

SIM-PSK User's Guide

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Introduction

SIM_PSK is an experimental computer program designed to facilitate basic amateur radio communications when using a weak signal with the SIM31, a new digimode specially designed for use on all amateur bands: MF, HF and VHF...

The five characters "SIM31", stand for "Structured Integrated Message PSK 31 bauds".

SIM31 is sharing many characteristics of the popular modes such as PSK31 and JT9.

It is designed for doing normal contacts by exchanging full info's, but moreover, it also allows to establish quite automatic contacts, even under weak signals conditions, with a narrow band using less than 45Hz...

Compared to other digimodes, SIM31 is probably the only one to have a new kind of automatic functionality:

You can set your software in Automatic mode <Auto SIM QSO's>, and begin calling CQCQ as many times as you want. Afterwards, sim-psk will reply to the call sign who just answered you manually; then, it detects and fills all info's of the QSO (Name, QTH, LOC, RSQ ...), at the end of QSO, it saves all info's into the SIM Logbook

The program does all that automatically, without any operator assistance...

Note: it's recommended never to leave your transceiver working alone without any presence!!

SIM-PSK can export one or several contacts at once in ADIF format at any time. Then you can upload your ADIF file to eQSL.cc or any other service having an ADiF compatible upload function.

It can be done quickly from the program Log menu at the end of your traffic.

Remark : uploading to LoTW must be done independently by TQSL as usual..

SIM_PSK also implements the new mode SIM63 running at twice the baud rate of SIM31.

System Requirements

SSB transceiver and antenna

Computer running Windows XP or later. (also runs under Linux, OS X, and probably FreeBSD and other unix-like operating systems.)

1.0 GHz or faster CPU and 100 MB of available memory

Monitor with at least 1024 x 780 resolution (more is better)

Audio input and output devices supported by your operating system

Computer-to-radio interface using a serial port to switch on your PTT line and/or "CAT" control,

or a VOX for T/R switching.

Audio or equivalent USB connections between transceiver and computer

No need to synchronise your computer clock to UTC.

Installation and Setup

SIM_PSK can be downloaded from the SIM31 Home page, from

<http://www.on4nb.be/sim31.htm>.

NB: to avoid any incompatibility between different versions and obtain the best performance, please make sure that you have always the latest version installed.

Compare daily the released version number (V6XXX) on the SIM31 Home page.

It's easier to download the .rar file at first installation.

Create manually a reserved folder ; example c:\SIM31\ (only if first installation).

Extract the .rar file to this created folder (Several files will be unzip: SIM_PSK31_V6XXX.exe, sim_users_guide.pdf, sim_users_guide_fr.pdf , pskreporter.dll...)

Create manually a shortcut of the .exe file named SIM_PSK31_V6XXX.exe on your desktop, where xxx refers to the version number.

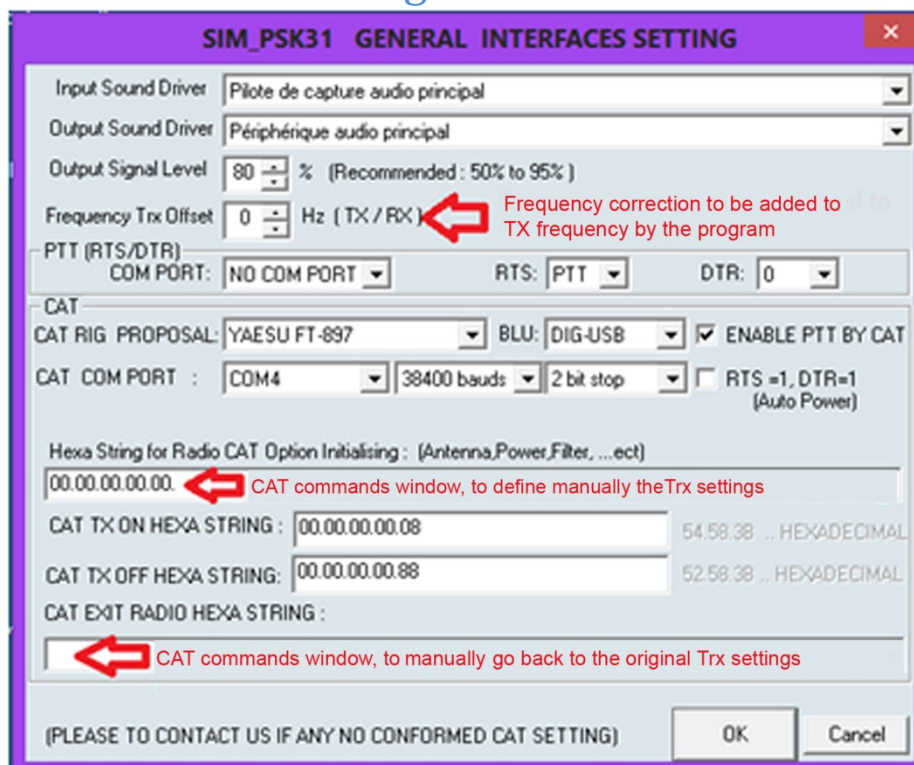
If you reinstall a new version within the RAR file, you will have to replace each time the desktop shortcut manually.

