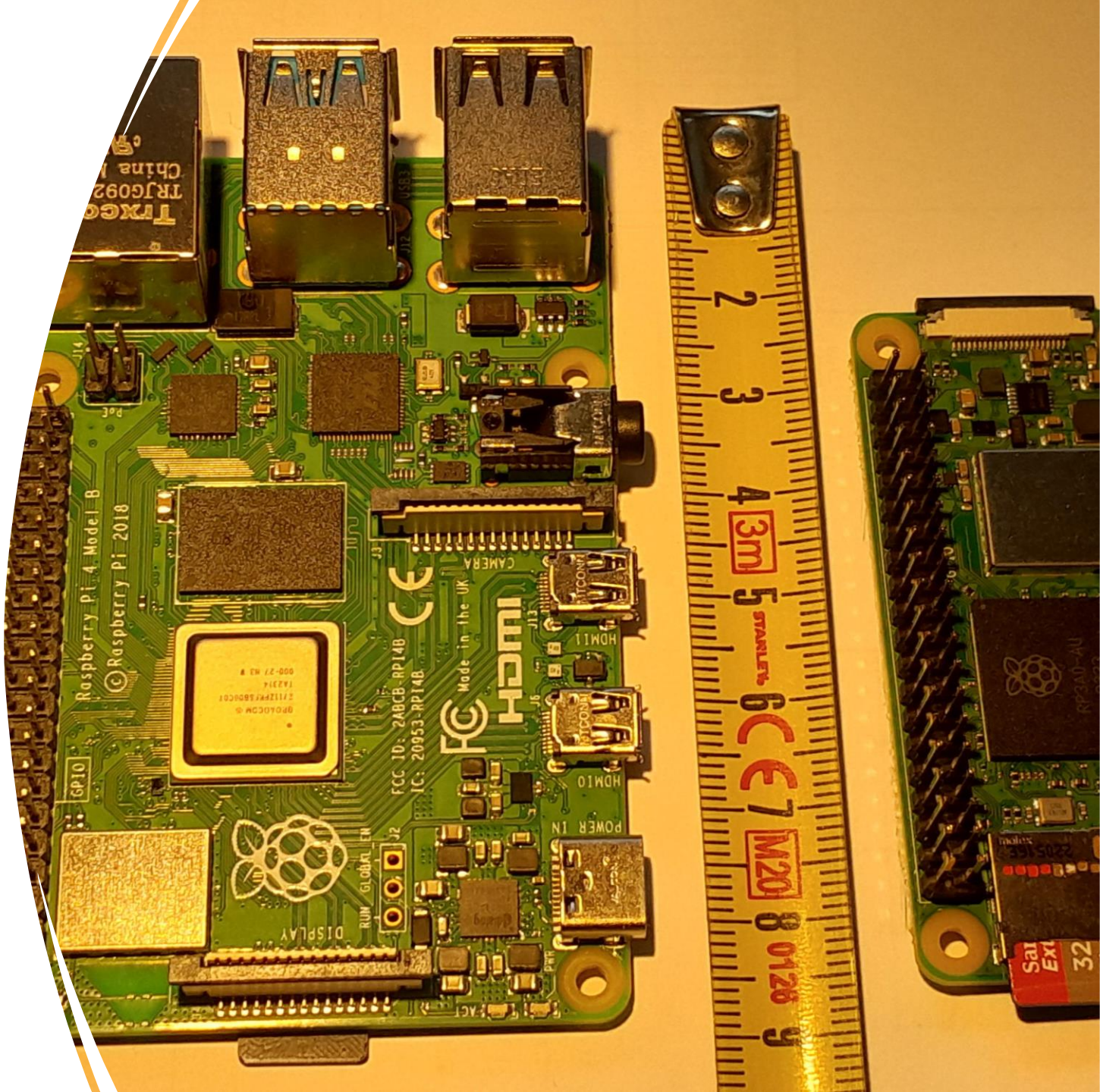
Radio med RPI

Låt en Raspberry PI styra din radiotillämpning

Tilman D. Thulesius – SM0JZT

SSA – QTC 20+ år
http://radio.thulesius.se

ver 23feb24



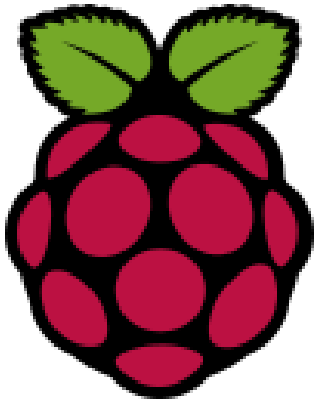
Nyare teknik kompletterar gammal

Technical Advances That Have Killed Amateur Radio by Making It Too Easy

1. Amplitude Modulation (AM): 1900
2. Semi-automatic CW Keys (Bugs): 1902
3. Vacuum Tubes: 1906
4. Single Sideband (SSB): 1915
5. Radio Teletype (RTTY): 1922
6. Repeaters: 1935
7. Electronic CW Keyers: 1945
8. Transistors: 1948
9. Electronic digital programmable computers: 1948
10. Antenna Rotators: 1950
11. Integrated Circuits: 1958
12. Digital Signal Processing: 1960
13. Microprocessors: 1971
14. the Internet: 1972
