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WSPR, EM and FT8 beacons (Multipsk V.4.48.6) - Rev. A

CONTENTS

1) Introduction

In this document, it will be found a small guide about the way to start WSPR, EM and FT8 beacons interfaced with a GPS receiver, for mobile stations.

Notes about the help in Multipsk:

- for the contextual help (extract of the manual for the called mode), click on the right button of the mouse, with the focus over the mode button, here « WSPR », “EM”, or “FT8”.
- use also the button hints. For this, wait a fraction of second with the mouse focus over the button.

2) GPS receiver

The GPS receiver, as for example the "VK-162" one, is installed outside. Its magnetic base permits to fix it on a steel sheet. Move aside the GPS receiver from the HF antenna and protect it from HF voltages with a clip-on ferrite. In general, a cable connects it to the PC on an USB port simulating a virtual serial port. So the GPS receiver transmits its data to the computer through this virtual serial port. Therefore, the user must first select the serial port (physical or virtual) related to this GPS receiver in the "**Serial port for GPS**" menu, on the Multipsk Configuration screen.

Advise 1: the HF power return on the PC can induce a loss of the mouse which can be solved by decreasing the HF power (or thanks to ferrites or to a shield). In case of Multipsk locking possibly due to a strong HF power return through the GPS receiver cable, disconnect this cable from the PC.

Advice 2: for old PCs (≤ Windows Vista and probably Windows 7), before purchasing a GPS receiver, be sure to be able to download the Windows driver matched to the GPS receiver, from the WEB...

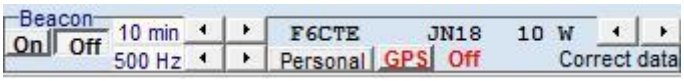
3) GPS window and WSPR beacon

3.1 Introduction

Thanks to the GPS receiver, the Locator and the right time necessary for the transmissions of WSPR frames by the beacon, will be automatically determined.
So other Hams will be informed, in real time, about your rough position displayed on a map, which can be useful if you are mobile (by car, boat etc). However, it should be noted that the Locator being on 4 characters, the accuracy of the received position is not very good (about +/- 100 km). For a much better accuracy it will be used either the Locator beacon or the GPS beacon in EM mode (see the §4 below).

3.2 Start up

Once in WSPR mode. The WSPR beacon panel appears as shown below.



The beacon activation is done with the "**On**" button and the deactivation with the "**Off**" button.

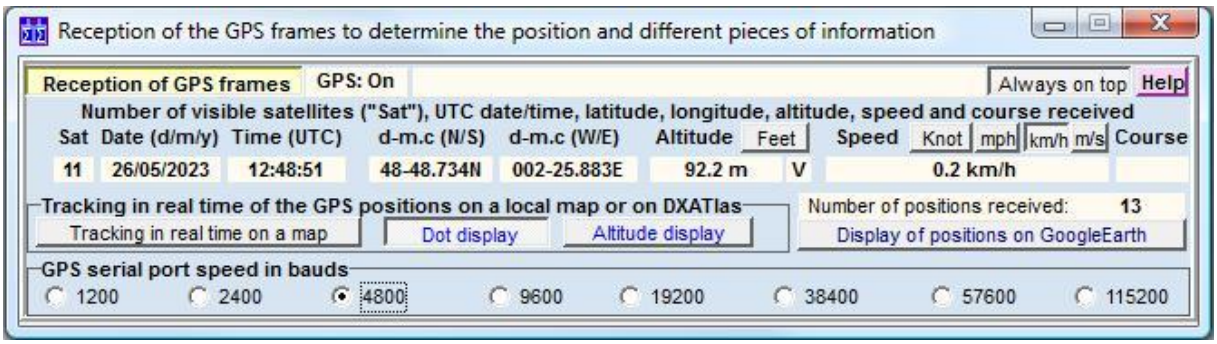
The **time interval** between 2 WSPR transmissions can be adjusted between 2 and 30 minutes.

The **central frequency** of the beacon transmissions can be adjusted between 400 and 600 Hz.

