

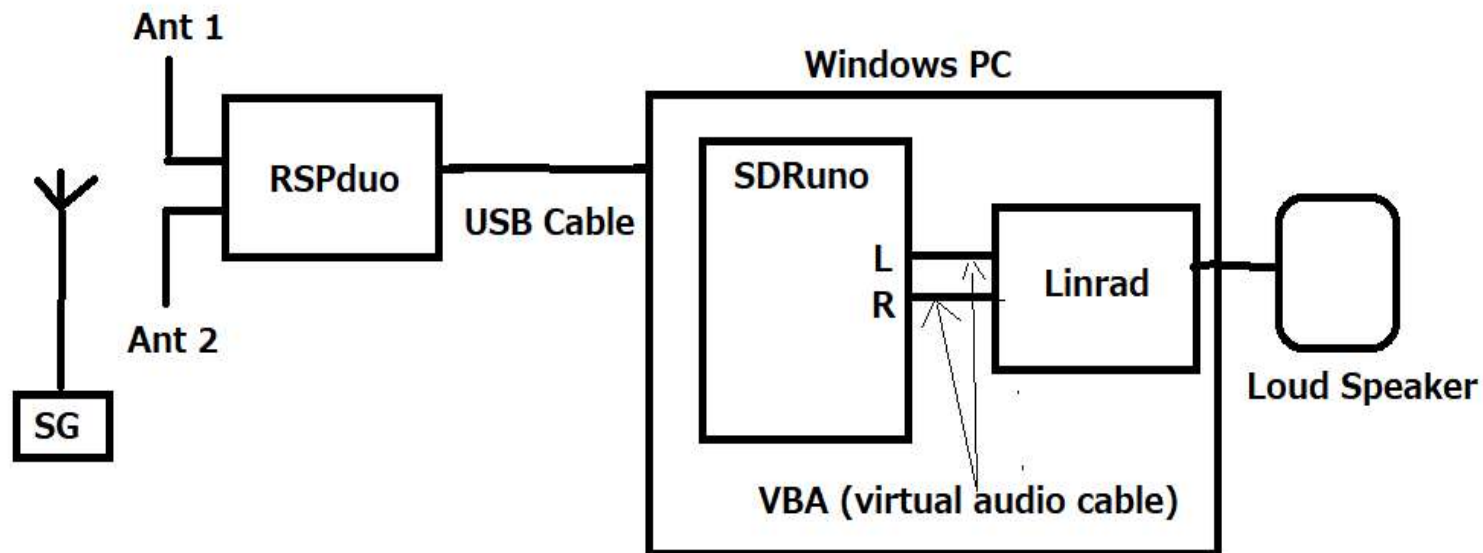
## Experiment of Noise Cancellation by RSPduo / SDRuno + Linrad (SDR Soft) Part 1 (Setting) Since

RSPduo has two tuners sharing LO (Local Authority), use it also for software cancellation by software It is possible. I tried this function before the phase variable API appeared.