15. CW Decoding Software: 1975
16. Automatic Link Establishment (ALE): 1978
17. Packet Radio: 1980
18. DX Clusters: 1989
19. Pactor: 1991
20. PSK: 1998
21: FT8: 2017
22. Raspberry PI 2012…

RASPBERRY PI

- Made in the UK
- 2012
- Eben Upton
- Datorvetenskap i skolan
- Raspberry Pi Foundation
- Broadcom
- HDMI, USB, Ethernet, SD-card, WiFi
- RPI 1, 2, 3, 4, 5
- 32 – 64 bitar 2.4 GHz QUAD Core
- LINUX

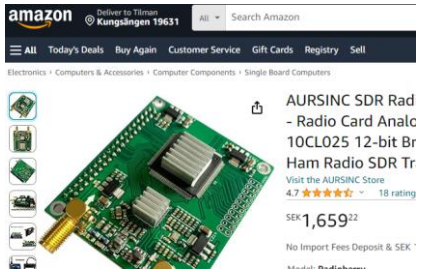


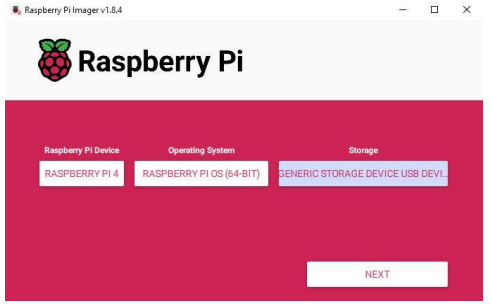
Radioberry

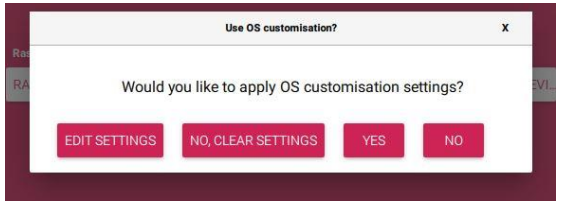
- QTC Feb 2024
- PA3GSB Johan
- AD9866 12 modemchip
- Cyclone FPGA

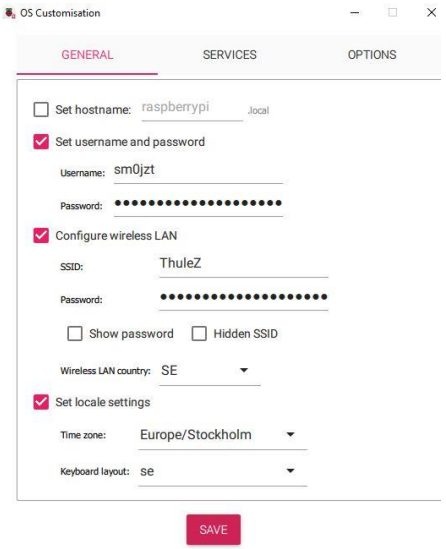
- Hjälp!!
  - https://www.pa3gsb.nl
    https://github.com/pa3gsb/RadioBerry
  - https://groups.google.com/g/radioberry