The **transmission power** must be specified, between 1 mW to 1000 W.

The call sign and the Locator are extracted from your personal data (click on the "**Personal**" button). They are immediately checked.

For a mobile station, click on the "**GPS**" button to open the "**GPS**" window.



Push on the "**Reception of GPS frames**" button to start the GPS frames reception. The Locator 4 characters will be updated according to the GPS position.

If the "**Display of the GPS positions on the map**" button is pushed, it is displayed, on the map, the GPS positions under the shape of a red dot if « **Dot display** » is pushed. To make work this function, it is necessary to have first clicked on "**Local**

map" or on "**DXAtlas**" or on "**OMMap**" (mapping program included in the Multipsk suite), at the panel of controls level on the Multipsk "RX/TX" screen.

Click on the « **Help** » button for details.

Example of decoded WSPR Locator frame:
12:33 | -1 dB | 19.7 s | 0.0 Hz/mn | 500 Hz | Msg type 1 | F6CTE JN18 10 W 32 Mi

Note: the first pieces of information are respectively the UTC time, the signal-to-noise ratio in dB, the time offset in seconds, the drift rate in Hz/minute, the AF frequency and the message type. The last piece of information is the distance between your QRA and the mobile station.

3.3 To see your transmissions (on WSPRnet or on PSKReporter) or to export your receptions (on PSKreporter)

WSPRnet

The "**WSPRnet**" button permits to see the receptions of your transmissions (or the ones of other Hams) on the map associated to the Internet WSPR database "https://www.wsprnet.org/drupal/wsprnet/map". You need a connection to the WEB. Afterwards, you will have to choose a call sign and a Ham band.

Automatic export of WSPR received frames toward PSKReporter

The WSPR frames received in the form "Call sign" + "Locator" ("Msg type 1" and "Msg type 3" types) can be automatically exported toward PSKReporter by pushing on the "**Automatic data transfer**" button of the PSKReporter window.

Note that "**PSKReporter**" is a menu item located at the top of the Multipsk RX/TX window. It is reminded that the PSKReporter map can be seen here: https://pskreporter.info/pskmap.html.

4) EM beacons

4.1 Introduction

The « EM » mode permits to use two types of beacon:

- One transmitting the 6 characters Locator (accuracy +/- 4 km), preceded by the call sign (12 characters maximum) and followed by the power transmitted (1 mW to 1500 W), the type of antenna plus its directivity and a free text of 26 characters. This beacon is rather aimed to a fixed station. However, thanks to a GPS tracking position, the station can be mobile and so can be tracked.

- One transmitting the exact GPS position (+/- 1 m but in fact limited by the GPS accuracy, i.e. about +/- 10 m) plus the altitude, preceded by the call sign (12 characters maximum) and followed by the UTC GPS date/time, the number of satellites received, the speed over ground (in knots), the course over ground (in °), the power transmitted (1 mW to 1500 W), the type of antenna plus its directivity and a free text of 10 characters. This beacon is aimed to a mobile station.

Notes:

- Thanks to the Reed Solomon coding and to a checksum, the probability to display a false beacon frame is extremely weak.

- These EM beacons can be tested with the EM_LOCATOR_BEACON.WAV and EM_GPS_BEACON.WAV files of the Multipsk collection of sound files. For explanations, see: http://f6cte.free.fr/About_the_collection_of_Multipsk_sound_files.pdf

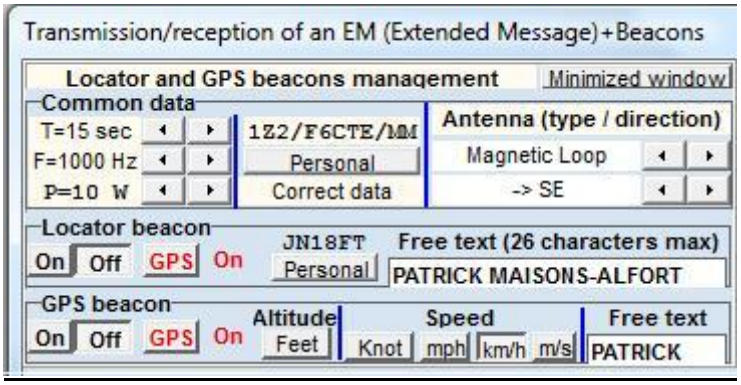
- For more details (included for beacons), EM specifications Version 3 are given here: http://f6cte.free.fr/SPECIFICATIONS.ZIP

- The received positions can be displayed on a **local map** or on **DXAtlas** or on **OMMap** (mapping program included in the Multipsk suite). The road traveled can be displayed on GoogleEarth or on OMMap.