When sim-psk has already been installed, you can just download each new .EXE file, so the shortcut you made on your desktop will stay valid for each new version.

Execute the shortcut you created to start up SIM-PSK.

The first window is used to set your interfaces parameters...

Audio and TX settings :



Note that, it is important to verify / adjust your TX/RX transmitter offset frequency.

Both of the modes SIM31 and PSK31 require a zero beat frequency for a correct operation; An offset correction TX / RX could be required. This important parameter must be correctly estimated and corrected. In the window "offset Setting", write the correct value but with the sign inverted. This parameter is more important yet when you want to operate your transceiver as an automatic SIM QSO Station.

Note: when you send your first CQ calls, please check if the stations answer exactly on your frequency. If it is not the case, you can compare both frequencies in the upper window of the program.

For new generations of transceivers, there are generally not any frequency offset problems between TX and RX; so, in this case, the offset frequency correction must be ignored and let to zero.

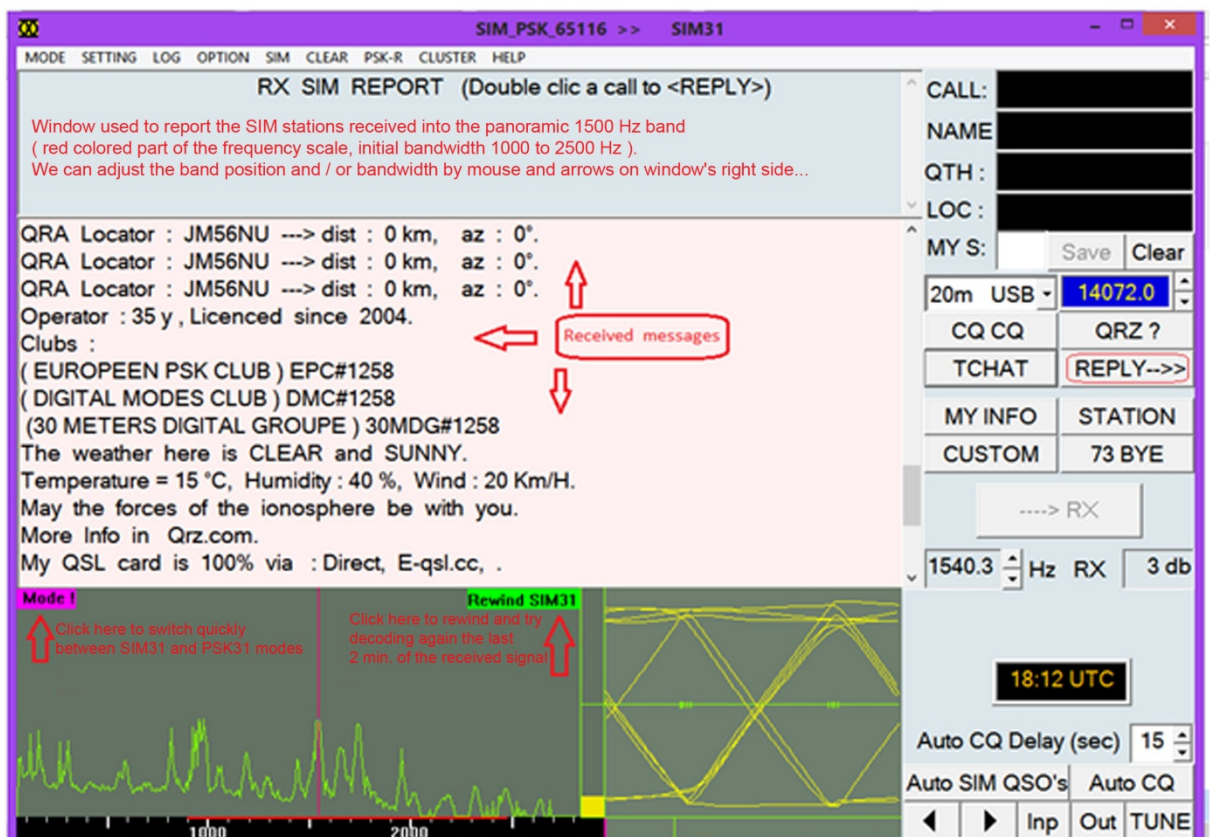
Important point : for a perfect decoding, your eye diagram must show that received signals are synchronised , any signal showing a scrolling can not be decoded correctly ; then to avoid this , you are invited to perform the sound card setting as below before your first call :
To run SIM_PSK under Windows, your sound card's raw sampling needs to be set at 48000 Hz.