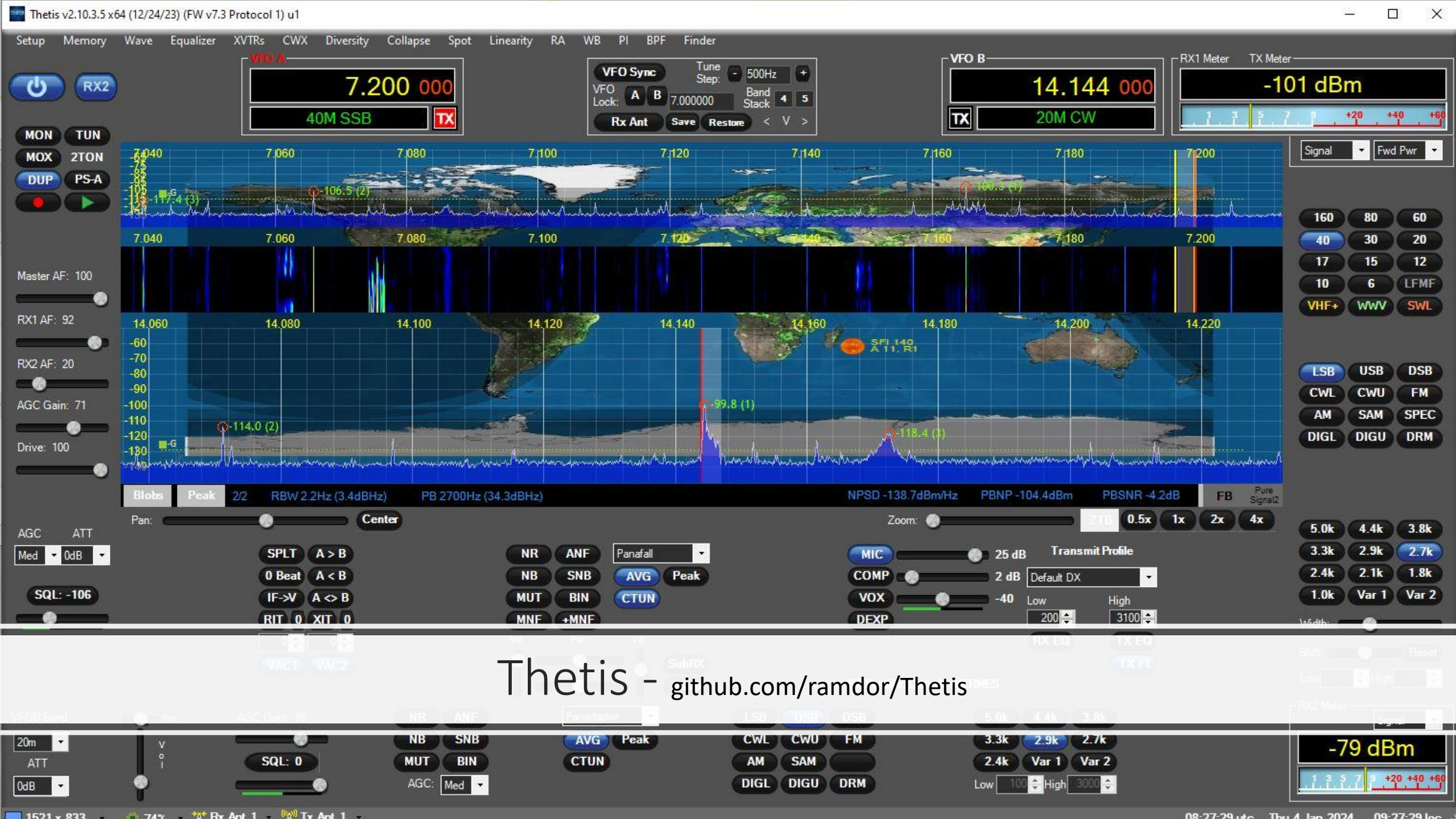
- Hat finns på AMAZON
  - Analog Devices AD9866 & 10CL025
- Kompletterande komponenter
  - LPI, BPF, PA
    - QRP-labs
  - PA3GSB preamp
- Bygga SD-kort….
  - Raspberry PI Imager
    - RaspOS
  - Starta RPI
    - Hitta IP
  - Logga in med ssh med Putty
  - github.com/pa3gsb/Radioberry-2.x
    - Följ “Building”
- Operatörspanel/programvara i PC
  - Thetis
  - SDRConsole (Hermes-light)





