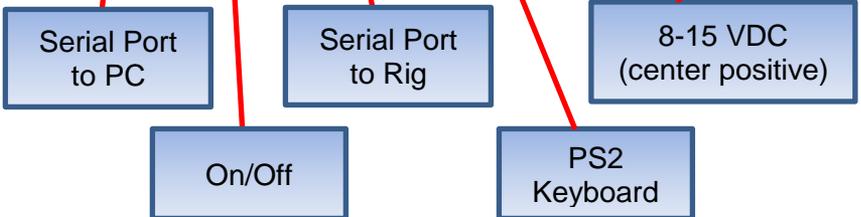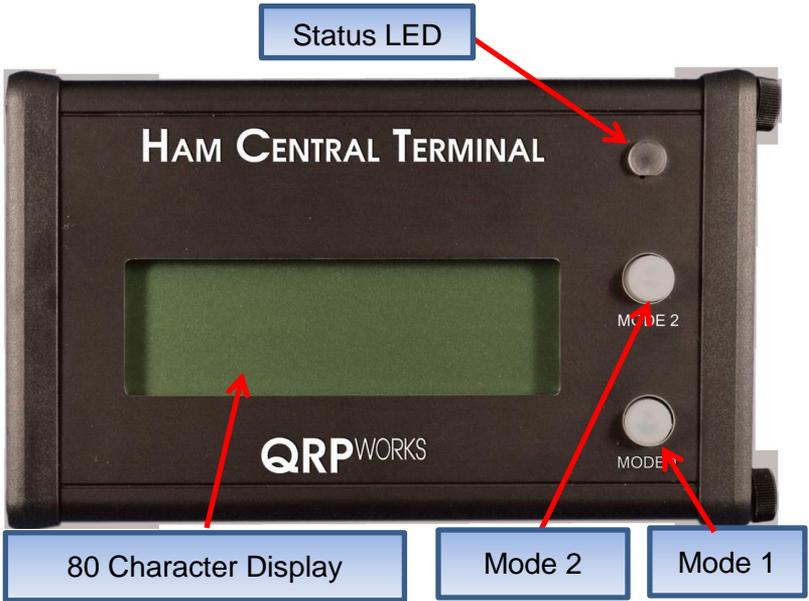
# Setup

Connections:

- **KX3/KX2**: connect a common 3.5mm (1/8") stereo cable from the HCT Radio serial port to the KX3 ACC1 (KX2 ACC) connector. A right angle connector on both ends is highly recommended to reduce the strain on the printed circuit boards. **Do not connect the radio cable if the PC cable is in use.**

- **K3**: use a DB9-M to 3.5 mm cable (available from QRPworks) from the K3 RS232 port to the HCT Radio port. **Do not connect the radio cable if the PC cable is in use.**

- **K3s**: plug the RJ45 to DE9 adapter cable that was supplied with the K3s into the K3s RS232 port. Use a DB9-M to 3.5 mm cable (available from QRPworks) from the DE9 adapter to the HCT Radio port. **Do not connect the radio cable if the PC cable is in use.**

- Connect 8-15 VDC power using a 2.1mm DC connector or use an internal 9V battery. For the DC connector, connect the DC positive voltage to the center pin. If external power is connected, the internal battery is automatically disconnected. See Battery Replacement for battery installation instructions.

- (optional, but recommended) Connect a PS2 keyboard to the HCT. This is used for transmitting and controlling the rig. If you do not plan to transmit using a keyboard (i.e. use CW paddles instead) or have any rig control (no macros), then this can be skipped.

    *Note: USB to PS2 adapters do not work in this application, nor do keyboards that are not native PS2.*

- The second 3.5mm jack, labeled "PC" is used for transferring log files from the HCT to the PC and for loading new software into the HCT. The Elecraft KXUSB or KXSER cables must be used between this serial port and a PC. **This port must not be connected to a PC if the Radio serial port is connected to the radio.**

KX3/KX2 Settings:
- Menu: RS232: set to 38400.  Other speeds do not work as well.
- Mode: TX Data, by tapping the Data/Text button.  Using VFO B, select:
  - PSK D for PSK
  - FSK D for RTTY.
  "TX Data" will be the mode shown on the screen
- Text: DEC ON, by holding the Data/Text button.

*Refer to the Data Modes section in the KX3 manual*


K3/K3s Settings:
- Menu: RS232: set to any speed (38400 recommended)
- Mode: Data Mode, by holding the AFX/Data Md button.  Using VFO B, select:
  - PSK D for PSK31
  - FSK D for RTTY.
  "TX Data" will be the mode shown on the screen
- Text: DEC ON, by holding the CWT/Text Dec button.  Use VFO B to select ON.  Set the Threshold as desired.  A setting of 3 seems to work well.

*Refer to the Data Modes section in the K3 manual*

# Starting Up

When the HCT is powered on, you will see a welcome screen briefly. For reference, the firmware version is displayed on this screen



The HCT will then automatically attempt to connect with the rig via its serial port. It will try every rig baud rate possible (starting with the fastest) until it establishes a connection. And it will retry a number of times before giving up. During the retries, the HCT screen will show a series of progression dots. Each dot is a try at each of the four baud rates (38400, 19200, 9600, and 4800).

*Note: turn the rig on first, and then turn on the HCT.*

When the HCT establishes a connection to the rig, it will briefly let you know the rate at which it connected. A connection is established after the HCT sends a command to the rig and the rig responds appropriately.
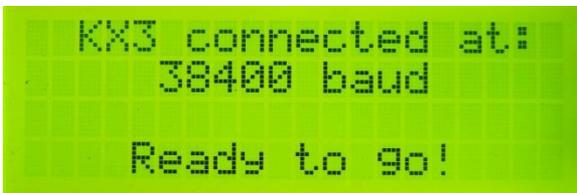


To change the baud rate, you must do that in the rig.
- For either rig, hold Menu, then select RS232 with the VFO B knob and select the rate desired.