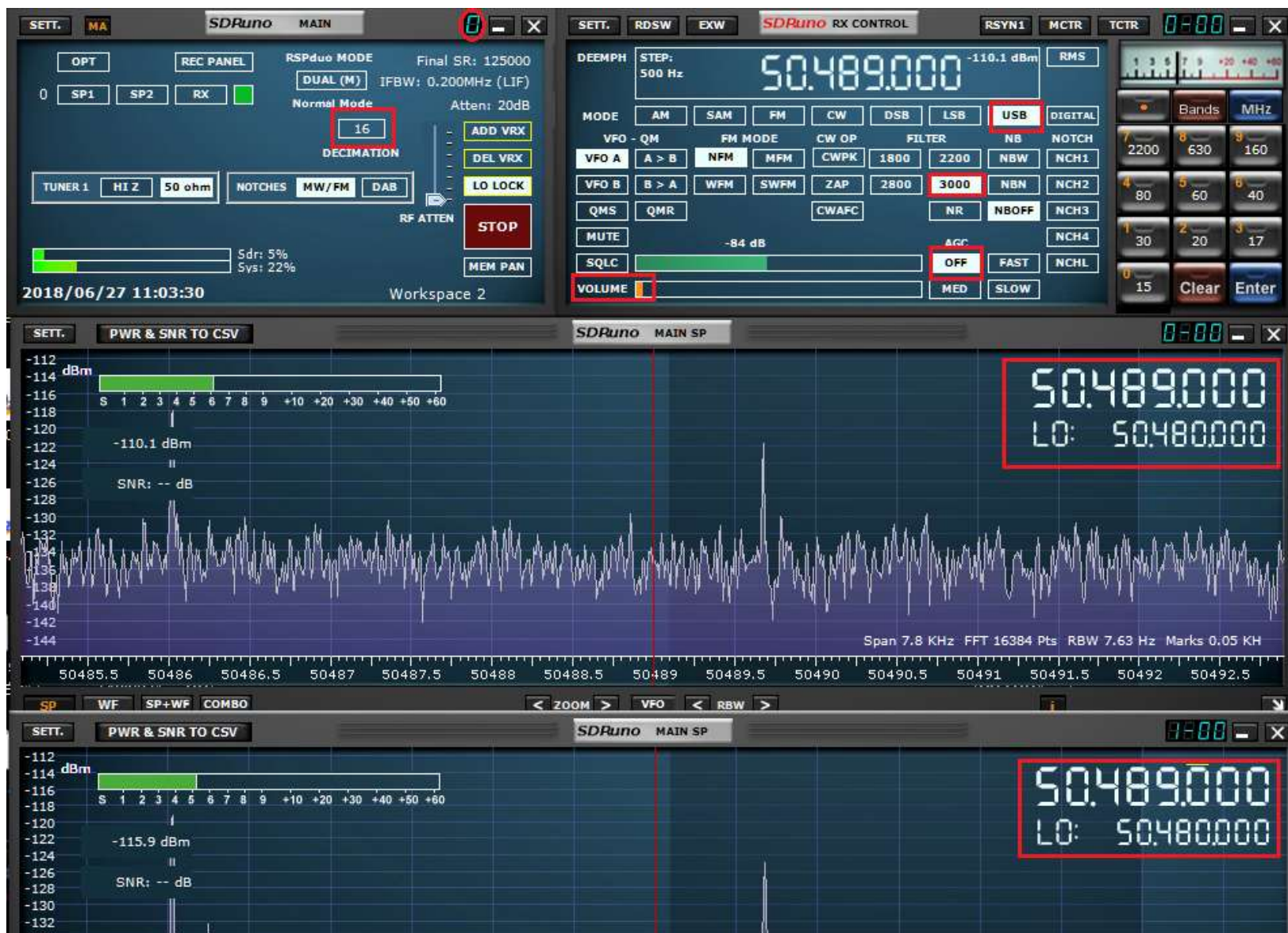
Experimental video :

