SAQ Reception Report for 4 July 2021 Transmissions

Whitham D. Reeve

Station: Cohoe Radio Observatory (CRO)

Coordinates: 60° 22' 04.7"N, 151° 18' 55.1"W

Elevation: 22 m AMSL

CRO is a remote observatory. Receiver I/Q output was recorded in real-time on 4 July. The recordings were then retrieved and analyzed 6 days after event.

Reception: Received signals were just too weak to copy the CW messages but were clearly visible in the spectrum plots (below).

Received first tune-up signals at 0844:00 to about 0850 UTC. Received start of first transmission at 0900:00 to 0906:35. Received second tune-up at 1142:10 through about 1143:56. Received second transmission at 1200:00 through 1206:45. Additional transmissions at around 1210 and 1219.

Frequencies of all tune-up and transmissions were about 18 Hz low of which a few Hz may be the receiver LO error. Some drifting of a few Hz throughout. Frequency always was low and never reached 17.200 kHz.

Audio files (.mp3) produced using the Audio Recording plugin for SDRuno.

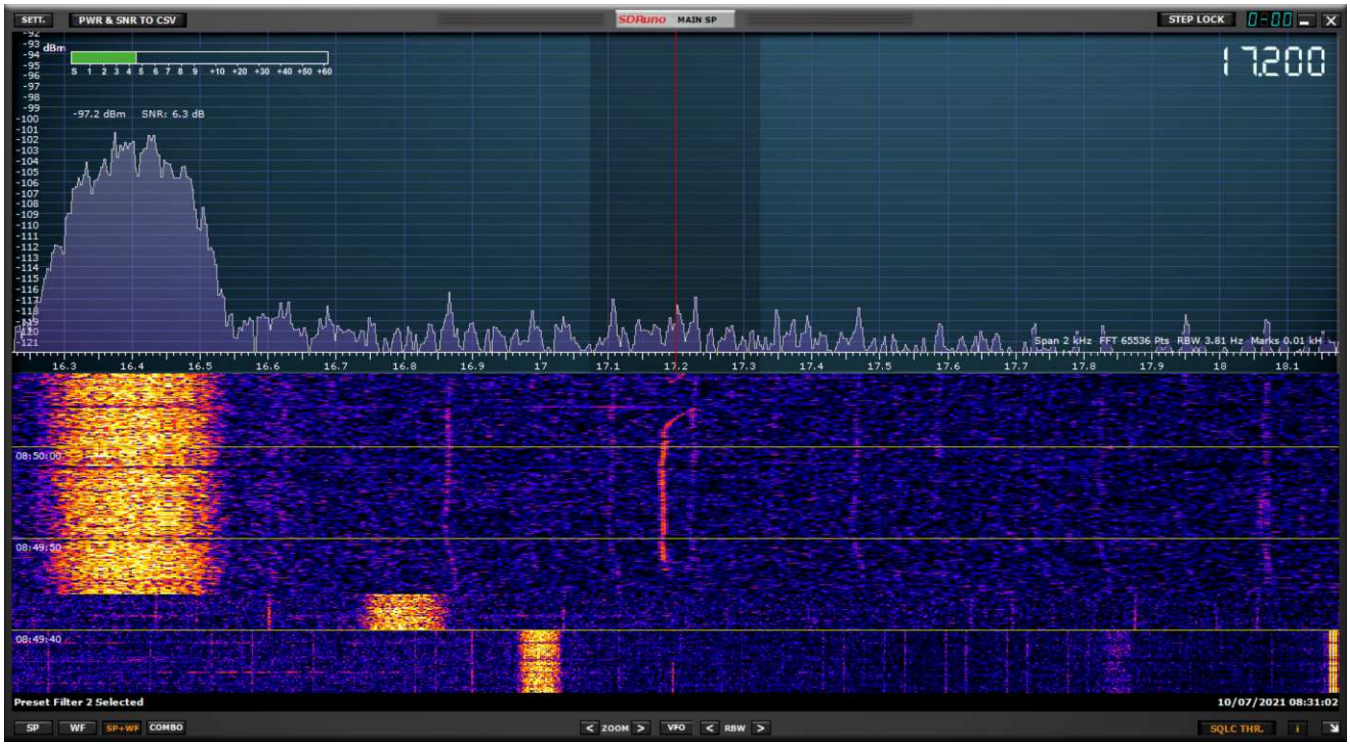
Instrumentation: Rotable 1.2 m diagonal square loop antenna at 3.5 m above ground level and oriented north-south, SDRPlay SDRduo receiver with SDRuno 1.40.2 software, Cat5e balanced transmission line and HI-Z receiver input. Additional details:

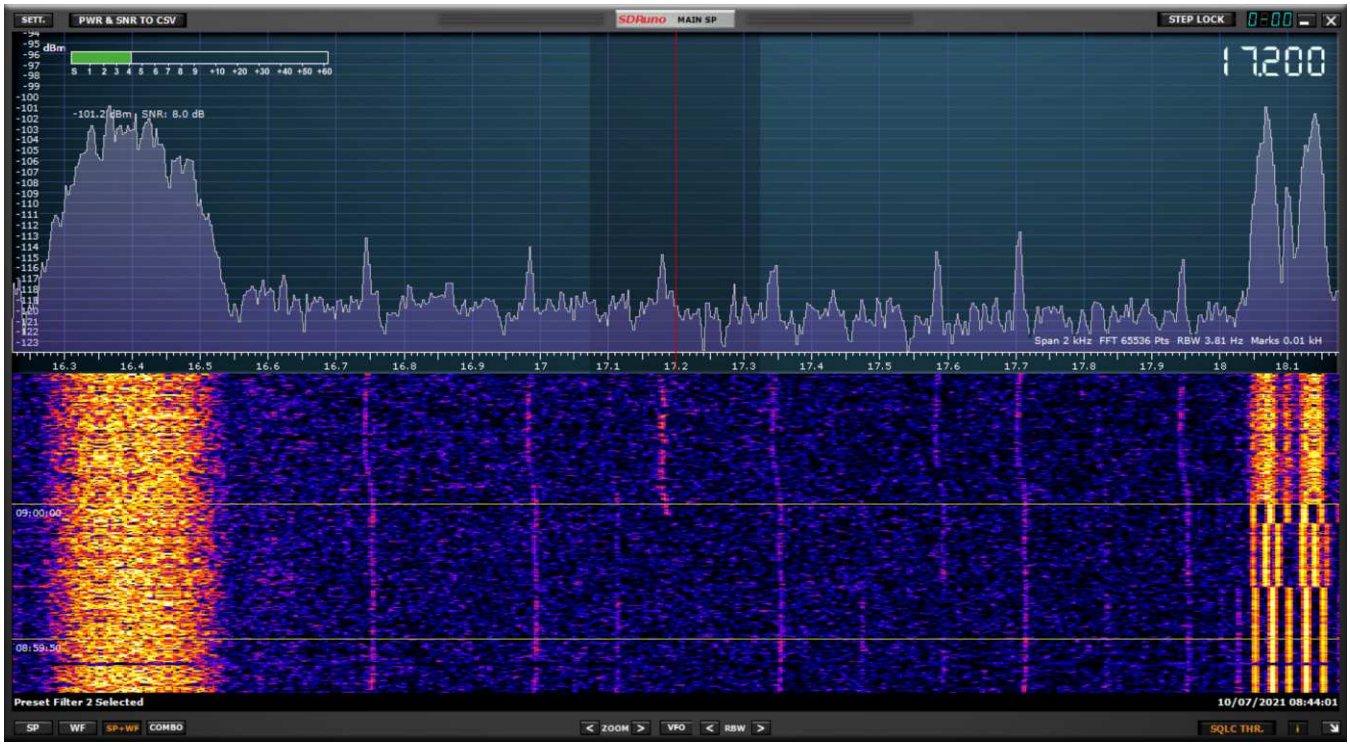
Antenna: http://www.reeve.com/Documents/Articles%20Papers/Reeve_CohoeVLFLoopAntenna.pdf

