

Genesis G11 RX & TX Calibration

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Now that you have completed at least the receiver portion of your G11, you can start on calibration. For RX there are basically three calibrations to be done. First is the input gain, second, image rejection, and third, the panadapter/S-meter level calibration.

1) **SOUNDCARD INPUT GAIN.**

Some soundcards and driver combinations require setting the input gain to achieve the best SNR with your particular setup. In some cases, you will not be able to change the gain, or, it just won't make any noticeable difference.

For most built-in soundcards, the only control you have over the input gain is either in the proprietary software that came with the device, or, in windows mixer, or sound device settings. Some audio devices, such as EMU by Creative labs, have a hardware gain control, these, obviously are adjusted via the hardware, not software.

There are so many possibilities, I will not try to cover them all here. But rather. Point you in the general direction.

The general procedure is this:

Using either a good strong, steady AM carrier, OR an injected signal from your signal generator (can be an "S-9 generator", the Elecraft SG2, or SG3... a second HF transmitter, or a bench signal generator). Start GSDR, and set the LOSEC so that your target signal is in the panadapter window.

For a helpful measuring grid, go to Setup > Display. In the 'Display Grid' box, check Vertical Grid and Horizontal Grid. You can change the 'Step' so your amplitude (dbm) scale is marked off at whatever step you like. (I set mine to 6).

Now, the idea here is to set the input gain in such a way that the signal is as strong as it can be, while the noise floor stays as LOW as possible.

Adjust the input gain, software or hardware, from 0 , upwards while watching the peak of the carrier, and the noise floor.

When you start, you may see the carrier only rise, and then after a certain point, the noise floor starts to rise. At this point, your input gain is set to optimal level.

Now, the EMU line (and others) adds a bit of a twist to this because there is a left and right hardware input gain control. In a case like this you need to balance the input gain very closely, AND set it for the best SNR.

To do this, you need to first go to Setup > General > Calibration... Press the STOP button in the WBIR box. Now starting with both input gain controls set fully counterclockwise... slowly increase the left control, until you reach the same ideal level as for other cards... when the carrier is the strongest, and the noise floor JUST starts to rise..stop there.

You may notice that the carrier's IMAGE signal (over on the other side of the panadapter display) is now almost as strong as the carrier.

Now, slowly increase the RIGHT control until you see a big drop in the image's strength, try to adjust the right control until the image is as weak as possible.

That's is , the hardware and software input gain is set.

As I mentioned, sometime's the software input gain makes no difference, other than to raise BOTH the carrier and the noise floor equally. In this case, just set for some minimal value (say 1-10) and leave it be.

2) RX IMAGE REJECTION CALIBRATION

Step 1. Hardware adjustment.

In basic terms, the 'images', or unwanted mirror image signals you see on your panadapter display are caused by an imbalance in the receiver and soundcard. (yup, same as balancing your stereo speakers...)

In order for the software image rejection to effectively null out these unwanted signals, the hardware must be as close to balanced as possible.

On G11 we will be adjusting 2 potentiometers to achieve this. **P1R**, and **P2R**. (See last page for location).

For this adjustment you need to inject a good STRONG signal on the band that is approximately mid-range of your G11 operating bands. For this example, I will use 20 meters.

The first step is to start GSDR, set LOSC to 14.100mhz.....

Start your signal generator, set to 14.110mhz.

Now, press the STOP button in GSDR (Setup > General > Calibration)

You should see your carrier at 14.110mhz, and a weaker image signal at 14.090mhz. (See Image 1.)

(if these are reversed goto Setup > Audio.. check the box next to "RX Swap I/Q"... click Apply. NOTE: you may have to go click on STOP in WBIR again now)

Adjust Pot **P1R** until the image signal is at the lowest amplitude possible.

Next, press "AF Preamp" on main screen.

Adjust **P2R** until the image signal is at the lowest amplitude possible.

The hardware RX image rejection is done. (See Image 2.)

No further adjustment to P1R, or P2R is needed.

STEP 2. Software Adjustment.

GSDR uses "WBIR" (Wide Band Image Rejection). Which is a nifty routine that takes image signals and drops them into the noise floor, all automatically. But, in order for WBIR to work correctly, it needs a starting point. In this step, we will give it that starting point.