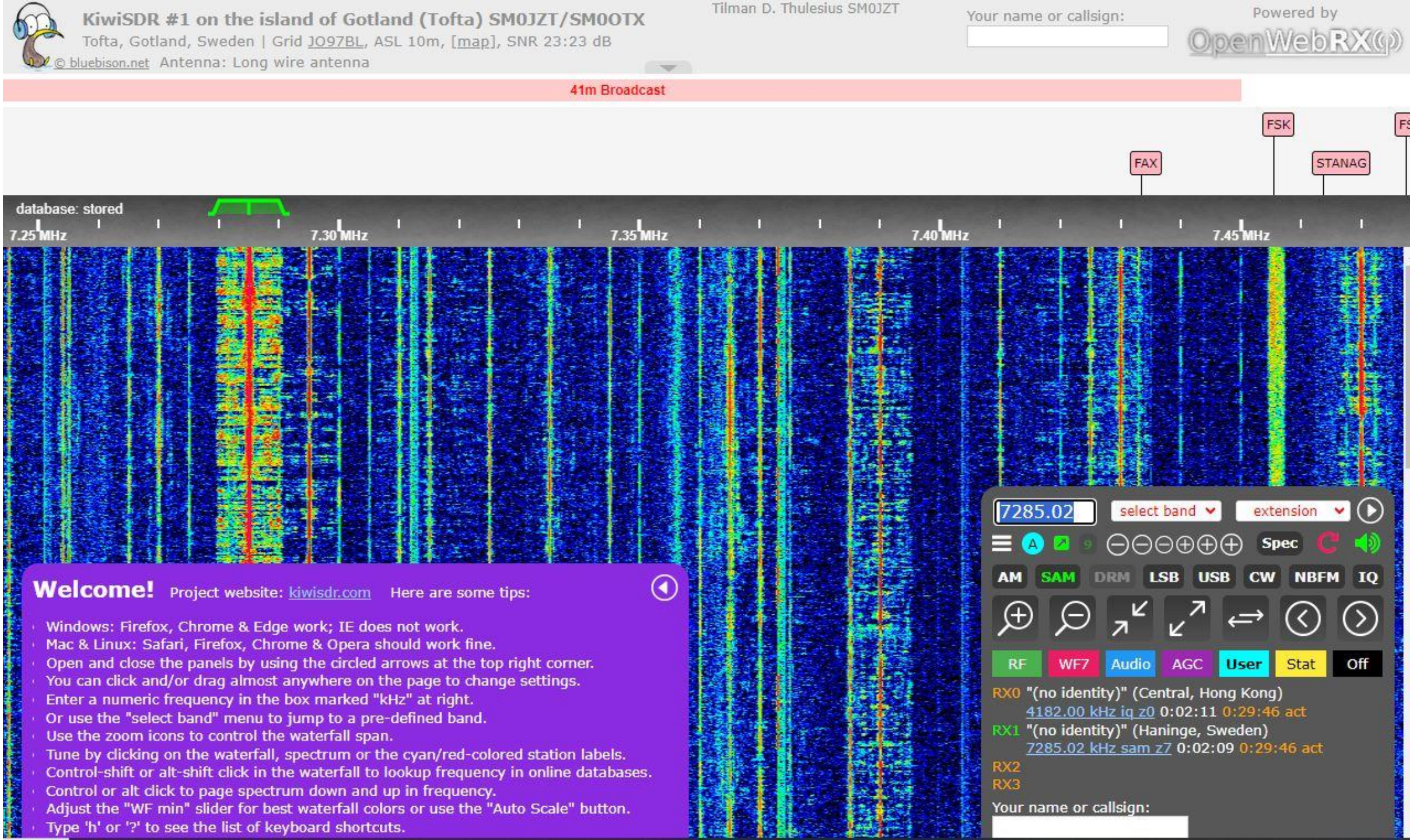






Thetis - github.com/ramdor/Thetis

Openwbrx+
Experimentplatform för multipla SDR-mottagaren
QTC Mar 2024


KiwiSDR #1 on the island of Gotland (Tofta) SM0JZT/SM0OTX
Tofta, Gotland, Sweden | Grid JO97BL, ASL 10m, [map], SNR 23:23 dB
© bluebison.net Antenna: Long wire antenna
Tilman D. Thulesius SM0JZT
Your name or callsign:
Powered by
OpenWebRX
41m Broadcast
FAX
FSK
STANAG
database: stored
7.25 MHz
7.30 MHz
7.35 MHz
7.40 MHz
7.45 MHz
Welcome!
Project website: kiwisdr.com
Here are some tips:
Windows: Firefox, Chrome & Edge work; IE does not work.
Mac & Linux: Safari, Firefox, Chrome & Opera should work fine.
Open and close the panels by using the circled arrows at the top right corner.
You can click and/or drag almost anywhere on the page to change settings.
Enter a numeric frequency in the box marked "kHz" at right.
Or use the "select band" menu to jump to a pre-defined band.
Use the zoom icons to control the waterfall span.
Tune by clicking on the waterfall, spectrum or the cyan/red-colored station labels.
Control-shift or alt-shift click in the waterfall to lookup frequency in online databases.
Control or alt click to page spectrum down and up in frequency.
Adjust the "WF min" slider for best waterfall colors or use the "Auto Scale" button.
Type 'h' or '?' to see the list of keyboard shortcuts.
7285.02
select band
extension
Spec
AM
SAM
DRM
LSB
USB
CW
NBFM
IQ
RF
WF7
Audio
AGC
User
Stat
Off
RX0 "(no identity)" (Central, Hong Kong)