- For the EM, FT8 and WSPR modes (and for the other modes), for other local maps that the ones supplied by Multipsk, you can consult: http://f6cte.free.fr/MAPS.ZIP . You can also export a map from OMMap.

4.2 Start up

Once in EM mode, the 3 EM beacon panels appear as shown below.



4.3 Locator (6 characters) beacon

To start this beacon, it is necessary, first, to fill the "**Common data**" panel, with the following pieces of information.

- The time interval between 2 EM transmissions: 15 seconds to 30 minutes.
- The central frequency of the EM beacon: 200 to 2500 Hz.
- The transmission power: between 1 mW to 1500 W
- The call sign: it is extracted from your personal data (click on the "**Personal**" button to supply it).
- The type or the gain of the antenna must be chosen among the different antenna types proposed.
- The directivity of the antenna must be chosen among the 8 proposed directions (for example, "NW" for "North West")

Afterwards, it is necessary to fill the "**Locator beacon**" panel, with the following pieces of information.

- The **Locator**: it is extracted from your personal data (click on the "**Personal**" button to supply it).
- The "**Free text (26 characters max)**". You can fill it, for example, with your first name, QTH, etc..

The beacon activation is done with the "**On**" button and the deactivation with the "**Off**" button.

For a mobile station, click on the "**GPS**" button to open the "**GPS**" window Refer to the explanations about this window supplied for the WSPR beacon, above (§3). The Locator 6 characters will be updated according to the GPS position.

Example of decoded EM Locator frame:

```
1001 Hz [14:38:55] (+12 dB): F6CTE        JN18FT    10 W
Magnetic loop     -> E   PATRICK MAISONS-ALFORT         0 Mi
```

Note: the first pieces of information are respectively the AF frequency, the local time and the signal-to-noise ratio in dB. The last piece of information is the distance between your QRA and the mobile station.

On the waterfall:

4.4 GPS beacon

To start this beacon, it is necessary, first, to fill the "**Common data**" panel as for the Locator beacon (see above)

Afterwards, it is necessary to fill the "**GPS beacon**" panel, with the following pieces of information.

- The **speed** (over ground for boats) expressed in **knot**, **mph**, **km/h** or **m/s**.
- The **altitude** expressed in meters ("**m**") or in feet ("**ft**"), if the "**Feet**" button is pushed.
- The "**Free text**". You can fill it with a text of 10 characters maximum, as for example your first name.

The beacon activation is done with the "**On**" button and the deactivation with the "**Off**" button.

Click on the "**GPS**" button to open the "**GPS**" window Refer to the explanations about this window supplied for the WSPR beacon, above (§3). The transmitted pieces of information will be the ones received by the GPS receiver.

Example of decoded GPS Locator frame:

```
1001 Hz [14:40:08] (+11 dB): F6CTE          9 sat. 12:38:38
13/05/2023  48-48.703N 002-25.868E           94 m         0.1
mph         ?    10 W Magnetic loop     -> E   PATRICK         1
Mi
```

Note: the first pieces of information are respectively the AF frequency, the local time and the signal-to-noise ratio in dB. The last piece of information is the distance between your QRA and the mobile station.

4.5 To see your transmissions on PSKReporter or to export your receptions on PSKreporter

Automatic export of EM beacon frames toward PSKReporter
Received beacon EM frames can be automatically exported toward PSKReporter by pushing on the "**Automatic data transfer**" button of the PSKReporter window. Note that the position "latitude+longitude" is transformed in a Locator 6 characters..