The setup is all the same as the previous step, but MAY need to be done on each band. (I have found that on my G11, that I did not even NEED to do this step, but I recommend that you do it at least once)

The first step is to start GSDR, set LOSC to 14.100mhz.....

Start your signal generator, set to 14.110mhz.

You should see your carrier at 14.110mhz, and a weaker image signal at 14.090mhz.

(you may notice that WBIR has already dropped the image signal into the noise, but still proceed)

In GSDR Setup > General > Calibration. In the RX Image Reject Cal box.... Press RESET.

The image signal will jump up a ways, then sink back into the noise.

After a few seconds, Press SAVE.

Now you can go check other bands with the same setup, inject a signal and if the image signal shows up, do the steps outlined above for that band.

If WBIR takes care of the image signal quickly (you won't even SEE the image appear) then you're all set. (See Image 3.)

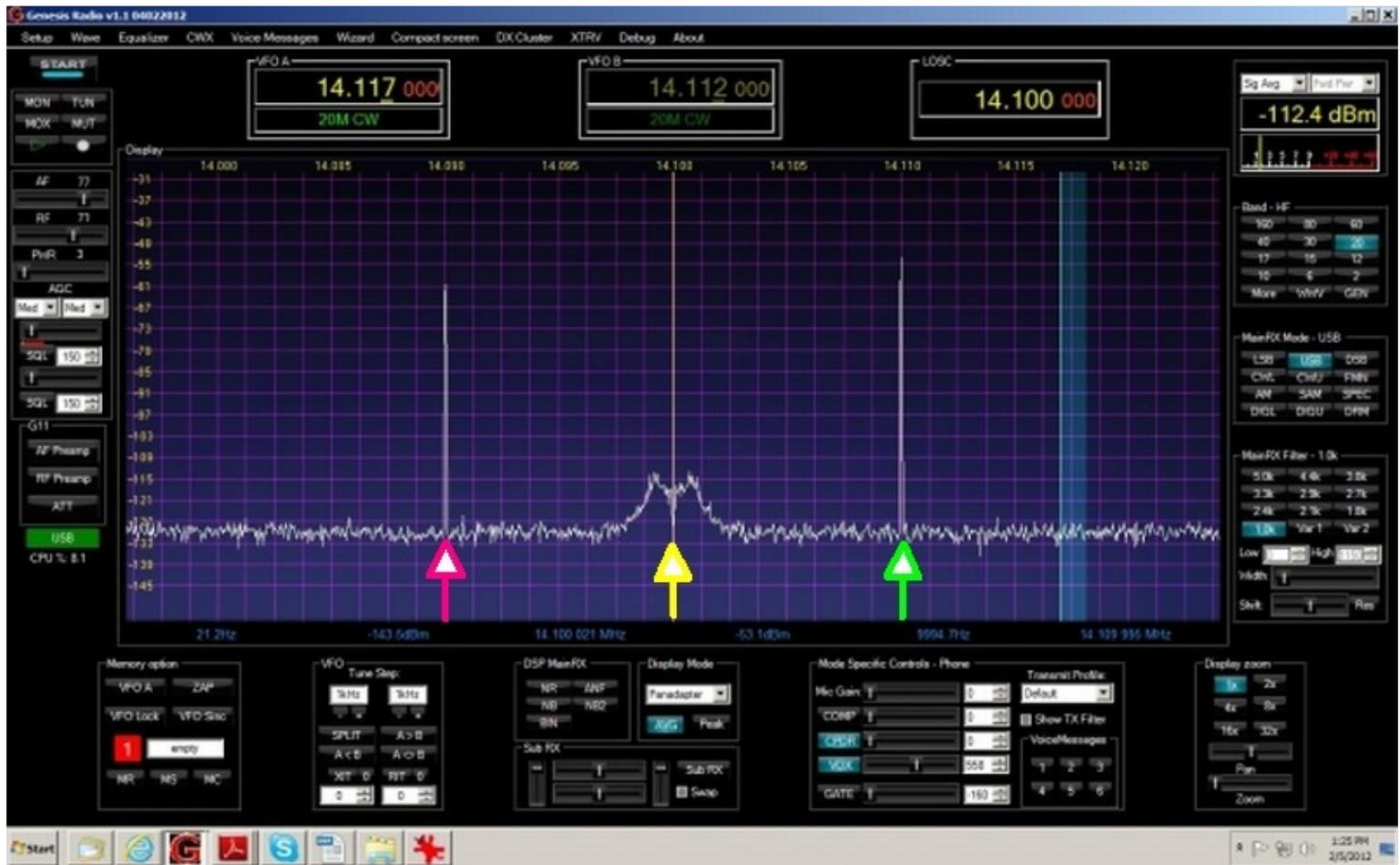


Image 1. Carrier (green arrow). Image (Pink arrow).
 This is what you will likely see before any adjustments are done.
 Note the image signal is only about -7dbc (7db below the carrier)