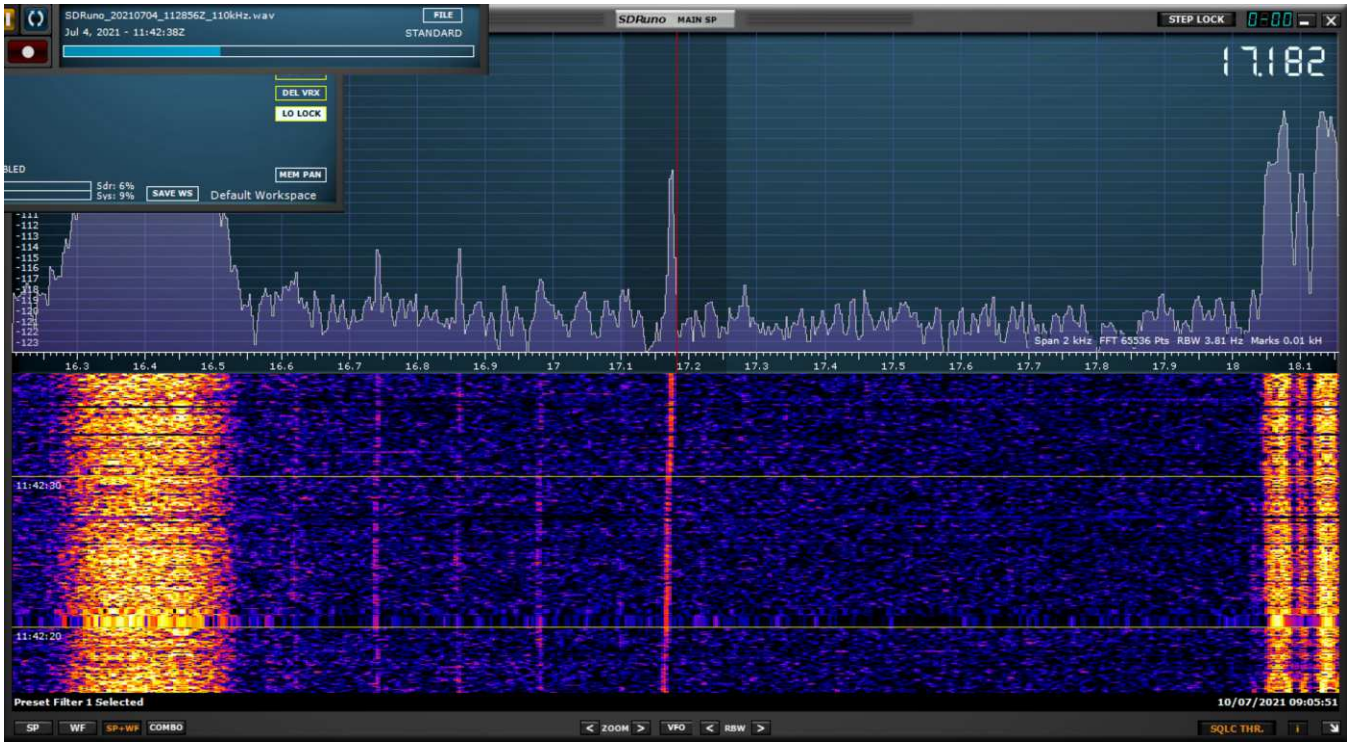
Receiver: http://www.reeve.com/Documents/Articles%20Papers/Propagation/Reeve_LFProp-ObsvP2.pdf