*It is recommended to connect at the fastest rate, 38400.*

After the HCT displays the connected baud rate briefly, it will automatically enter the normal, receive mode and show decoded text from the rig.

If the rig is in the text mode and is displaying characters in the lower right of the screen, the HCT will automatically show the characters.  If the rig is not decoding and displaying characters, then the HCT screen will be blank.

If the HCT cannot connect to the rig, even after many tries, you will see the following message:



If this occurs, please see the troubleshooting tips.


# Skipping the Connection to the Rig

If you would like to skip the connection process, perhaps because you'd like to enter some messages or macros and the rig is not connected, then Hold the Mode 1 button on the HCT while it says "Connecting to Rig", until it says "Connecting Aborted".  At this point, you will see a blank screen, as no text is being received.

# Receiving Text

The HCT will display the characters decoded and received from the rig starting in the upper left of the 80 character display. Once the top 20 character line is filled, the next line is used.

Once all 4 lines of the display are filled, the lines will scroll up and the 4th line (bottom) will show the next data received. Don't fret if you want to see the line that just disappeared from the screen, as it has been saved and can be viewed by scrolling back (more on scrolling later).

While receiving text, the LED to the right of the display will be off, indicating the HCT is in the normal, real-time receiving mode.

*Note: You may find it easier to tune in a specific signal by placing the rig in the FINE TUNE Mode rather than COARSE Mode.*

*Also, the HCT removes extra spaces between characters, so more useful text is seen on the screen.*

# Scrolling

As mentioned above, once the top line of the display is scrolled off of the screen, it is saved.  Actually, 20 of the most recent lines are saved.

1. To be able to view this saved text, you must first enter the Freeze/Scroll mode.  To do so, while in the real-time receiving mode (LED is off), tap the mode 1 button. Two things will happen:

    a. The Orange LED will turn on, indicating the HCT is in the Freeze/Scroll mode

    b. The text on the screen is now frozen, not changing.

*Note: even though the screen is frozen, behind the scenes the HCT is still collecting text from the rig.   So when you go back to normal, real-time receiving, you'll see the most recent text received.*

To scroll back to view the previously saved lines (up to 20), while in the Freeze/Scroll mode (Orange LED is on), HOLD the mode 1 button.  The HCT will scroll back line by line, at approximately 1 line per second, until you get to the end of the scrolling (20 lines).  Release the Hold button to stop scrolling.  Hold it again to resume scrolling.

To use the keyboard instead to Scroll:
- Alt-F to enter the Freeze / Scroll mode
- Arrow Up or Down to scroll one line at a time
- Page Up or Down to scroll a page (4 lines) at a time.

If less than 20 lines have been saved, you will see <END of DATA> at the end of the received text.



When you scroll 20 lines back, you will see <END OF SCROLL>



# Resuming Real-time Receiving

To resume real-time receiving, while in the Freeze/Scroll mode, TAP the mode 1 button again.   Or if using a keyboard, press **Alt-F** or **ESC**.  You will briefly see the following message:

`<Back to Real Time>`

# Summary of <u>Scrolling</u> Operation:

| Mode | Action | Result | LED |
|---|---|---|---|
| Real-time receiving | | | Off |
| Real-time receiving | Tap mode 1 button or Alt-F | Freeze/Scroll mode. | On |
| Freeze/Scroll | Hold mode 1 button | Scroll back, ~1 line per second | On |
| Freeze/Scroll | Release mode 1 button | Scrolling stops where it is | On |
| Freeze/Scroll | Hold mode 1 button again | Scrolling resumes from where it was stopped | On |
| Freeze/Scroll | Arrow up/down | Scroll up/ down 1 line per press | On |
| Freeze/Scroll | Page up/down | Scroll up/ down 1 page (4 lines) per press | On |
| Freeze/Scroll | Tap mode 1 button or Alt-F or ESC | Back to real-time receiving | Off |

# Transmitting Text

There are 2 modes offered to send text using the keyboard.
- **Immediate Mode** – characters are sent to the rig as they are typed.

- **Buffered Mode** – characters appear on the bottom line of the HCT display and are not sent to the rig unless the Enter key is pressed or the number of characters set by the user is reached.   In this mode, you may Backspace to correct text.

## Immediate Mode

To set the transmitting mode to Immediate:
- Press CTRL-C (for Configure)
- Enter a 1 for the number of characters

To transmit text, simply type on the keyboard.  Sending has priority, so any time a key is pressed on the keyboard, the rig will be put into the transmit mode and the character typed will be sent.

## Buffered  Mode

To set the transmitting mode to Buffered:
- Press CTRL-C (for Configure)
- Enter a number between 2 and 20 for the number of characters.  Press Enter when done.  When the number of characters you type hit this number, the text will automatically be sent to the rig.

The benefit of this mode is the ability to backspace to correct text before it is sent to the rig.  While this is standard using

PSK31 and a computer, the HCT offers this feature for CW, RTTY and PSK31…without the need of a computer.

To transmit text, type on the keyboard.  The characters will appear on the bottom line of the HCT display, and be sent to the rig when:
1.  The number of characters typed reaches the number set using CTRL-C…or
2.  The Enter key is pressed.

If you see something on the bottom line to change, just Backspace  to correct it.

When characters are buffered and not yet sent to the rig, the orange LED will be on, indicating so.  So, if you are typing and finish your sentence and the orange LED is on, don't forget to press Enter so the last characters are sent to the rig.


In either mode, to stop transmitting, there are two options:

1.  Simply stop typing.  The rig will go back into the receive mode approximately 4 seconds after the last character was received by the rig.  This allows you to take a breath between words and still stay in the transmit mode on the rig.  Note that this is an Elecraft feature built into the rig.