Therefore, when running under Windows, open the Sound control panel ,Click on "Properties", then "Advanced", and select "16 bit, 48000 Hz (DVD Quality)" for "Recording" and for "Playback" devices.

If you are using the Windows default sound card, be sure to turn off the sounds generated by windows system to avoid sending them on the air.

For some Auto power USB port com cables, we need to force RTS and DTR=1 to provide the necessary power supply.

Sim-PSK main window :



To set the output audio level of SIM_PSK adapted to your transceiver, click down the "Tune" button on the main screen. SIM_PSK should switch the Transceiver in transmission for a few seconds. To set the output audio level of SIM_PSK adapted to your transceiver, click down the "Tune" button on the main screen. SIM_PSK should switch the Transceiver in transmission for a few seconds, and generate a steady audio tone of constant level. This level shows the signal which will be sent during a QSO in SIM31 mode.

Listen to the generated audio tone, using the audio monitoring of your radio or any other method. The tone must be perfectly smooth, with no clicks nor glitches. Increase the mixing control of audio output (playback) and then decrease the setting until the RF output will falls back to about 10%. This will be a good audio level to drive your TX. Release the Tune button to stop your test transmission. SIM31 is a QRP digital mode, then please don't overdrive your

transmitter by setting a too higher sound card output level, and you must try to suppress if any, the possible RF which can add inappropriate noises on your audio.

A poor audio quality means some spurious and/or interferences added on the transmitted signal of which you are responsible.

Input signal level must be adjusted by using the yellow vertical barograph, try adjusting the level slightly below the middle... the background noise must be clearly displayed into the spectral graph.

A weak barograph level is not optimal for decoding performance and to compute the S/N evaluation.

These optimal adjustments, on the same pc, remain optimal for all other digital modes regardless of used software.

NB : that's well known, with BPSK31 or SIM31 , you are invited to reduce the radio AGC gain to the minimum, in order to reduce signal distortions. Any other DSP function can also affect the received or transmitted signal, so we have to set off all these AF process options.

To configure your personal parameters, you have just:

to select the menu "Setting" and to fill in your personal infos (CALL , NAME, QTH , QRA , AGE, QSL ...etc) Not more than 12 characters for the Callsign, Name and QTH .

Personal info setting window :

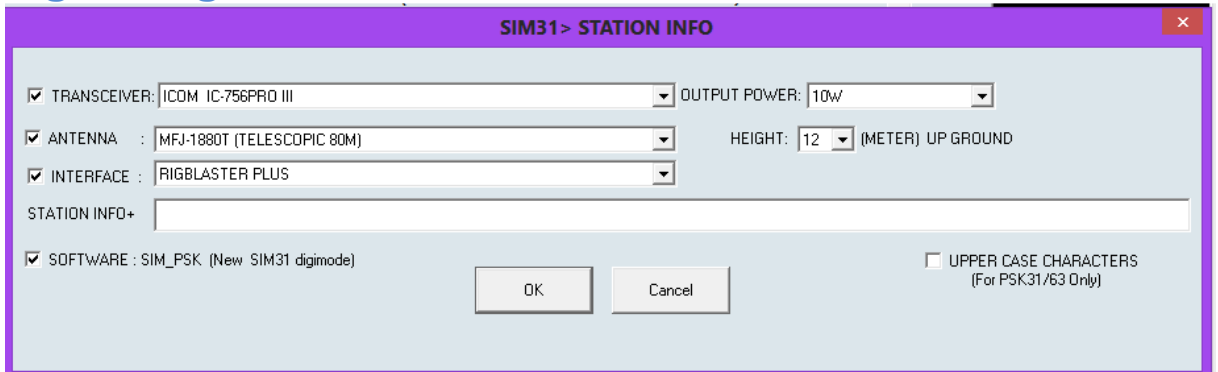
The screenshot shows the 'SIM31 > PERSONAL INFO' window. The fields are as follows:

- CALL: MYCALL (It's better, if possible, to avoid Prefix/Suffix with Call)
- NAME: MYNAME
- QTH: MYQTH + []
- GRID: JM56NU
- BIRTH: 1960 AGE: 35 Y YEAR LICENSED: 2004 AGE: XX YEAR YOUNG . LICENCED: XX
- CLUBS: EPC#1258 DMC#1258 30MDG#1258 (Example : EPC#12365 30MDG#1458 ...)
- WX: CLEAR AND SUNNY +
- TEMP: 15 °C HUMIDITY: 40 % WIND: 20 KM/H SNOW: 0 cm
- INFO IN : QRZ.COM QRZCQ.COM HRDLOG.NET HAMCOM.COM
- MEAN PARAM REPETITION: 2 (2 recommended)
- QSL: DIRECT BUREAU E_QSL.CC LOTW

Buttons: OK, Cancel

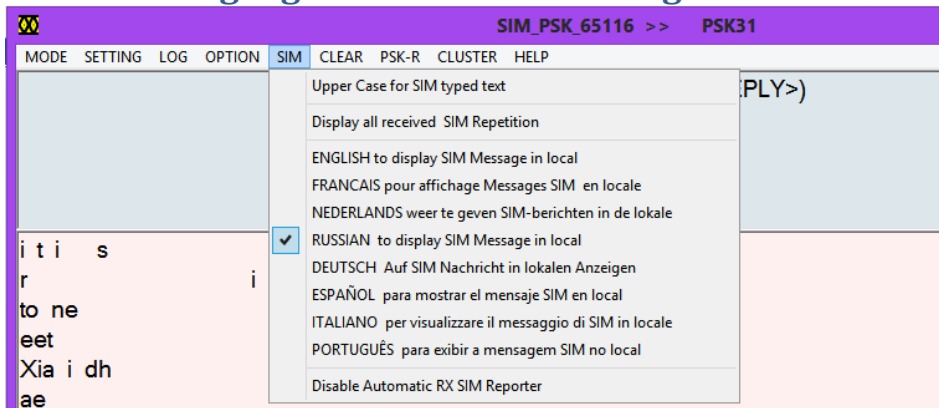
to fill your rig's info's (transceiver ,power , Antenna , height above ground).

Rig settings window :

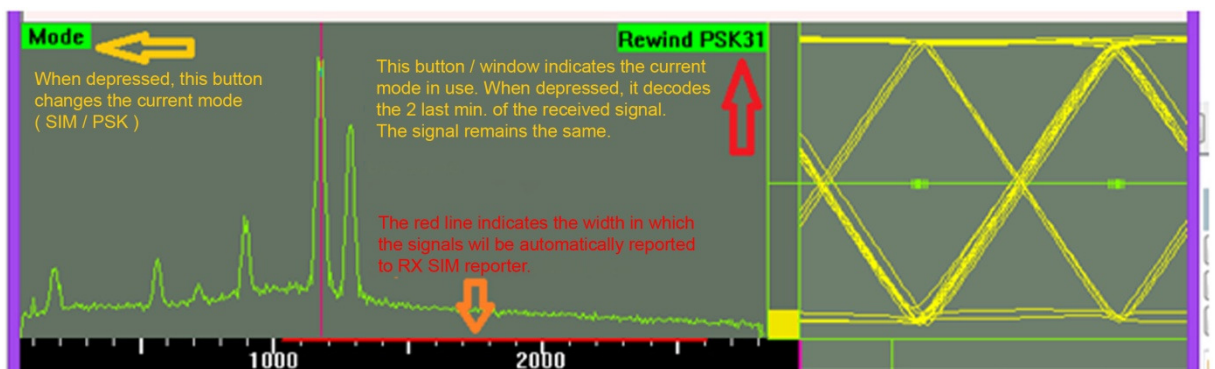


To select the favourite language, that sim-psk31 must use to translate the received SIM31 messages.