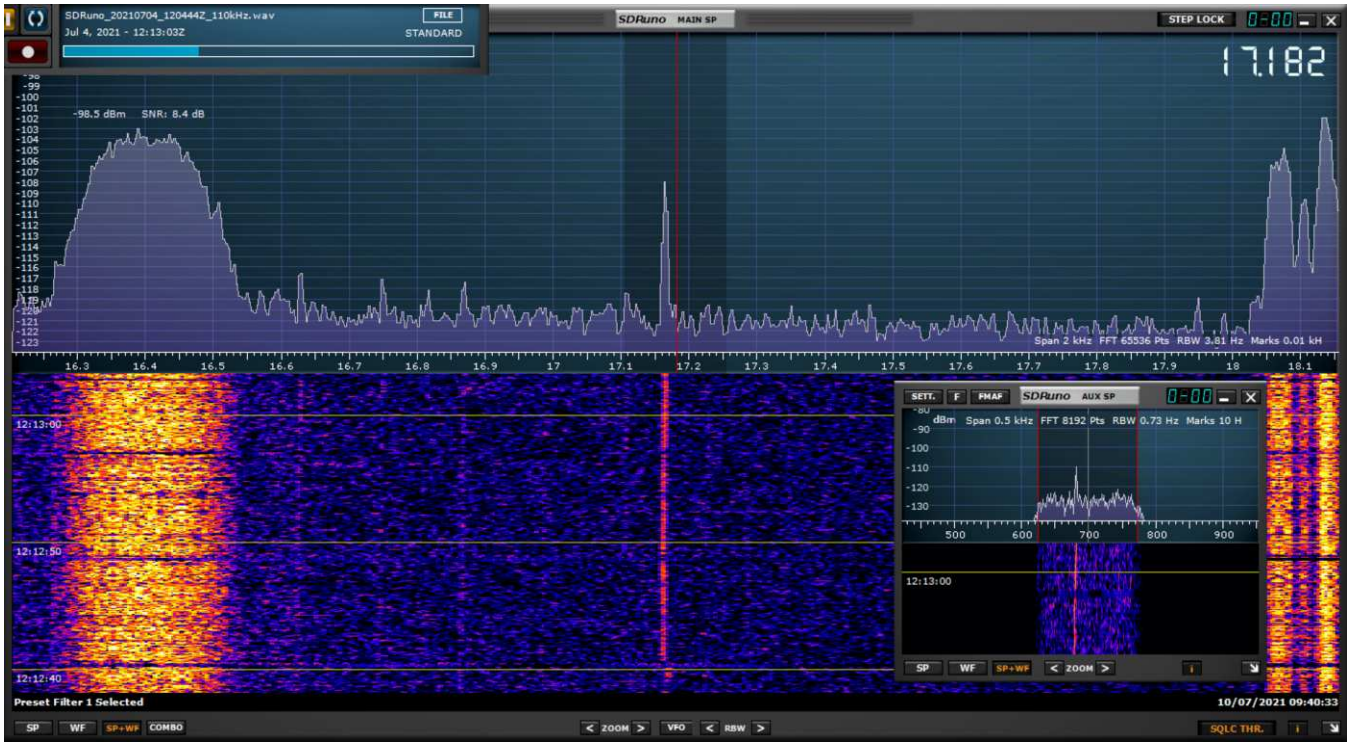
Images of Spectra:

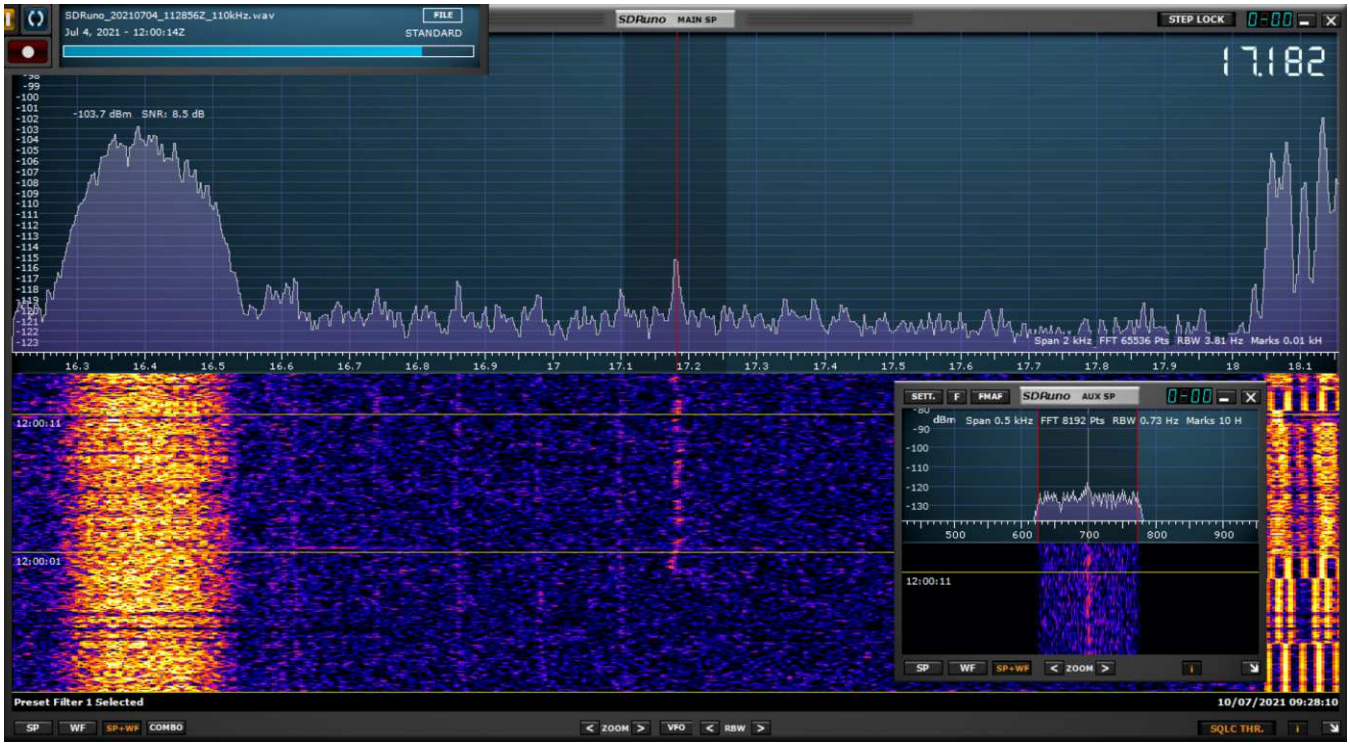
Note: SAQ is in center of spectrum plots. Spectra at 16.4 kHz is Norwegian VLF transmitter and at 18.1 kHz is (probably) Russian VLF transmitter. Some plots also have demodulated IF spectrum (SP2) overlaid at lower-right corner of main spectrum (SP1) plots. All images produced from playback of original I/Q recordings.