2.  Hit the ESC key.  By hitting the ESC key, the rig will go back into the receive mode right away.  This is useful if you send by mistake or just want to go back to receive faster than the built-in 4 second wait in the rig.  Especially useful when contesting.

*Note: When sending text from the rig directly, you send CW with paddles. The rig does the translation from CW to the mode you are in (PSK31, RTTY, CW).  As such, there is no way to differentiate upper and lower case letters.   All letters are sent using lower case.  The HCT uses the same features in the rig,*

*and the result, as you might have guessed, is the same. **All characters are sent lower case**, regardless of whether you type upper or lower case on the keyboard.*

## Stored Text Messages

The HCT allows you to store 10 text messages, 80 characters each.  These are used to store "canned" text, such as calling CQ, "my name is...", contest exchanges (599 CO), etc.

Messages are stored and sent using the function keys, **F1-F10**.

# Creating or Editing a Message:

- In the real-time mode (LED is off), press **F12**.  The LED will now be Green indicating you are in the Edit mode. The screen will prompt you to press a key **F1** through **F10**.

  - If no message has been stored previously, you will see <no message yet….just start typing>

  - If a message has been previously stored, it will be displayed.  Edit or add any additional text.  See the "Editing a Stored Text Message or Macro" section in this manual for a list of editing options.

    When finished, press the **F12** key again to save the changes and return to the real-time mode.  The LED will go out and you will see the following message briefly:

    

    ```
    Message F1 SAVED
    ```

  - If you want to cancel the editing of a message, press the **ESC** key at any time.  The HCT will return to the real-time receiving mode.  The LED will go out and you will see the following message briefly:

o New in version 2.3.0 and later: When in RTTY or PSK31, the rig will remain in transmit mode for approx. 4 seconds after the last character has been sent. To have the rig go back to receive immediately after the last character has been sent, add a vertical bar "|" at the end of the message (without the quotes). It's especially useful when contesting.

Example: 5NN CO |

# Naming Text Messages

The HCT provides a way to name a message. The name will then be shown in the message summary screen.

To name a message, simply enter the name as the first characters followed by a colon ":". Everything to the left of the colon is the message name and is not sent to the rig. Everything to the right of the colon will be sent to the rig as text.

The HCT comes with two named text messages to get you started:
- F1 is to call CQ, and is named Calling CQ..
- F2 is to answer a call.

It's advised to keep the names short, as the space for the characters used are shared with the characters used for the

message.  The longer the name, the less room you will have for the message.

# Sending a Stored Text Message

To send a stored text message, just press the F key of the message to be sent.  The rig will enter the transmit mode and the message will be sent.   The sent message in its entirety will appear on the HCT screen at once, while the rig is sending the message character by character, as if you were sending CW.  You can see this in the text scroll area (lower right) of the rig.

If you press an F key more than once, or multiple F keys in sequence, the messages will be sent in sequence (chained).  This is useful, for instance, if you want to send a longer CQ.  If the message stored in F1 is:

*CQ CQ CQ CQ CQ DE KF0UR KF0UR KF0UR*

Pressing F1 twice will result in the following message:

*CQ CQ CQ CQ CQ DE KF0UR KF0UR KF0UR  CQ CQ CQ CQ CQ DE KF0UR KF0UR KF0UR*

*Note: When you scroll back to see previous data received, you will also see the data you sent as well, whether it's key by key or from a stored message.   This way, you'll see the entire conversation.*

# Callsign Entered

The HCT gives you the ability to enter another station's callsign and have it sent out automatically.  You may be familiar with this feature in most contest loggers.

To use it,

- Enter the call by pressing **Alt-C**.  Enter up to 10 characters.  Backspace to make changes.
- In any of the 10 HCT messages, use the exclamation point (!) where you want the other station's call to appear.

Example:
- Press Alt-C and enter KB3SII.
- In message 1, enter:  ! de KF0UR.  The HCT will then send "KB3SII de KF0UR".

Press Alt-C again to see the call entered, and to edit it.
The entered call will be there until the QSO is logged.

## Summary of Message Editing Operation:

| Mode | Action | Result | LED |
|------|--------|--------|-----|
| Real-time receiving | | | Off |
| Real-time receiving | Press F12 | Enter Edit Message Mode | Orange |
| Edit Message Mode | Press F1 thru F10 | Enter new or Edit existing message | Orange |
| Edit Message Mode | Press F12 | Message saved, then back to real-time | Off |
| Edit Message Mode | Press ESC | Cancel Edit message.  Back to real-time | Off |

## Stored Text Message Summary

If you don't recall which text message is stored where, the HCT can help.

While in the normal, receiving mode (LED off), press **Page Down** or **Page Up** on the keyboard, and the first 18 characters of messages 1-4 will be shown.  Press **Page Down** to see messages 5-8, and **Page Down** again to see messages 9-10.

Press **Page Up** to go in the opposite direction.

Press **ESC** to go back to the real-time receiving mode.

While viewing the Text Message Summary, you can press a desired F key.  So if you are viewing the Text Message Summary screen and see that you want to send the text stored in F5, you can press F5 while viewing this screen.  You don't need to press ESC first.

# Reserved Message Characters

The following characters are reserved for special purposes, and cannot be used as normal characters:

# - used for serial number
! -  used for the other station's call

# Sending a Stored Text Message without a Keyboard

The HCT provides a means to send messages without using a keyboard.  This is useful if you don't want to take a keyboard with you, but still want to be able to send some canned messages, such as CQ, or a contest exchange ("599 CO").

To use this feature, start by loading messages into the HCT by using a keyboard as specified above (see Creating or Editing a Message).

Tap Mode 2 until the message you want to send is displayed.
If you have named your messages, the name will be displayed.
Tap Mode 1 to send it.