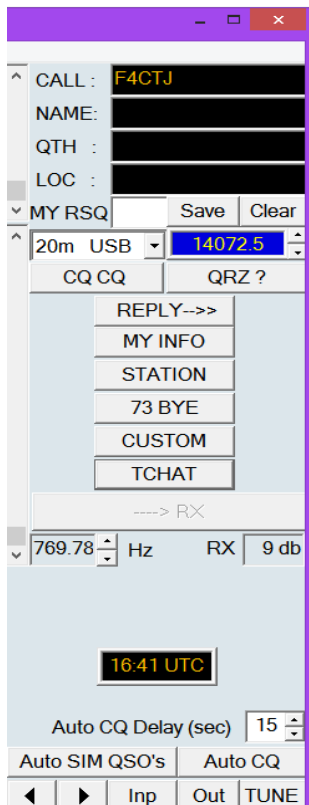
Choice of language for macros receiving :



Status Indicators :



On-Screen Controls :



TX Macros :

SIM31 mode is mainly a structured message based mode; it can also handle a classic plain text message but structured message was preferred here, because it's faster and more robust against noise and large spread distortions.

The most classic digital messages used by any hamradio were established in a messages list and coded as structured binary messages, faster and noise resistant.

You can prepare your Tx content by selecting within the messages list box what you want to send.

You can also prepare your own plain text messages based on the coded characters of the SIM varicode...

It remains possible to type a real time text by the keyboard as with classic BPSK31.

Reply window :

SIM_PSK > TX

Welcome OM <NAME>

-----> Good Day Dear OM

Thanks for this QSO it Has been a pleasur

Very good signal , 100% copied

<< name << qth

My info (name,qth,loc,wx...)
 My station (trx,ant,interface...)

HEADER ---> TX
START KEYB ---> TX

<< name << qth

no rain since 3 months

----->QSL

Tnx fer this fine and short QSO

I wish well and happiness to you and your family

pse kn
end sk

ALL ---> TX NOW

Save + Cancel

Log Book :

NB : In automatic QSO mode , the program will collect and save QSO's infos automatically, so there is nothing to do manually during an automatic QSO .

At the end , we have just to check the log result to correct any possible false collected infos, then export in ADIF format, and check the file before sending to eQSL.cc for example.

To save a QSO manually:

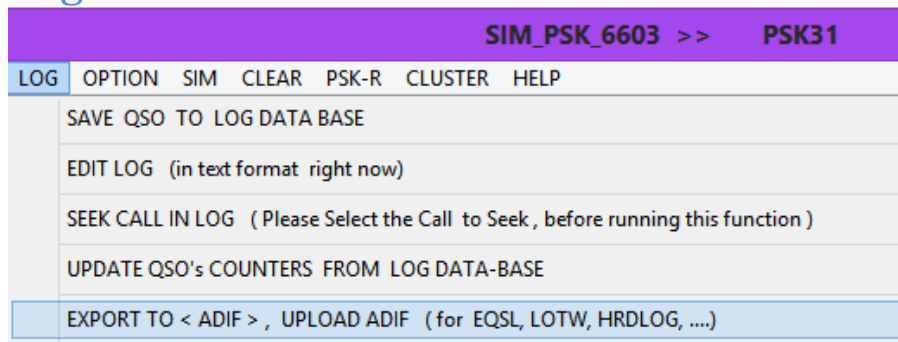
Except in some rare case, you will collect the received infos by a double-click on each word; it will transfer it into the reserved fields (upper right window) . You have just to check for their validity, and record it to the logbook by clicking on the save button....

In some exceptional case or with BPSK31 mode, you need to double click on the Name, QTH, LOC .. to copy it into the reserved pad before using the save button to record the QSO into the LOG data base.

Data collected during a QSO :



Log book utilities window :



Doing QSOs

By longstanding tradition and legal obligation, a minimal valid QSO requires the exchange of the call signs. A signal report and several other informations are also generally sent. SIM_PSK is designed to facilitate making such contacts, using short structured messages.

The process works best if you use these structured formats instead of plain text, and if you follow standard procedures.