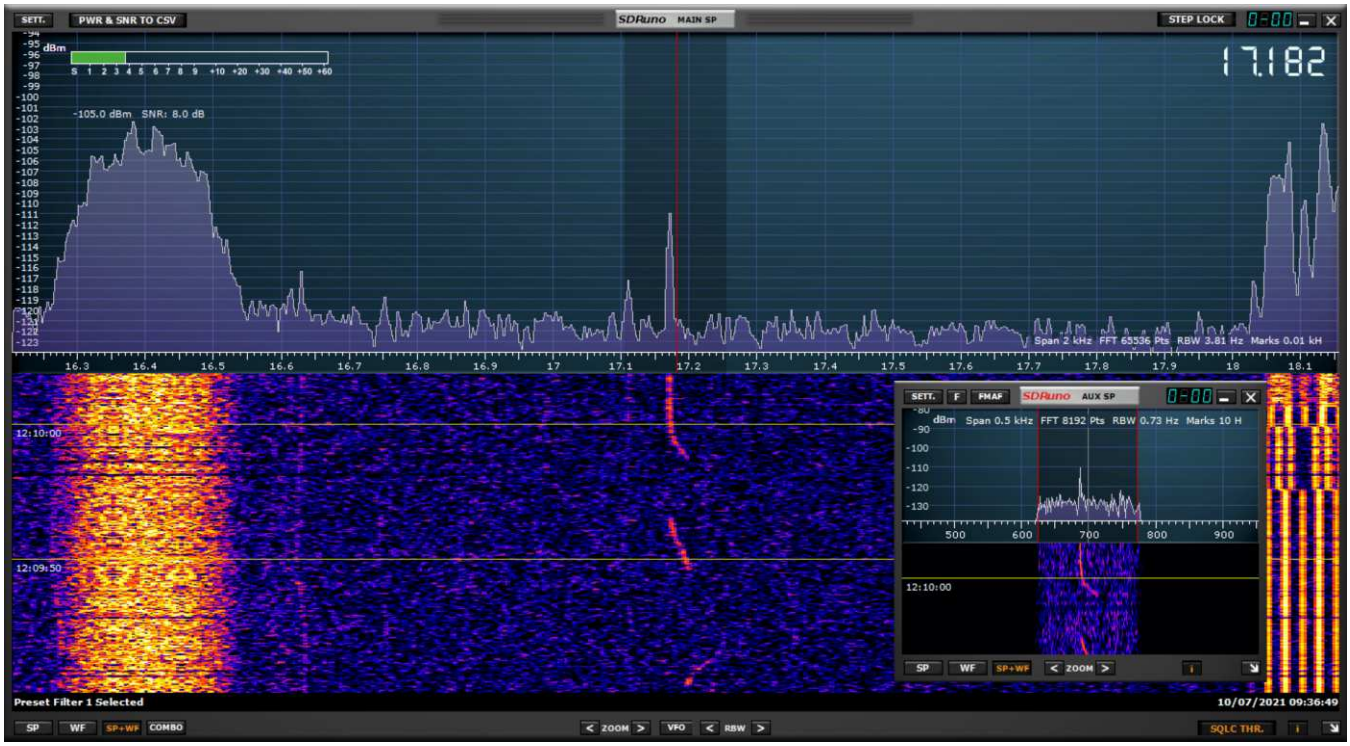


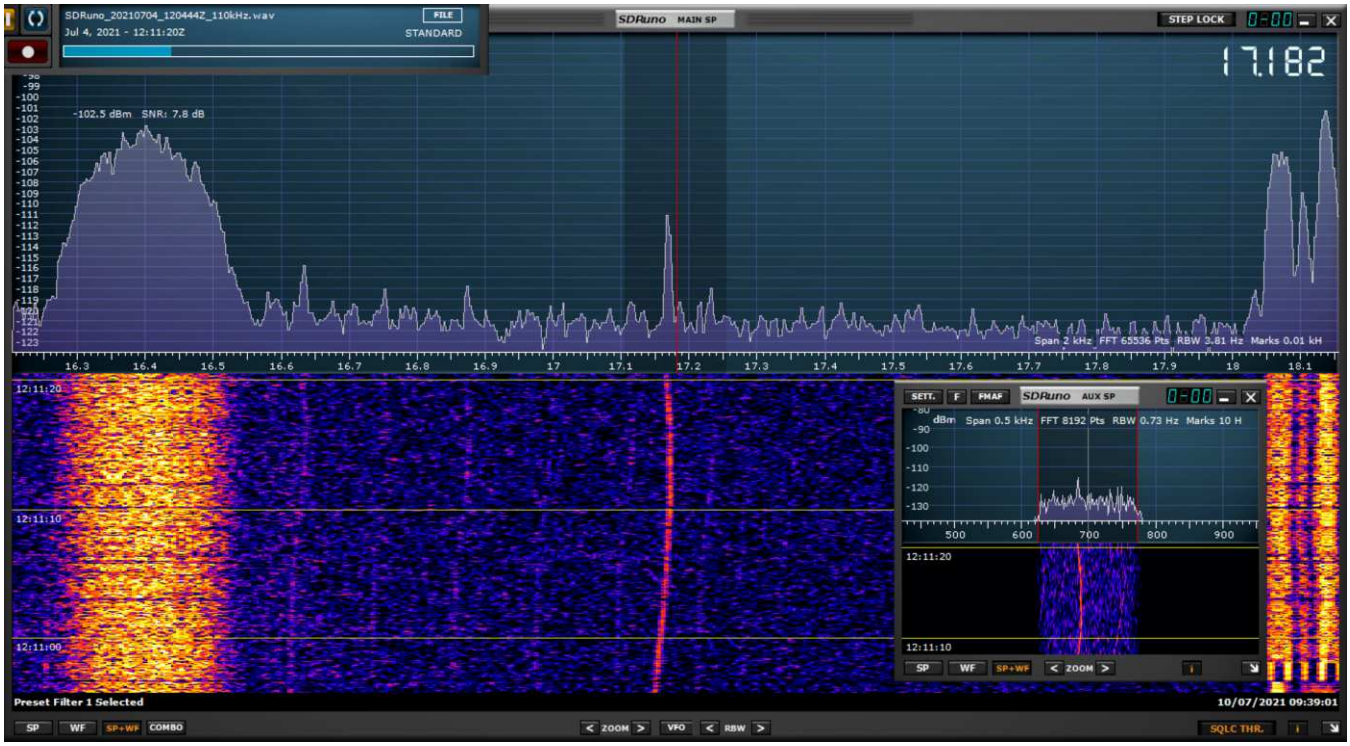



SDRuno_20210704_112856Z_110kHz.wav
Jul 4, 2021 - 11:42:38Z
FILE
STANDARD
SDRuno MAIN SP
STEP LOCK
17.182
DEL VRX
LO LOCK
MEM PAN
Sdr: 6%
Sys: 9%
SAVE WS
Default Workspace
Span 2 kHz FFT 65536 Pts RBW 3.81 Hz Marks 0.01 kH
11:42:30
11:42:20
Preset Filter 1 Selected
10/07/2021 09:05:51
SP
WF
SP+WF
COMBO
ZOOM
VFO
RBW
SQLC THR.


SDRuno_20210704_120444Z_110kHz.wav
Jul 4, 2021 - 12:13:03Z
FILE
STANDARD
SDRuno MAIN SP
STEP LOCK
17.182
-98.5 dBm SNR: 8.4 dB
Span 2 kHz FFT 65536 Pts RBW 3.81 Hz Marks 0.01 kH
SDRuno AUX SP
Span 0.5 kHz FFT 8192 Pts RBW 0.73 Hz Marks 10 H
12:13:00
12:12:50
12:12:40
Preset Filter 1 Selected
10/07/2021 09:40:33
SP
WF
SP+WF
COMBO
ZOOM
VFO
RBW
SQLC THR.


SDRuno_20210704_112856Z_110kHz.wav
Jul 4, 2021 - 12:00:14Z
FILE
STANDARD
SDRuno MAIN SP
STEP LOCK
17.182
-103.7 dBm SNR: 8.5 dB