To abort sending a message, hold Mode 2.

# Summary of <u>Message Summary</u> Operation:

| Mode | Action | Result | LED |
|---|---|---|---|
| Real-time receiving | | | Off |
| Real-time receiving | Press Page Down | First 18 characters of messages 1-4 shown | Off |
| Message Summary Mode | Press Page Down again | First 18 characters of messages 5-8 shown | Off |
| Message Summary Mode | Press Page Down again | First 18 characters of messages 9-10 shown | Off |
| Message Summary Mode | Press Page Up | First 18 characters of messages 5-8 shown | Off |
| Message Summary Mode | Press an F key | The text stored in the F key will be sent, and then back to real-time receiving. | Off |
| Message Summary Mode | Press ESC | Back to real-time receiving | Off |

# Stored Rig Macros

The HCT allows you to store 10 rig macros, 80 characters each.   Rig macros are a series of commands to the rig to set the rig into a set configuration.   Pretty much anything you can do from the rig's front panel or the menu can be done via a rig macro.   Instead of a written or mental checklist, just put all the necessary commands in a rig macro, and send the macro with just a keystroke.

Rig Macros are stored and sent using the function keys, **Alt-F1** to **Alt-F10**


# Creating or Editing a Rig Macro:

- In the real-time mode (LED is off), press **Alt-F12**.  The LED will now be Green indicating you are in the Edit mode.  The screen will prompt you to press a key **F1** through **F10**.   (**Alt-F1** through **Alt-F10** can be pressed as well)

   o If no macro has been stored previously, you will see <no macro yet….just start typing>

   o If a macro has been previously stored, it will be displayed.  Edit or add any additional text.  See the "Editing a Stored Text Message or Macro" section in this manual for a list of editing options.


   When finished, press the **F12** key again to save the changes and return to the real-time mode.  The LED will go out and you will see the following message briefly:
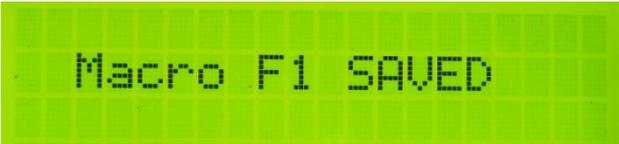
Macro F1 SAVED

- o If you want to cancel the editing of a macro, press the **ESC** key at any time. The HCT will return to the real-time receiving mode. The LED will go out and you will see the following message briefly:



<Edit Cancelled>
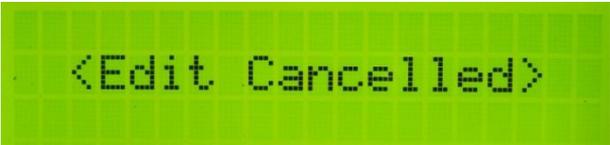
# Naming Rig Macros

The commands used in rig macros are cryptic, and when you look at a list of commands in a rig macro, it may not be obvious what the macro does. To help you remember, HCT allows you to name each macro. The name will then be shown in the macro summary screen, and also when the macro is sent to the rig.

To name a macro, simply enter the name as the first characters followed by a colon ":". Everything to the left of the colon is the rig macro name and is not sent to the rig. Everything to the right of the colon will be sent to the rig as commands.

The HCT comes with two named rig macros stored to get you started:
- Alt-F1 is for PSK31 and is named PSK.
- Alt-F2 is for RTTY and is named RTTY.

It's advised to keep the names short, as the space for the characters used are shared with the characters used for

commands.  The longer the name, the less room you will have for commands.

For more information on macros and a complete list of commands, please see the Elecraft "K3 and KX3 Programmers Reference" in the Manuals and Downloads section of the Elecraft website.

Macro Examples:  Note the colon.  The name is to the left, the commands are to the right.  The name and the colon are not sent to the rig.

PSK:FA00014070000;MD6;DT3;SWH17;PC005;
RTTY:FA00014080000;MD6;DT2;SWH17;PC005;

## Sending a Rig Macro

To send a stored rig macro, just press the Alt-Fx key of the macro to be sent, where x is from 1-10 (i.e. Alt-F5).  The sequence of commands will be sent to the rig.   If the macro is named, the name of the macro will be briefly displayed:



## Stored Rig Macro Summary

Similar to stored text messages, if you don't recall which rig macro is stored where, the HCT can help.

Press **Alt-Page Down** or **Alt-Page Up** on the keyboard, and the first 18 characters of macro 1-4 will be shown. Press **Page Down** to see macros 5-8, and Page Down again to see macros 9-10.

Press **Page Up** to go in the opposite direction.

Press **ESC** to go back to the real-time receiving mode.

If a macro has been named (first characters preceding a colon ":") then the macro name will be displayed instead of the macro commands.

## Summary of Macro Summary Operation:

| Mode | Action | Result | LED |
|---|---|---|---|
| Real-time receiving | | | Off |
| Real-time receiving | Press Alt-Page Down | The name or first 18 characters of macros 1-4 shown | Off |
| Macro Summary | Press Alt-Page Down again | The name or first 18 characters of macros 5-8 shown | Off |
| Macro Summary | Press Alt-Page Down again | The name or first 18 characters of macros 9-10 shown | Off |
| Macro Summary | Press Alt-Page Up | The name or first 18 characters of macros 5-8 shown | Off |
| Macro Summary | Press an Alt-Fx key | The macro stored in the Alt-Fx key will be sent. | Off |

| Macro Summary | Press ESC | Back to real-time receiving | Off |
|---|---|---|---|

# Editing Stored Text Messages and Rig Macros

The editing features apply to editing text messages and rig macros.  Here are the commands available:

- *Backspace*: moves the cursor one character to the left and erases the character
- *Home*: moves the cursor to the first character.
- *End*: moves the cursor to the right of the last character
    - o *If at maximum characters, the cursor will move to the last character*
- *Arrow Left*: moves the cursor one character to the left.
- *Arrow Right*: moves the cursor one character to the right
    - o *If at maximum characters, the cursor will not move past the last character*
- *Arrow Up*: moves the cursor one line up
- *Arrow Down*: moves the cursor one line down, but not past the last character.