4182.00 kHz iq z0 0:02:11 0:29:46 act
RX1 "(no identity)" (Haninge, Sweden)
7285.02 kHz sam z7 0:02:09 0:29:46 act
RX2
RX3
Your name or callsign:

OpenWebRX
SM0JZT RX-station
Kunsgängen, Sweden | Loc: JO89ul, ASL: 5 m
Help
Status
Chat
Receiver
Map
Files
Settings
JS8
SSTV
Rockp...
Radio ...
HCJB
Vari
Radio
HLL2 -...
Chann...
Kazan...
-4000
4000
7.1 MHz
7.2 MHz
7.3 MHz
7.4 MHz
7.5 MHz
7.3910 MHz
7.1340 MHz
SDRPlay RSPDuo 41m Broadcast
Modes
FM
WFM
AM
LSB
USB
CW
SAM
DMR
D-Star
NXDN
YSF
M17
FreeDV
DRM
DIG
Controls
1kHz
SQ
NR
Settings
Display
REC
13:02 UTC
-57.4 dB
OpenWebRX+ message log
Author: Marat Fayzullin | OpenWebRX documentation and support
Web Audio API succesfully initialized, using ScriptProcessorNode API, sample rate: 48000 Hz
WebSocket opened to ws://10.4.15.164/ws/
Server acknowledged WebSocket connection, OpenWebRX+ version: v1.2.46
Audio stream is compressed.
FFT stream is compressed.
Name
Message
Send
Audio buffer [0 ms]
Audio output [48.2 ksps]
Audio stream [49 kbps]
Server CPU [14%/65°C]
Clients [1]
https://www.openwebrx.de

Map
Satellite
Iceland
Reykjavík
Sweden
Norway
Finland
Stockholm
Baltic Sea
Estonia
St Petersburg
Санкт-Петербург
North Sea
Denmark
Ireland
Belarus
Kyiv
Київ
Kazan
Казань
Belgium
Slovakia
Ukraine
France
Hungary
Serbia
Black Sea
Bulgaria
Georgia
Azerbaijan
Istanbul
Ankara
Türkiye
Spain
Marseille
Madrid
Algiers
مدينة الجزائر
Tunis
تونس
Athens
Αθήνα
Tehran
تهران
Syria
OpenWebRX
Filter by frequency or band...