Note that "**PSKReporter**" is a menu item located at the top of the Multipsk RX/TX window. It is reminded that the PSKReporter map can be seen here: https://pskreporter.info/pskmap.html.

5) FT8 beacon

5.1 Introduction

It is proposed a simple FT8 beacon, transmitting a message, in "free text" format, of the following type:

- Call sign followed by "+", followed by the 6 characters Locator, as for example, "**F6CTE+JN18FT**". Note that the received positions will be displayed on a map or on OMMap.
- Call sign followed by "-", followed by a free text of 6 characters maximum, as for example, "**F6CTE-BEACON**" or "**F6CTE-30 W**".
- If the Locator and the free text are both selected, it will be transmitted alternately one or the other message, as for example:
  F6CTE+JN18FT
  F6CTE-BEACON
  F6CTE+JN18FT
  F6CTE-BEACON...

To be decoded by other programs as WSJT-X", "JTDX" etc, it is compulsory that the PC clock be synchronized with the true UTC time (by using CLOCK, for example).

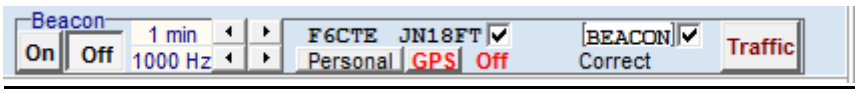
So other Hams will be informed, in real time, about your rough position displayed on a map (local map or (OMMap or DXAtlas)), which can be useful if you are mobile (by car, boat etc).

Notes:

- This FT8 beacon can be tested with the FT8_BEACON.WAV file of the Multipsk collection of sound files. For explanations, see: http://f6cte.free.fr/About_the_collection_of_Multipsk_sound_files.pdf
- The received positions can be displayed on a **local map** or on **DXAtlas** or on **OMMap** (mapping program included in the Multipsk suite). The road traveled can be displayed on OMMap.

5.2 Start up

Once in FT8 mode, the FT8 beacon panel appears as shown below.



To start this beacon, it is necessary, first, to give:

- The time interval between 2 FT8 transmissions: 15 seconds to 30 minutes.
- The central frequency of the FT8 beacon: 200 to 2700 Hz.

- The call sign and the Locator 6 characters: They are extracted from your personal data (click on the "**Personal**" button to supply them).
- The free text (6 characters max) (“BEACON” above). Note that the frame is completed with final spaces until to reach 13 characters.

It can be checked (ticked) either one beacon or both (default option).

The beacon activation is done with the "**On**" button and the deactivation with the "**Off**" button.

For a mobile station, click on the "**GPS**" button to open the "**GPS**" window.
This "**GPS**" window makes possible the reception of "$GPRMC" and "$GPGGA" GPS frames, these ones permitting the determination, in real time, of the position of your Ham station and the UTC time. So the Locator and the right time for the transmissions of FT8 frames by the beacon will be automatically determined.

Refer to the explanations about this window supplied for the WSPR beacon, above (§3).

Example of decoded FT8 beacon frames:

```
20:00:01 |  13 dB | 1000 Hz | Beacon (Ft)| F9XYZ+JN28FS          149 Km | France
20:00:06 |  13 dB | 1000 Hz | Beacon (Ft)| F9XYZ-BEACON                | France
```

The displayed pieces of information are respectively: the UTC time / the signal-to-noise ratio in dB / the AF frequency / the FT8 message type (“Beacon” here) / the FT8 beacon message / the distance between your QRA and the station / the country from which the beacon transmits.

On the waterfall:

5.3 To see your transmissions on PSKReporter or to export your receptions on PSKreporter

Automatic export of FT8 beacon frames toward PSKReporter
Received beacon FT8 frames can be automatically exported toward PSKReporter by pushing on the "**Automatic data transfer**" button of the PSKReporter window.

Note that "**PSKReporter**" is a menu item located at the top of the Multipsk RX/TX window. It is reminded that the PSKReporter map can be seen here:
https://pskreporter.info/pskmap.html