Editing has two modes of operation, which are typical of many editors.  The Insert key is used to toggle between these two modes:
- **Insert**, where a new character is *inserted* to the left of the cursor.  The cursor will be a blinking box.
- **Replace**, where a new character *replaces* the character at the cursor. The cursor will be an underline.

In the Insert mode, if there are more characters than allowed for the message or macro, the character at the end will be truncated as new characters are added.

# Quick QSY™

If you have frequencies that you use frequently, they can be put in a rig macro and sending a rig macro can be used to command the rig to go to that frequency and mode.

But if you want to go to a frequency not in a rig macro, say for a DX Spot, or you're not familiar with the macro commands, the HCT provides a Quick QSY feature to change frequency and mode quickly.

To use it, press **Alt-Q**.  The screen will then prompt you for the frequency, and the format required is also displayed.

Optionally, you can change modes as well by adding a single letter on the end of the frequency.  The modes available are as follows:

| Mode | Letter to add |
|:---:|:---:|
| CW | C |
| USB | U |
| LSB | L |
| PSK31 | P |
| RTTY | R |
| AM | A |
| FM | F |
| CW REV | W |
| Data Rev | V |

Examples:

- 14070  -  sets freq to 14.070 Mhz.  Mode does not change.
- 14070P - sets freq to 14.070 Mhz AND mode to PSK-D for **P**SK31
- 21080R - sets freq to 21.080 Mhz AND mode to FSK-D for **R**TTY (screen shot)
- 7023C  -  sets freq to 7.023 Mhz AND mode to **C**W
- 28425U - sets freq to 28.425 Mhz AND mode to **U**SB

```
QSY to: 21080R
format: 14070C
last letter is mode
<ENTER:go  ESC:quit>
```

## Contesting

While the HCT is not a substitute for a contest logging program, it can help with sending your contest exchange.

Use the exclamation point (!) in a message to substitute the other stations call.
Example:

- Let's say F2 is used to send an exchange
  - First enter "! 599 CO" without the quotes in message F2
- W1ABC calls you. Use ALT-C to enter the other station's call W1ABC, and press Enter.
- Then, pressing F2 will send "W1ABC 599 CO"

*Note: Normally you would press Enter after entering a call using Alt-C, to complete the operation.  But you can save that keystroke and press an F2 as soon as the call is typed in.*

If the contest exchange is static text, like RST and section ("599 SFL") or name and state  ("Steve NY"), the exchange can simply be put in a text message (F1:F10) and sent with a single keystroke.

If the contest exchange contains a QSO serial number, the HCT has a feature to help.  To use the serial number feature,

- Use the "#" (without the quotes) in a text message where you want to send the serial number.  For the following examples, assume the next serial number is 234.

- o Example: KF0UR 599 # #   will send KF0UR 599 234 234

- To set the serial number, press **Alt-N** (number).   You can then see the next serial number that will be sent, or can change it by backspacing and typing a new numbers.  Press **Enter** to save the change or **ESC** to exit without saving. This should be used at the beginning of a contest or if you need to set the number at any time.  The maximum QSO number is 32000.

```
Next nbr sent: 1

<ENTER:go   ESC:quit>
```

- The HCT will increment the serial number when you log the contact. If you are not using the HCT log, then Press **Alt-I** (increment) to increment the number by one. If you've incremented by mistake, press **Alt-N** to change it to the desired number.  This might happen if you thought you worked someone, but really didn't (busted QSO).

In addition to the # for the serial number you may also enter the other station's call and have it sent out automatically as part of a message.  See Callsign Entered in an earlier section for details.

The other station's call will be erased when the QSO is logged.


# LCD Backlight Brightness

The LCD backlight brightness is adjustable.  When operating using a battery, it is wise to minimize the current usage (but you already knew that), and this feature helps you do so.  The

display is transflective, so backlighting may not be needed at all when outdoors.

There are 2 ways to adjust the brightness:
- On the HCT control panel, in the normal Receiving mode (LED off), press and hold the Mode 1 button.  The brightness will cycle through levels from off to bright. Release the button when the desired brightness is reached.
- On the keyboard, press **Alt-B**. Each press of **Alt-B** will go to the next level of brightness, from off to bright.

The brightness selected is remembered in EEPROM, so the next time you turn on the HCT, it will start at the last brightness selected.

# Rig Status

To help you manage your rig, the HCT displays a number of measurements from the rig on one handy screen,

To access the rig status screen, press Alt-S. The rig's supply voltage, supply current, and PA temperature will be displayed. Each subsequent press of Alt-S will update the screen.

Press ESC to exit the screen and resume real-time receiving.
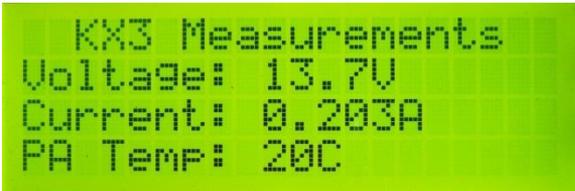
```
    KX3 Measurements
Voltage: 13.7V
Current: 0.203A
PA Temp: 20C
```

# Voltage Check

To display the power supply voltage whether from an external source or an internal 9V battery, press **Alt-V**. The current voltage will display for a few seconds and the HCT will automatically return to the real-time receiving mode.

The HCT will automatically check the voltage periodically, and if at or below the low voltage threshold (6.5 volts), will display a low voltage warning screen.