New device settings

Device name

Device name

Device type

Airspy R2 or Mini

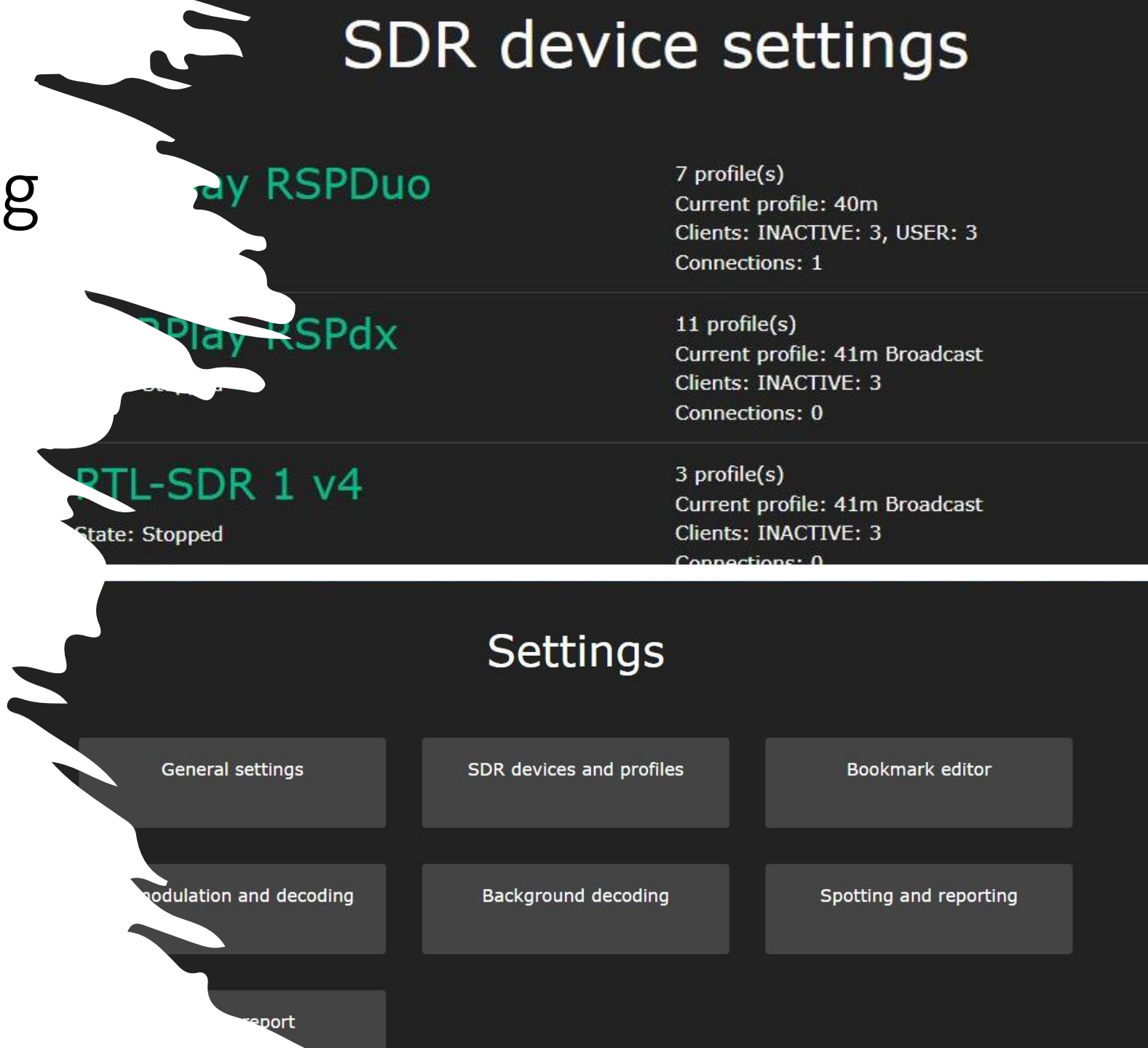
- Airspy R2 or Mini
- Airspy HF+ or Discovery
- Blade RF
- FunCube Dongle Pro+
- FiFi SDR
- HackRF
- HPSDR devices (Hermes / Hermes Lite 2 / Red Pitaya)
- LimeSDR device
- Perseus SDR
- PlutoSDR
- RadioBerry
- RTL-SDR device
- RTL-SDR device (via SoapySDR)
- RTL-SDR device (via rtl_tcp)
- R&S device using EB200 or Ammos protocol
- SDRPlay device (RSP1, RSP2, RSPDuo, RSPDx)
- Device connected to a SoapyRemote server
- Ettus Research USRP device