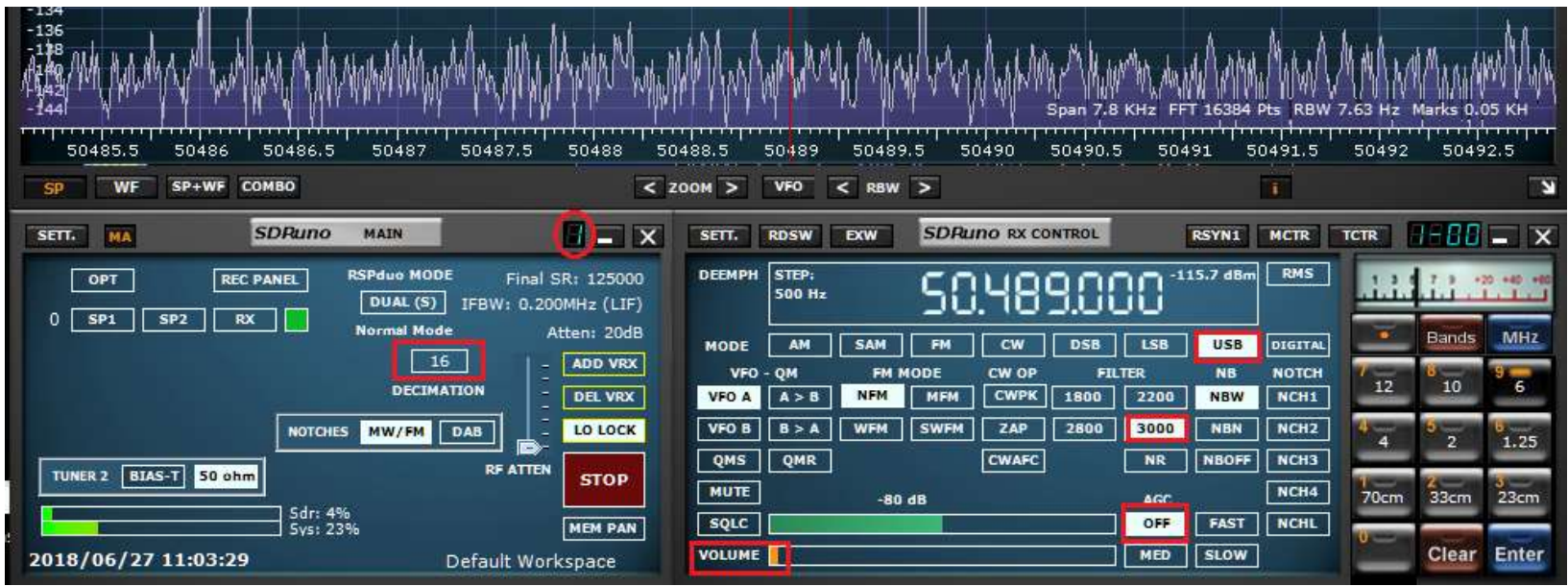
<https://youtu.be/o5-jLNAn-1s> What to

**prepare** 1 [RSPduo](#) receiver and [SDRuno](#) dedicated software 2. [Linrad](#) SDR software 3. 2 antennas 4. Signal generator (SG) **RSPduo / SDRuno Preparation** Set up RSPduo / SDRuno and Linrad so that it becomes the composition of the figure below. **SDRuno setting Set SDRuno as** shown below. - Set SDRuno to DUAL mode. - Launch instance 1 after starting instance 0. - Make Decimation the same. - Make the same mode. - Set Filter to the same band. - Turn AGC OFF.

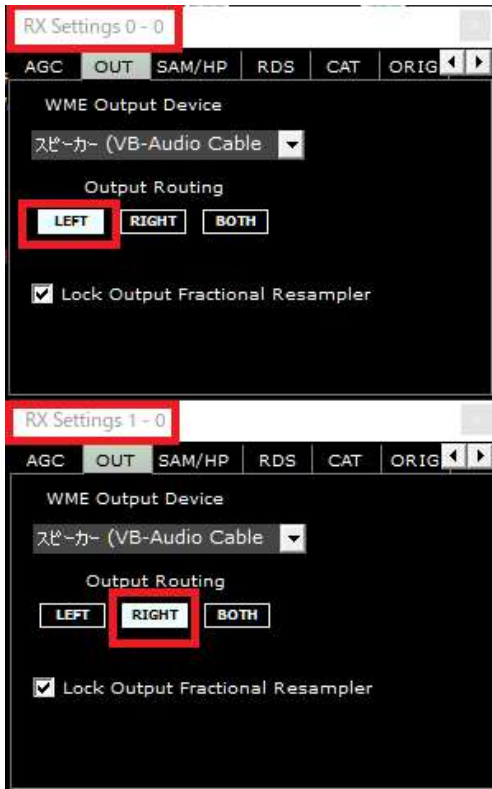


- Set Tune and LO to the same frequency respectively. (Please make sure that Tune and LO do not overlap. Please keep at least 10 kHz apart.) - VOLUME will be set to the same level by squeezing it to the left end once and then turning the wheel of the mouse by the same amount I will.





- Open SETT. On the RX Control panel for each instance. On the OUT tab, set Tuner 1 to LEFT channel and Tuner 2 to RIGHT channel.



This completes the setup on SDRUno side. Please click each Play! Button. The demodulated signal from ANT 1 is supplied to the L channel of VBA and the signal from ANT 2 is supplied to the R channel. Next, we process these signals on Linrad.

## Download / install / general usage of

Linrad Download and install Linrad from the link below.

<http://www.sm5bsz.com/linuxdsp/linrad.htm>

Regarding general usage, our company can not support, please refer to the following English manual.