*Note: remember that if an external power source is plugged in, the internal battery is disconnected.*

```
    Voltage = 8.965 V
```

# Logging

HCT Logging allows you to have some basic logging features when using the HCT. While it does not try to replicate a full blown log or contest logging program, it does allow you to capture the basic QSO information easily.

## Main Logging Functions

To access the HCT log, press **Alt-L**. You will then see the following logging functions screen:
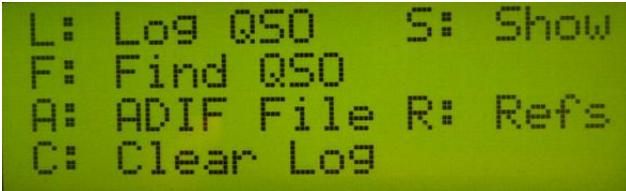
```
L: Log QSO    S: Show
F: Find QSO
A: ADIF File R: Refs
C: Clear Log
```

**L**: to log a new QSO. There is room for 1200 QSOs.

**F**: to find an existing QSO in the log. Enter all or part of a call. The most recent QSO with the text string entered will be displayed. Press **Alt-Arrow Down** to find the next earlier QSO.

A wildcard character (*) can be used as well.

Example:
Finding "W1AB" will find all log entries for W1AB
Finding "W1AB*" will find W1AB, and also W1ABC

Once a QSO is found, it can be edited and saved by Pressing Enter.

The QSO may be deleted by pressing **Alt-X**. Note that deleting the QSO does not remove it from the log. Instead, the call is

changed to \*Deleted\* and will not be output when creating the ADIF export.  As a result, deleting a QSO should not be used to make more room in the log.  Clearing the log will do that.

**A**: to create an ADIF file for export to a PC, so it can be imported to your main log.  All QSOs (not deleted) will be exported.

**R**: to create an ADIF file for export to a PC, but only include QSOs tagged with the currently active Reference (SOTA, IOTA, Lighthouse, etc.)

If you select this option, then you will be asked to select what type of reference it is on this following screen:
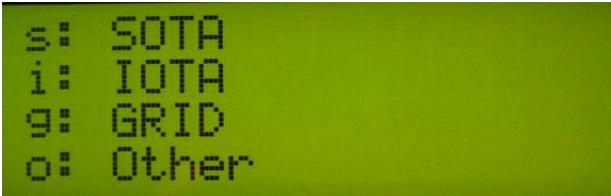


The purpose of this selection screen is to output the data with the proper ADIF field name.  For example:
- SOTA Refs need to use the ADIF tag "MY_SOTA_REF"
- IOTA needs to use the ADIF tag "MY_IOTA"

Selecting the reference type selects the proper ADIF tag for output.

**C**: to erase the entire log.  You will be prompted with a Y/N to be sure.

**S**: to show QSOs in the log.  The most recent  QSO will be shown.  Press **Alt-Arrow Down** to go down the log QSO-by-QSO.  Press **Alt-Arrow Up** to go in reverse order.

**ESC**: press **ESC** any time to go back to real time receiving.

## Logging a New QSO

To log a new QSO, enter the HCT Log by pressing **Alt-L**, and then **L** to Log a QSO.  The QSO log screen will then be shown



The info here is shown as an example.

To navigate from field-to-field, press **TAB** or use the up or down arrows.

To navigate within a field, use the left right arrows, home or end.  Press **Insert** to toggle between the insert (flashing cursor) or overtype modes (same as editing messages and macros).

Press Enter to save the QSO.

**Call:** Enter the call worked.  Maximum: 10 characters.  Enter either upper or lower case.  The HCT will convert it to upper case.  This is a required field.

**Exch:** Enter the exchange.  Maximum 10 characters.  Any characters can be entered, so this can be used for regular QSOs ("599") or contest exchanges ("2A CO", "Steve NY").  This is not a required field.

If you use the QRPworks ADIF Export Utility v1.9 or later, a new feature is available.

In ADIF Export Utility v1.7 and previous, the Exchange field is always interpreted as RST_RCVD in the ADIF file.

With ADIF Export Utility v1.9, you have the opportunity to populate the RST RCVD and RST SENT fields.

In version 1.9 of the Utility,
- RST RCVD is now added as an ADIF field. The format of the 10 character **Exch** field in the QRPworks log is now Rcvd / Sent
- If a / character is found, the characters to the left of the / is the RECEIVED and the characters after the / is the SENT
- If no / character is found, the Exchange is RST_RCVD.
- As shown in the table of examples, the Exchange does not have to be a traditional "599" signal report.

*Examples*

| "Exchange" data in the log | ADIF RST_RCVD | ADIF RST_SENT |
|---|---|---|
| 579 | 579 | (blank) |
| 579/59 | 579 | 459 |
| /589 | (blank) | 589 |
| 001 NY/022 CO | 001 NY | 022 CO |

Also new in ADIF Export Utility v1.9 are 2 new ADIF fields:
- Call Sign, if entered in the Utility
- Band

**Freq:** enter the frequency in Mhz. If connected to the rig, this will be automatically filled in with the freq. at the time you accessed this screen.

**MD:** enter the mode. This could be 2 characters for CW or up to 4 characters for RTTY. If connected to the rig, this will be automatically filled in with the mode selected at the time you accessed this screen.

# Activities using References

The HCT provides features for operators in a number of activities to manage various references, such as:

- Summits on the Air (SOTA)
- Islands on the Air (IOTA)
- Lighthouses
- Grids
- And any other activity that uses some kind of reference

By reference, we mean a published identifier used within the activity to report activations, collect points, etc. Example: SOTA uses Summit References (i.e. "W0/FR-001"), IOTA uses island reference numbers (i.e. "AF-041").

This feature of the HCT allows you to
- Store up to 48 References (maximum 16 characters each)
- Select which  Reference is active
- Automatically include the Reference as part of the log entry
- Export an ADIF log file of QSOs for the active reference only.