Settings / SDR device settings /

Apply and save

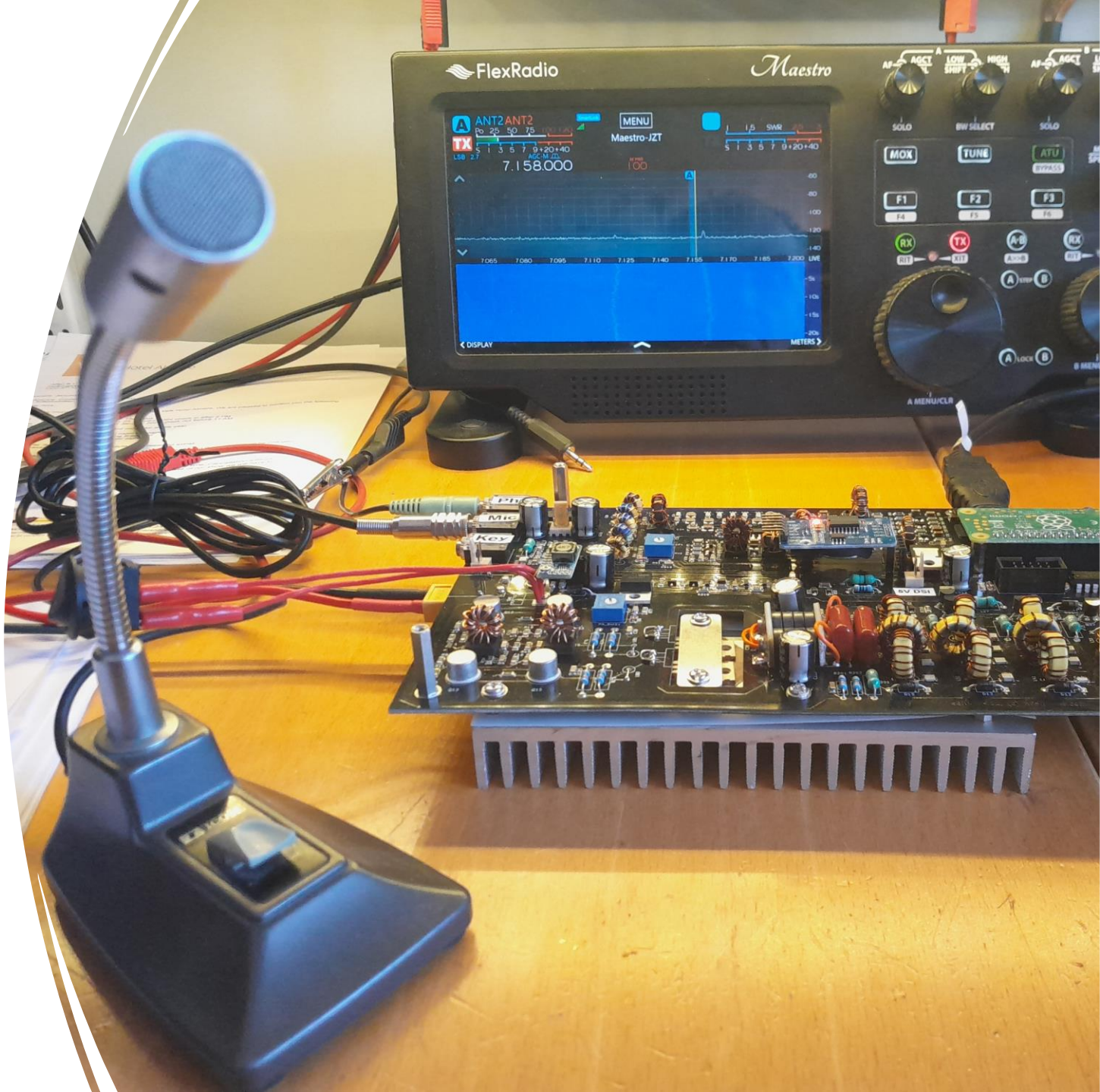
Websnitt för konfig

- Bygg SD-kort
  - Hämta image - https://luarvique.github.io/ppa
- ssh – Putty
  - sudo apt update
  - sudo apt upgrade
  - sudo openwebrx admin adduser
  - sudo openwebrx admin listuser
  - sudo openwebrx –h
- Hjälp !!!
  - fms.komkon.org/OWRX
  - groups.io/g/openwebrx
- Registrera RX (receiverbook)
  - www.openwebrx.de
  - Registrera konto
  - “My receivers”
  - Receiver key -> General settings



sbitx

- QTC Apr 2024
- Radioexperiment från Indien
  - Ashhar Farhan – VU2ESE
  - BITX20 (enkelsuper)
  - SBITX v3
    - HybridSDR
    - 20W
    - Webclient
    - RPI med radio…



RPI med radio…

- Material / Hjälp!!….
  - https://www.hfsignals.com/index.php/sbitx-v3
  - sbitx.net
  - https://github.com/afarhan/sbitx
  - https://www.vu2ese.com
  - groups.io/g/bitx20
- V3 – USD 199 / 429 + moms/frakt

sBitx SM0JZT JO89U... | pi@sbitx: ~ | Downloads | HF SIGNALS – The H... | Inbox - sm0jzt@gmai...

sBitx SM0JZT JO89UL 2024/02/19 15:24:31Z

MODE LSB | 10M 12M 15M 17M 20M 30M 40M 80M | REC OFF | WEB | RIT OFF | STEP 100H | B:7.000.000 A:7.168.000 | AUDIO 89