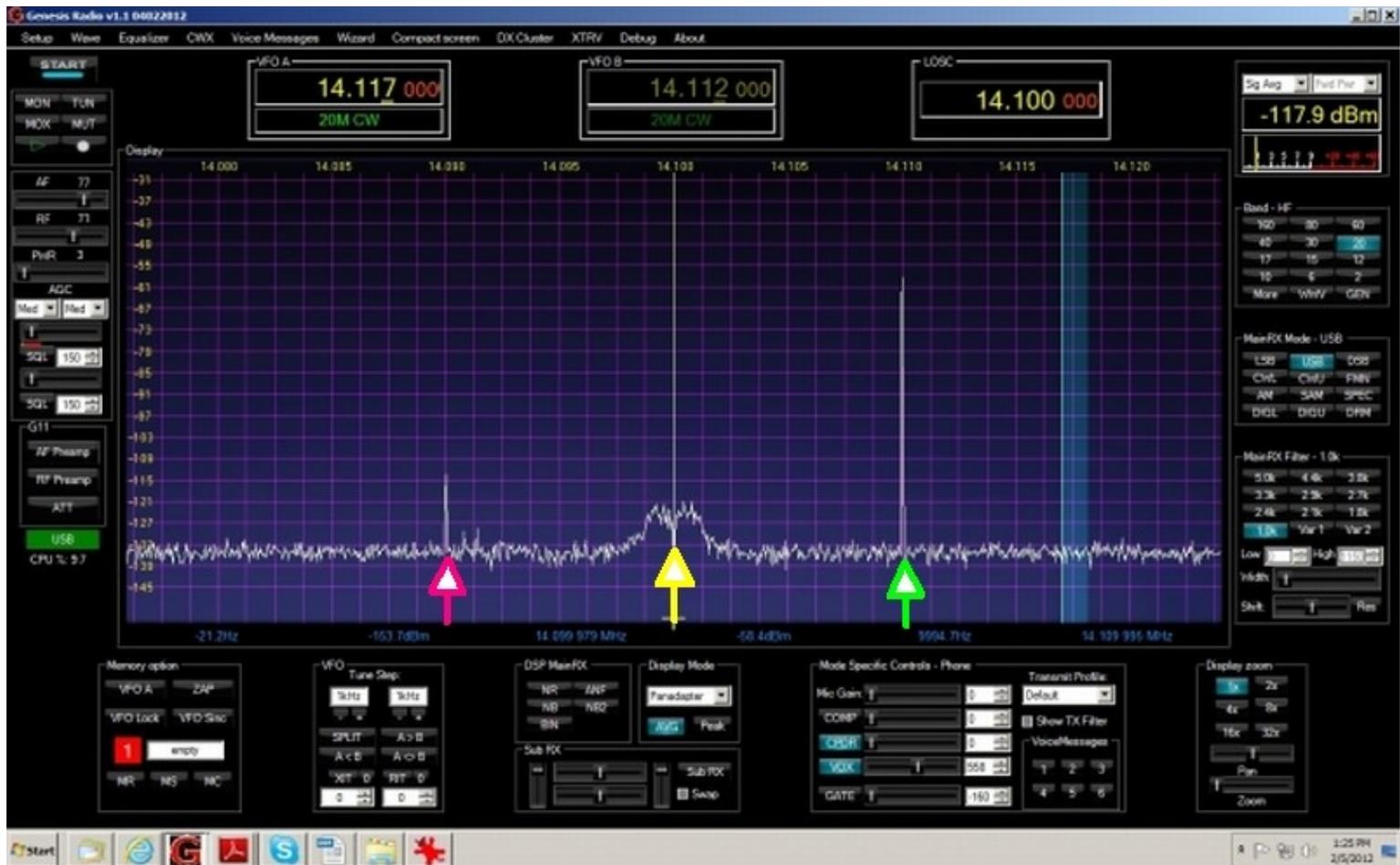


Image 2.