To use the Reference feature, press **Alt-P** .  On the next screen, press **M** to Manage Refs.
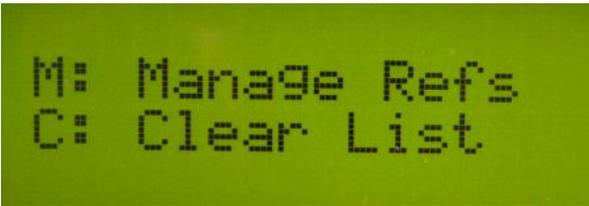


The next screen displayed will show references 1-4.  Page Up and Down, or Arrow Up and Down to navigate to references 5-48.

## Storing and Selecting a Reference

Enter up to 16 characters per line (1 line = 1 Reference). Since most references are less than 16 characters, there's usually room to enter an optional short note for each reference. Use a colon (":") to separate the reference from your note. This can be used as a handy reminder when looking at a list of references and trying to recall what they are.

To select which reference is active, Arrow or Page Up/Down to the reference desired and press CTRL-S (for **S**elect). An asterisk ("*") will be displayed on the line of the active reference.

In the following screenshot example:

- 4 SOTA Summit Refs are entered, all with a short note
- Number 02 is selected as the active summit. Note the asterisk indicating so.

Active reference indicator, CTRL-S selects



Now when you log a contact, the reference (a Summit Ref in this example)  will be saved with the QSO.  The optional short note you might have entered after the colon and the colon itself will not be saved in the log.

## Exporting an ADIF File

To export an ADIF file with only the QSOs of the reference activated.
- Go to the Logging Screen (**Alt-L**)
- Press R for Reference

Note that the difference between pressing R (reference) vs.  A (ADIF File) is that A will export all QSOs, while R will export only those QSOs for the active reference.

If a QSO was logged with the wrong reference selected, the correction is easy.  Just:
- selected the proper reference (Alt-P, then M, then CTRL-S for the proper reference)
- go to the log, find the QSO, and hit Enter to resave it. The currently active reference will now be saved with that QSO.
-

As mentioned in the Logging section, if you select this option, then you will be asked to select what type of reference it is on this following screen:

```
s: SOTA
i: IOTA
g: GRID
o: Other
```
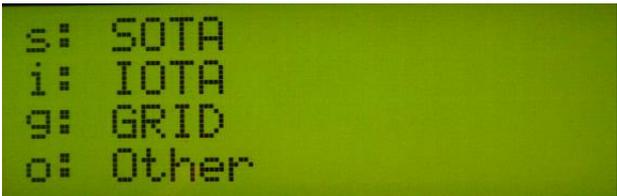
The purpose of this selection screen is to output the data with the proper ADIF field name.  For example:
- SOTA Refs need to use the ADIF tag "MY_SOTA_REF"
- IOTA needs to use the ADIF tag "MY_IOTA"

Selecting the reference type selects the proper ADIF tag for output.

# Setting the Date and Time

If you want to the log to automatically populate the date and time, then;

- Turn off the HCT and install a CR2032 button cell battery (see Battery Replacement). The Positive (+) side is up, away from the printed circuit board
- With the HCT on in the normal receiving mode , press Alt-D.
  - o Enter the Date in yyyymmdd format
  - o Enter the 24 hour time in hhmm format
  - o Switch between date and time using the Tab key.

# Self Test

The HCT has a self test function that will run through a number of checks.

To run self test, either
- Press Alt-T or
- With the power off, hold the Mode 2 button and then power on the HCT until you see "Starting Self Test".

Self test will then check the LEDs, display, switches, and serial port.

For the serial port test, you must insert a cable into either the PC or Radio connectors and short the tip and ring together. This will allow the HCT to do a loopback test.
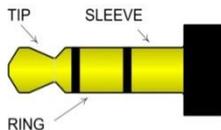
# Battery Replacement

To replace the internal 9V battery,

- Remove the 5  thumb screws in the right side end panel (as viewed from the front)
- Remove the plastic bezel and metal end panel
- Slide out the bottom panel of the enclosure, exposing the battery in its holder (and have a look at the guts of your HCT too)
- Replace the battery, paying attention to the polarity
- Replace the bottom panel by sliding it back on
- Replace the bezel and end plate
- Replace the 5 thumbscrews



Feet further from this edge

Feet closer to this edge

9V Battery Compartment

(Lithium Batteries are a tight fit, but they do fit.)

Note when replacing the bottom panel that the feet are closer to one edge, as shown.  Aligned this way, it'll slide in easily.  If it's backwards, it will go in part way and get caught.  Do NOT force it...turn it around!
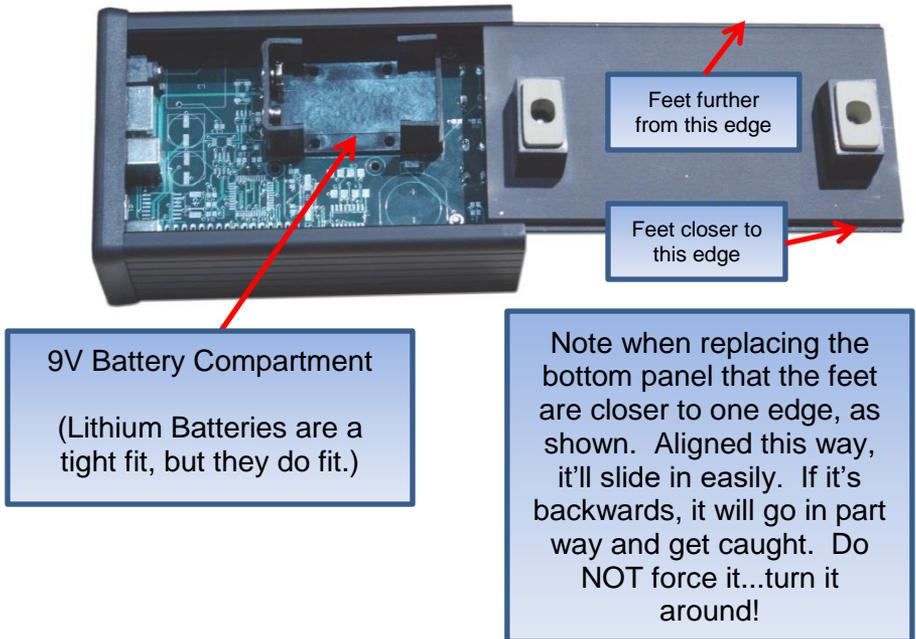
# System Reset

