**Quick-Start Guide for MAP65 v2**

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**Summary:** Version 2 of MAP65 provides support for single- as well as dual-polarization systems, for sample rates 95238 and 96000 Hz, for JT65 sub-modes A, B, and C, and for direct soundcard input as well as input routed through Linrad or SDR-Radio.  These capabilities mean that MAP65 2 is usable with any of the following hardware and software combinations:

* WSE with Linrad or direct input from a 4-channel soundcard
* IQ+ with Linrad or direct input from a 4-channel soundcard
* SDR-IQ or other RFspace radios with Linrad or SDR-Radio
* FUNcube Dongle with Linrad, SDR-Radio, or direct USB input to MAP65
* SoftRock or similar with Linrad, SDR-Radio, or direct input from a 2-channel soundcard

Together with a dual-polarization antenna and receiver, MAP65 makes for a superb EME system at 144 or 432 MHz.  The same is true for single-polarization systems at 1296 MHz.  Screen shots showing MAP65 2.2 in operation on 144 MHz are posted at <http://www.physics.princeton.edu/pulsar/K1JT/MAP65_2.2.png> and <http://www.physics.princeton.edu/pulsar/K1JT/MAP65_Main_Window.png>.

**Quick-Start Instructions:**

1. Use something like “C:\MAP65” rather than “C:\Program Files\MAP65” for the installation directory.
2. Download and install MAP65 from a link on the following page:  
   <http://www.physics.princeton.edu/pulsar/K1JT/map65.html>
3. On the final screen of the installation wizard you will be offered a chance to run a program that configures optimized FFT routines for your particular computer.  Choosing the first (default) checkbox will be adequate for most purposes, and will result in an optimization process that takes a few minutes.  Later, you may want to run the batch file "wisdom2.bat" in the installation directory to gain a small additional speed advantage.  This second-level optimization may take as long as an hour. Wait until the optimization procedure finishes before proceeding.
4. Start MAP65 by clicking on its desktop icon.
5. On the **Station** tab of the **Setup | Options** screen, enter your callsign, grid locator, and other parameters as required for your station setup.  Be sure to check **Xpol** if yours is a dual-polarization system, and uncheck it for single polarization. In the box labeled **Fadd**, enter the difference between the frequency reported by Linrad or SDR-Radio and the corresponding on-the-air frequency.  For example, if your system converts 144.100 MHz to 28.100 MHz, enter 116.0 for **Fadd**. For now you may leave parameters **Fcal** and **Dphi** set to zero. (You may wish to optimize their values later.)
6. Go to the **I/O Devices** tab.  If you check **SoundCard** input, choose the proper audio input device from the drop-down list.  Depending on your hardware setup, it might be necessary to check the box labeled **Swap SoundCard I/Q**.  If you check **Network UDP Packets**, select the correct input sample rate for your hardware — either 96000 or 95238 Hz. Depending on the way you have configured Linrad or SDR-Radio, you might need to change the network **Port** number from the default value 50004. Choose the output device you wish to use for Tx audio.
7. If your receiver uses the Si570 synthesizer chip and you want MAP65 to be able to set its frequency, go to the **Si570** tab and set parameters **Frequency multiplier** and **Frequency correction (ppm)** as needed. The IQ+ receiver uses a frequency multiplier of 2, while the SoftRock uses 4. If you know that the Si570 master oscillator is off frequency, you can enter a suitable correction in parts per million (ppm). The commanded Si570 frequency will be **Multiplier** × (1.0 + 0.000001 × **Correction**) × **ForceCenterFrequency**. Check the box labeled **Initialize IQ+ on startup** if you want your IQ+ receiver to be reset each time MAP65 starts.
8. Click **OK** to dismiss the Setup dialog window.
9. If you are using a FUNcube Dongle, you can set its parameters by clicking the item **FUNcude Dongle Settings** on the **Setup** menu.
10. On the **Mode** menu, select JT65 sub-mode A, B, or C.
11. Position the five main windows of MAP65 as you wish, possibly resizing some of them as desired.  An example of the arrangement I use is shown in the first screen shot mentioned above.
12. If you will be using Linrad or SDR-Radio, start that program and be sure it is configured to send data packets to MAP65 on the port number you selected (default 50004).  In Linrad, you want the “timf2” data packets. When everything is working properly the vertical colored “thermometer” bars should show signal levels around 20–30 dB. Click the **Auto Zero** button at the bottom of the waterfall window to adjust its zero level.  If you are using soundcard input or a FUNcube Dongle, enter the center frequency (for example, 144.125) at bottom right of the Waterfall and check the box labeled **Force Center Freq (MHz)**.  This is the frequency converted by your receiver hardware to zero frequency in the I/Q baseband data.  If you are using the IQ+ receiver, click **Set Rx Freq** to command the receiver's Si570 synthesizer to the correct frequency.
13. You may want to adjust the spinners labeled **Freq Span** and **Freq Offset** for the most pleasing display of the desired portion of the band. For normal EME activity on the 2m band you will probably want to display a range something like 144.100 to 144.160, which shows on the screen as 100 to 160. On 432 or 1296 MHz, an appropriate range is something like 0 to 90 (i.e., 432.000 to 432.090, etc.).
14. You should now be ready to use MAP65.

**I/Q Calibration:**

1. Have MAP65 running in the usual way. Check **2D Spectrum** on the Wide Graph window, which causes the lower (zoomed) waterfall to be replaced by a spectral plot. Reduce the value of **N Avg** to 2.
2. Introduce an unmodulated signal strong enough to produce a narrow spike 2-3 cm high in the spectral plot. Click on this spike, thus marking it with a green tick on the upper and lower frequency scales. A red tick will appear at the image frequency, an equal distance on the other side of the zero-frequency notch. You will probably see a signal at the image frequency, perhaps something like 35 dB down from the main signal (roughly 1/3 its height).
3. Select **Adjust I/Q Calibration** on the **Setup** menu. In a few seconds a message will appear in the decoded text window showing the relative amplitudes and phase errors (in radians) of the I and Q channels.
4. Check **Apply I/Q Calibration** on the **Setup** menu. The image signal should disappear.

**Noise Blanker:**

1. Check the box labeled **NB** to activate the noise blanker.
2. Adjust the blanking level by moving the horizontal slider. The percentage of blanked samples is displayed as the third number in the status-bar box labeled **Rx noise**. A good setting is somewhere around 0.1 to 1 % under quiescent conditions.

**Selection of Colors and Waterfall Palettes**

1. Options are available for setting the color scheme used in the **Band Map** and **Messages** windows. The **Colors** tab on the **Setup** screen allow you to set the background color and the colors for “newest” through “oldest” callsigns and messages to anything you like. Colors are specified in RGB (red, green, blue) format. Click the **Color Selector** button to bring up a utility that lets you test and select potential colors.
2. Four different waterfall palettes may be selected from the **View** menu.