Span 2 kHz FFT 65536 Pts RBW 3.81 Hz Marks 0.01 kH
12:00:11
12:00:01
SDRuno AUX SP
Span 0.5 kHz FFT 8192 Pts RBW 0.73 Hz Marks 10 H
Preset Filter 1 Selected
10/07/2021 09:28:10
SP WF SP+WF COMBO ZOOM VFO RBW SQLC THR.


SETT.
PWR & SNR TO CSV
SDRuno MAIN SP
STEP LOCK
17.182
-105.0 dBm SNR: 8.0 dB
Span 2 kHz FFT 65536 Pts RBW 3.81 Hz Marks 0.01 kH
12:10:00
12:09:50
SDRuno AUX SP
Span 0.5 kHz FFT 8192 Pts RBW 0.73 Hz Marks 10 H
Preset Filter 1 Selected
10/07/2021 09:36:49
SP WF SP+WF COMBO ZOOM VFO RBW SQLC THR.


SDRuno_20210704_120444Z_110kHz.wav
Jul 4, 2021 - 12:11:20Z
FILE
STANDARD
SDRuno MAIN SP
STEP LOCK
17.182
-102.5 dBm SNR: 7.8 dB
Span 2 kHz FFT 65536 Pts RBW 3.81 Hz Marks 0.01 kH
12:11:20
12:11:10
12:11:00
SETT. F FMAP SDRuno AUX SP
dBm Span 0.5 kHz FFT 8192 Pts RBW 0.73 Hz Marks 10 H
Preset Filter 1 Selected
10/07/2021 09:39:01
SP WF SP+WF COMBO
ZOOM VFO RBW
SQLC THR.