If you want to reset the HCT, press **Alt-R**.  Then press "**Y**" to confirm the reset or "**N**" or **ESC** to cancel the reset.  The reset is similar to turning the unit off and then on again.

One reason for doing a reset is to re-initiate the communications to the rig, in case it is not connected.

# Help

For help in remembering HCT commands, press **F11**.  A summary of the features and commands will be shown.  Press **Page Up** or **Page Down** to scroll through the list.

A summary of commands can be found at the end of this manual.   It is printed twice, so you can remove one and take it with you.   But since help is built in, you may not need to take any paper with you.

```
msg send:    F1:F10
msg edit:    F12
macro send: ALT-F1..
macro edit: Alt-F12
```

Page Down to see the next page:

```
QSY:         Alt-Q
freeze:      Alt-F
ck voltage: Alt-V
quit:        ESC
```

# Updating the Firmware

The HCT firmware is able to be upgraded via the "PC" serial port connector.

Please see the Ham Central Terminal Utility manual on the www.qrpworks.com Support Page.

# Technology

The HCT is not just a larger screen.  Inside is a PIC microcontroller.  It is a computer on a chip, complete with CPU, memory, and EEPROM.  Firmware running on the microcontroller controls the presentation and all functions of the HCT.   There's a lot of stuff going on!

# Support

If for any reason you have questions or issues regarding the HCT, please contact us via  the  www.QRPworks.com Contact page.

# Acknowledgements

We would like to acknowledge and thank Sierra Radio Systems for the use and support of their Hamstack C library.

# Troubleshooting Tips

1. Issues connecting with the rig

   If you experience issues connecting to the rig, the following procedure is recommended.  Verify the rig baud rate is set to 38400.

   a.  Turn off the rig
   b.  Turn off the HCT via the on/off switch
   c.  Turn the rig on first.
   d.  Wait a few seconds
   e.  Turn on the HCT

2. The HCT is connected, but no text is appearing

   Ensure that the rig's Text Decoding feature is turned on and you see characters scrolling on the rig's display (in the lower right hand corner).

   See the Owner's Manual for more details on setting up the rigs.

   In a nutshell,

   For the KX3/KX2, the setup is as follows:
   o  For PSK31:
      - Mode: TX Data  (tap Data/Text button)
      - Data MD: PSK D (select with VFO B)
      - Text Decode: ON (hold Data/Text button)

   o  For RTTY:
      - Mode: TX Data (tap Data/Text button)
      - Data MD: FSK D (select with VFO B)
      - Text Decode: ON (hold Data/Text button)

   o  For CW:
      - Mode: CW (tap Mode 1 button)
      - Data MD: not applicable

- Text Decode: ON (hold Data/Text button)

For the K3/K3s, the setup is as follows:
- For PSK31:
  - Mode: TX Data
  - Data MD: PSK D
  - Text Decode: ON
  - Threshold: at your discretion

- For RTTY:
  - Mode: TX Data
  - Data MD: FSK D
  - Text Decode: ON
  - Threshold: at your discretion

- For CW:
  - Mode: CW
  - Data MD: not applicable
  - Text Decode: ON
  - Threshold: Auto , CW 5-40

3. I'm using a USB keyboard with a PS2 adapter, but it does not work.

   At this time, USB keyboards with PS2 adapters will not work.  You must use a PS2 keyboard.

# Summary of Keyboard Commands

| | |
|---|---|
| Alt-B | Change LCD background **B**rightness |
| Alt-C | Enter other station's **C**all |
| Alt-D | Set **D**ate and Time |
| Alt-F | **F**reeze display |
| Alt-I | **I**ncrement the contest serial number |
| Alt-L | Go to **L**og functions |
| Alt-N | Display / Set the contest serial **N**umber |
| Alt-P | References (ex. SOTA **P**eaks) |
| Alt-Q | Quick **Q**SY |
| Alt-R | **R**eset the HCT |
| Alt-S | Rig **S**tatus |
| Alt-T | Self **T**est |
| Alt-V | Display **V**oltage |
| | |
| CTRL-C | **C**onfigure HCT |
| | |
| F12, then F1-F10 | Edit text messages |
| F1-F10 | Send text messages |
| Alt-F12, then F1-F10 | Edit rig macros |
| Alt-F1-F10 | Send rig macros |
| F11 | Help |

| F12 | From Edit mode. save message or macro |
|---|---|
| Page Up / Down | Display text message summary |
| Alt-Page Up / Down | Display rig macro summary |

## Summary of Keyboard Edit Commands

| Home | Go to first character |
|---|---|
| End | Go to last character |
| Up Arrow | Go up one row |
| Down Arrow | Go down one row |
| Left Arrow | Go left one character |
| Right Arrow | Go right one character |
| Insert | Toggle mode (insert or replace) |

## Summary of Logging Commands

| TAB or up/down arrows | Move from field to field |
|---|---|
| Enter | Save the QSO |
| Alt-Arrow Down | Find Next QSO (after first is found) |
| Alt-X | Delete the QSO displayed |

# Index