<http://www.nitehawk.com/w3sz/Linrad%20Installation%20&%20Configuration%20User%20Guide%20-%20V1-0.pdf>

## Linrad setting

In this experiment, we use the "Adaptation" function of Linrad. With the signals of Ant 1 and Ant 2, the software automatically detects the strongest phase position with the Adaptation function. I will describe the necessary settings for that.

1. On the main menu screen in the figure below, type "U". I / O Sets the sound card.

```
32bit Linrad-04.14a
32bit Linrad-04.14a Soundcard
expert mode

A=Weak signal CW          1=Process first file named in 'adfile'
B=Normal CW              2=Process first file named in 'adwav'
C=Meteor scatter CW      3=Select file from 'adfile'
D=SSB                    4=Select file from 'adwav'
E=FM                      5=File converter .raw to .wav
F=AM                      T=Toggle network output
G=QRSS CW
H=TX TEST
I=SOUNDCARD TEST MODE
J=ANALOG HARDWARE TUNE
K=RADAR

M=Init moon tracking and EME database
N=Network set up
S=Global parms set up
U=A/D and D/A set up for RX
V=TX mode set up
W=Save current parameters in par_userint
F9=Emergency light
F1 or !=Show keyboard commands (HELP)
```

2. On the next screen, type "A" and set the input sound device of Linrad.

```
32bit Linrad-04.14a
CURRENT A/D and D/A SETUP FOR RX

Linrad RX input from: NOT YET SELECTED (Select Menu Option 'A')
Linrad RX output to: NOT YET SELECTED: (Select input first.)

DMA rate  min=30    max=300

A = Change input settings and reset all other soundcard settings
    if a soundcard is selected as input.
B = Change the output soundcard settings.
C = Change min/max dma rate.
E = Enable/Disable frequency converter and set LO.
Z = Disable the output soundcard.
X = To main menu.
```

The following question appears. Type "A" and specify Soundcard.

SELECT HARDWARE FOR RX

A = Soundcard  
B = SDR-14 or SDR-IQ  
C = Perseus  
D = SDR-IP  
E = Excalibur  
F = LibExtIO hardware  
H = RTL2832 USB dongle  
I = SDRplay or Mirics USB dongle  
J = bladeRF  
K = PCIe 9842  
L = OpenHPSDR  
M = Afedri-NET  
O = Airspy  
P = CloudIQ  
Q = Airspy HF+  
Y = Network  
Z = Disable (Disk input allowed)

Next, the following question will be asked. Type "N" and proceed.

Use Portaudio for rx input? (Y/N) =>

Next, the following choices are displayed, so type "9" here and press "Enter" key.  
Type "N" for "Do you need more channels from the same sound card? (Y / N)".  
"Use extended format (WAVEFORMATEXTENSIBLE)? (Y / N) type" N "Type" 4800  
"for" Sampling speed (Hz) "and press" Enter "key (VBA sample rate)

```
Select SOUND CARD device for RX input from list
```

- 0 Mic 1 (Virtual Audio Cable)
- 1 CABLE-β Output (VB-Audio Cable)
- 2 CABLE Output (VB-Audio Virtual
- 3 â€œâ€œâ€œ (2- USB AUDIO CODEC)
- 4 â}âCÂN (High Definition Audio)
- 5 Line 1 (Virtual Audio Cable)
- 6 Line 2 (Virtual Audio Cable)
- 7 â}âCÂN (High Definition Audio)
- 8 â€œâ€œâ€œ (USB AUDIO CODEC)
- 9 CABLE-A Output (VB-Audio Cable)

```
Select (first) device for Rx input by line number> 9
```

```
Do you need more channels from the same soundcard ? (Y/N)
```

```
F1 for info/help
```

```
Linrad can not query hardware because Windows will report that
everything is possible. Windows will silently resample and provide
data that would be meaningless in an SDR context.
```

```
Therefore, make sure you enter data that is compatible with the
native capabilities of your soundcard hardware. (And make sure that
the soundcard really is set to the speed you have selected.)
```

```
Use extended format (WAVEFORMATEXTENSIBLE) ? (Y/N)
```

```
Sampling speed (Hz)> 48000_
```