This is after hardware adjustment. Note the image signal is now approx -54dbc.

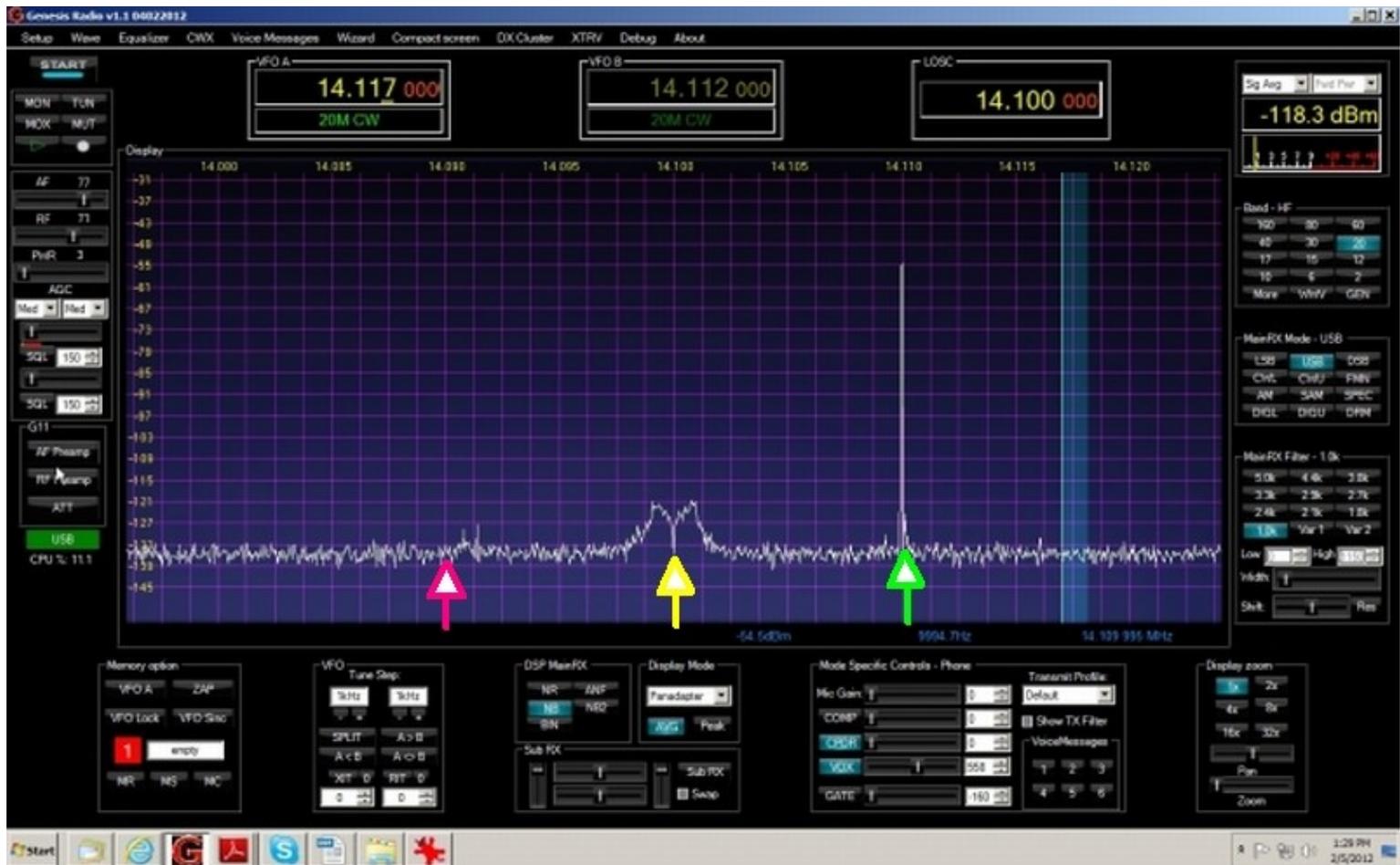
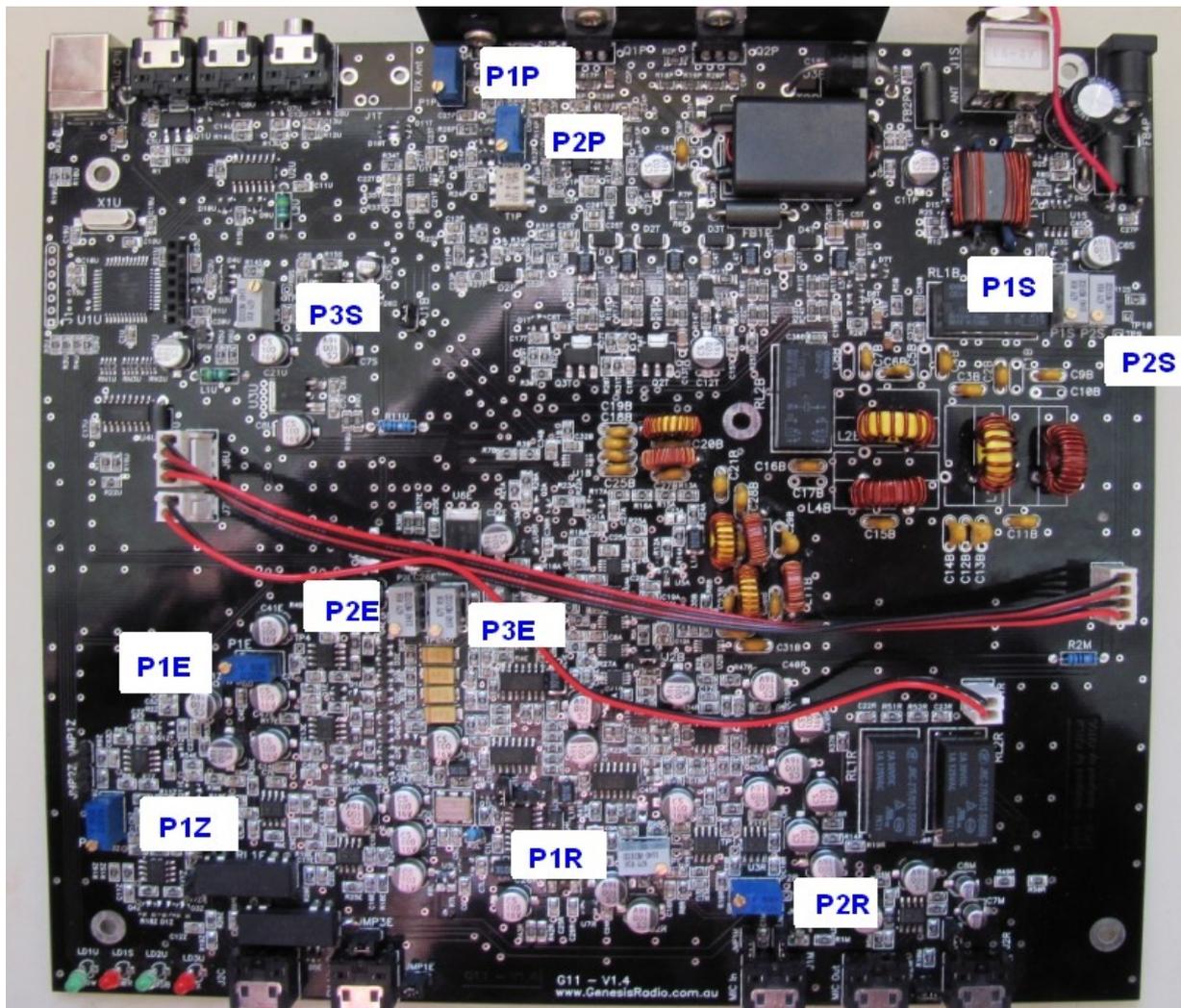


Image 3. This is after WBIR "RESET/SAVE"
 Note the image is now completely in the noise, approx -80dbc.

Location of adjustment potentiometers



P1R	Receive Image rejection adjustment
P2R	Receive Image rejection adjustment with AF Preamp ON.
P1Z	CW monitor sidetone volume
P1E	Transmit image rejection
P2E	Local oscillator null
P3E	Local oscillator null
P1S	SWR/Power meter cal. Reflected power adjust
P2S	SWR/Power meter cal. Forward power adjust
P3S	High SWR protection level adjust.
P1P	PA bias adjust, Q1P
P2P	PA bias adjust, Q2P