The recommended basic procedure for a QSO should follow this sequence:

BUTTON CQ CQ : CQ CQ CQ DE ON2VH ON2VHF ON2VHF

BUTTON REPLY : ON2VHF ON2VHF ON2VHF DE F1ABL F1ABL F1ABL R-12

BUTTON MY_INFO: F1ABL F1ABL F1ABL DE ON2VHF ON2VHF ON2VHF RR-9

Hi Dear OM

NAME : LAURENT LAURENT LAURENT

QTH : PONT-A-CELLE PONT-A-CELLE PONT-A-CELLE

LOCATOR : JO20EM JO20EM JO20EM

HW? ***** BTU *****

F1ABL F1ABL DE ON2VHF ON2VHF PSE KN

BUTTON MY_INFO: ON2VHF ON2VHF ON2VHF DE F1ABL F1ABL F1ABL RR-12

Hi dear OM LAURENT

NAME : MICHEL MICHEL MICHEL

QTH : MOLLANS-SUR-OUVEZE MOLLANS-SUR-OUVEZE

LOCATOR : JN24OF JN24OF JN24OF

HW? ***** BTU *****

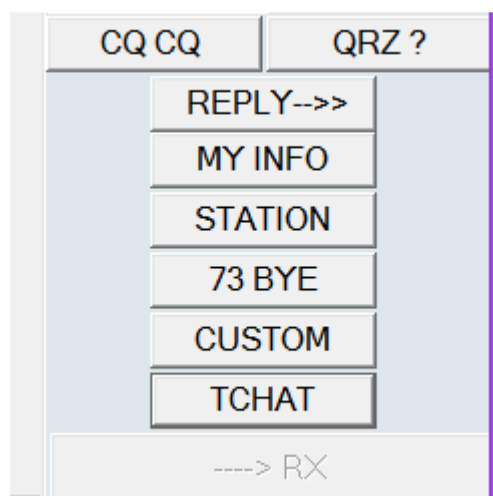
ON2VHF ON2VHF ON2VHF DE F1ABL F1ABL F1ABL PSEKN

BUTTON MY_STATION (ON2VHF).

BUTTON MY_STATION (F1ABL).

BUTTON BYE73 (ON2VHF)..

BUTTON BYE73 (F1ABL). End of QSO



Special Mouse Commands :

SIM RX REPORTER WINDOW	Double click onto any callsign in the SIM Rx reporter window to set all required parameters for a correct answer (Call sign, Mode, baud rate and frequency) and you are ready to <Reply> the selected callsign...
Received text window	Double click onto any call sign to put it into CALL Pad for Reply
	Double-click on the QTH to insert it into the QTH window (for message insertion and for saving it to Logbook).
	Double click on the Locator to put it into LOCATOR window (for saving it to Logbook).
SPECTRUM	Left click on a spectrum position: rewinds the last 2 minutes of the signal recorded and decodes it in 31 bauds default mode : PSK31 or SIM31.
	Right click on a spectrum position: rewinds the last 2 minutes of the signal recorded and decodes it in 63 bauds default mode (PSK63 or SIM63).

Technical Description:

Description of new digimode: SIM31 (Structured Integrated Message BPSK31.)

Name of software: SIM-PSK

Modulation : DBPSK « Differential Binary Phase Shift Keying ».

Speed : 31 bauds , 187 char/min (or 31.25 wpm).

Pulse shape : Similar to classic BPSK31

Bandwidth : About 50 Hz

Code : "varicode" able to encode characters or messages (words or full sentences.).

Demodulation : Differential (coherent demodulation tests are planned)

Synchronization : automatic on signal

Error correction : FEC (Forward Error Correction) tolerates one error bit per character

Convolution code : NO.

Interleaved: YES

Repetition : YES, only for some messages structured as CQCQ, QRZ, QRALOC, NOM, QTH,

Drift tolerance :20 Hz/min (depending on signal level).

Lower limit of intelligibility: -15.5 dB in text mode. Until -17dB in message mode (in presence of white noise with a bandwidth of 3 kHz)

Reception mode : indifferent (LSB or USB)

Note: The frequency adjustment is simplified by staying in USB on all bands

Characters set : 53 "fixed code" A..Z 0..9 <CR> <SPACE> . , : - = + ? ' () ! / @ # *

No delete character on error nor wait character. Lowercase characters are converted to uppercase,

Special Characters : The special characters such as "É" are converted into standard capitals characters (in this example: "E") but can be displayed in lowercases locally

Messages: The messages used by the hamradio are coded and structured.