On the screen that will be displayed next, type "3." On the

```
Select radio interface>
```

- 1: One RF, one audio channel (normal audio)
  - 2: One RF, two audio channels (direct conversion)
  - 3: Two RF, two audio channels (normal audio, adaptive polarization)
- ```
F1 for help/info
```

screen that will be displayed next, type "0" and press the "Enter" key. When you

```
32bitLinrad00444a
Select receiver hardware to use with soundcard.

0  Undef
1  Undef reversed
2  WSE
3  SI570
4  Soft66
5  Elektor
6  FCD Pro Plus
7  Afedri USB

Select by line number=> _
```

return to the A / DD / A setting menu, Like "Linrad RX input from"

```
32bitLinrad00444a
CURRENT A/D and D/A SETUP FOR RX

Linrad RX input from: SOUND CARD device = CABLE-A Output (VB-Audio Cable
                        device number   = 9, native MME
                        associated radio  = Undef
                        sample rate      = 48000
                        no of input bytes = 2 (16 bits)
                        radio interface  = Two Rx channels, two audio channels
  (normal audio, adaptive polarization)

Linrad RX output to:  NOT YET SELECTED: (Select Menu Option 'B')

DMA rate  min=30    max=300

A = Change input settings and reset all other soundcard settings
   if a soundcard is selected as input.
B = Change the output soundcard settings.
C = Change min/max dma rate.
E = Enable/Disable frequency converter and set LO.
Z = Disable the output soundcard.
X = To main menu.
```

Next, type "B" on the screen above. The following figure will be displayed, so type "N".

```
Use Portaudio for rx output? (Y/N) =>
```

Next, the following selection screen will be displayed, so type "2". (In this example, VB - Audio Cable B is used, but please normally speakers.)



```

Select SOUND CARD device for Rx output

0  âXâsü[âJü[ (High Definition Aud
1  âXâsü[âJü[ (VB-Audio Virtual Ca
2  âXâsü[âJü[ (VB-Audio Cable ß)
3  Line 2 (Virtual Audio Cable)
4  âXâsü[âJü[ (VB-Audio Cable A)
5  PL2488H (2- High Definition Aud
6  âXâsü[âJü[ (2- USB AUDIO CODEC
7  âXâsü[âJü[ (USB AUDIO CODEC)
8  Line 1 (Virtual Audio Cable)

Select device for Rx output by line number> _

```

Setting of output sound device has ended. Since the screen below is displayed, type "X" and "Press any key" is displayed as "(Do not forget to save on W the main menu)" Press any key. As soon as you return to the main menu, type "W" and save your settings.

```

CURRENT A/D and D/A SETUP FOR RX

Linrad RX input from: SOUND CARD device = CABLE-A Output (VB-Audio Cable
device number       = 9, native MME
associated radio     = Undef
sample rate         = 48000
no of input bytes   = 2 (16 bits)
radio interface     = Two Rx channels, two audio channels
                    (normal audio, adaptive polarization)

Linrad RX output to: SOUND CARD device = âXâsü[âJü[ (VB-Audio Cable ß)
device number       = 2, native MME
D/A sample rate     = 8000 to 96000
D/A bytes           = 1 or 2
D/A channels        = 1 or 2

DMA rate   min=30   max=300

A = Change input settings and reset all other soundcard settings
   if a soundcard is selected as input.
B = Change the output soundcard settings.
C = Change min/max dma rate.
E = Enable/Disable frequency converter and set LO.
Z = Disable the output soundcard.
X = To main menu.

```

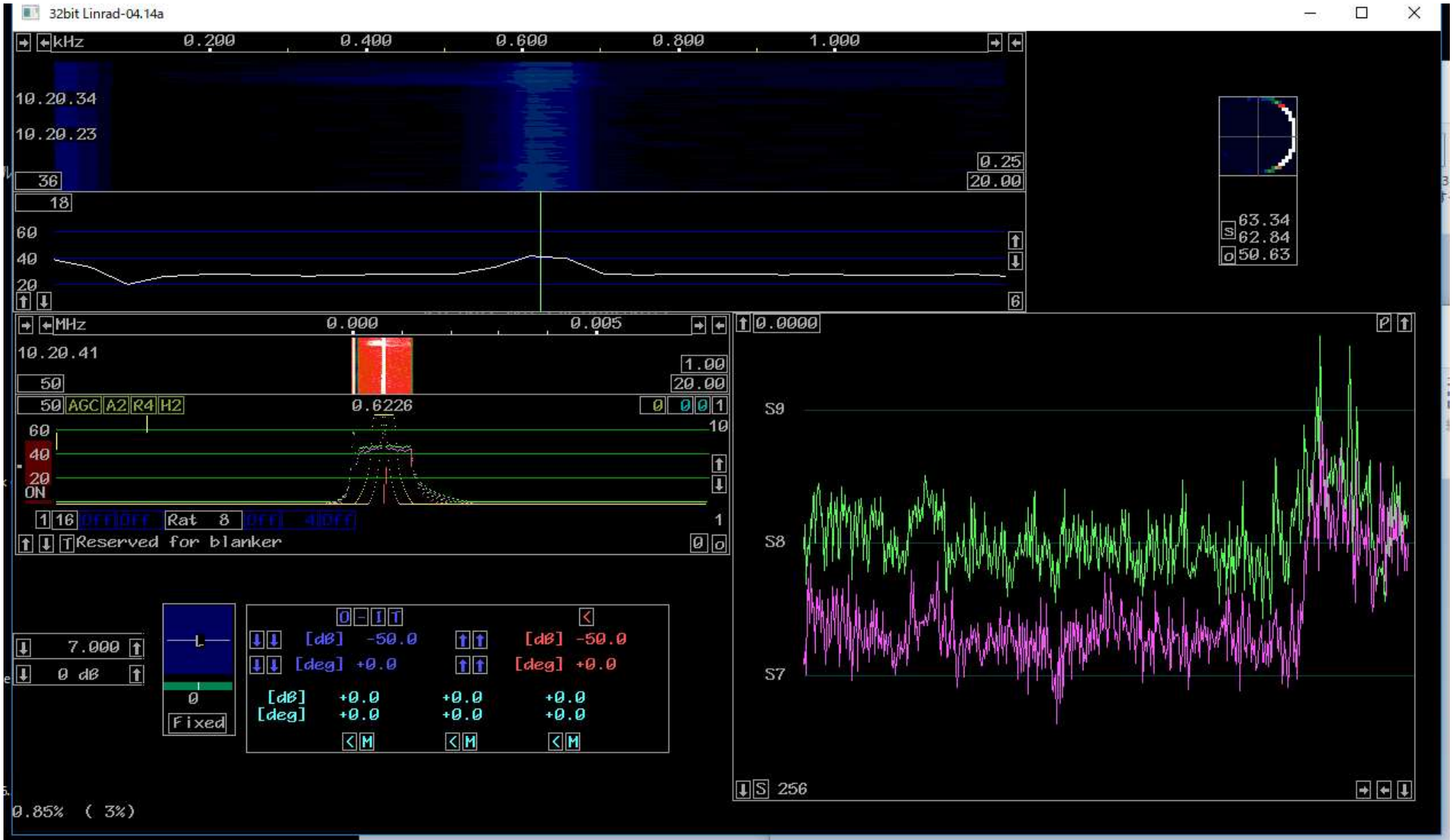
3. From the main menu, type "B" for CW, the reception screen will be displayed. When I try to open the reception screen at the very beginning, the next question will come after a series of questions. Press "D" to change to "Man" and press "H" to change it to "ON". Then press "S".

```
INIT POLARISATION PARAMETERS FOR TWO CHANNEL RADIO

A => Angle for channel 1 (0=Hor.) 0.0 deg
B => Phase for channel 2          0.0 deg
C => Amplitude for channel 2     0.0 dB
D => Toggle adjust mode          Man
E => Start polarization           0
F => Initial averaging            8
H => Toggle phasing graph        ON

S => Save to disk and exit
```

4. The reception screen is displayed. In Linrad, since each size can be adjusted to some extent size, please layout according to your preference.



This completes the setting. Please refer to "Part 2" below for operation manual.

[Experiment of Noise Cancellation by RSPduo / SDRuno + Linrad \(SDR Soft\) Part 2 \(Operation\)](#)