CALL | SENT | RECV | EXCH | NR | LOG» | WIPE | QRZ

TEXT

SPLIT OFF | VFO A | SPAN | AGC | BW | DRIVE | IF

7158 7160 7163 7165

sbitx v3.0
Enter \help for help

Welcome SM0JZT your grid is JO89UL
Recording stopped
RTC detected
CE ETTEIE

MIC 100 | TX | RX

pi@sbitx: ~

File Edit Tabs Help

```
sm0jzt@Openwebrx2:~ $ sudo apt update
//deb.debian.org/debian bookworm InRelease
//deb.debian.org/debian-security bookworm-security InR
//deb.debian.org/debian bookworm-updates InRelease [55
//archive.raspberrypi.com/debian bookworm InRelease [2
://luarvique.github.io/ppa/bookworm ./ InRelease
//archive.raspberrypi.com/debian bookworm/main armhf P

//archive.raspberrypi.com/debian bookworm/main arm64 P

 kB in 1s (636 kB/s)
kage lists... Done
pendency tree... Done
te information... Done
an be upgraded. Run 'apt list --upgradable' to see it.
webrx2:~ $ sudo apt upgrade
kage lists... Done
pendency tree... Done
te information... Done
```

Downloads

File Edit View Sort Go Tools

/home/pi/Downloads

Home Folder
Filesystem Root
Documents
dev
etc
home
pi

Name	Size	Modified
Pi-Star_Config_2024-Feb-18.zip	13.3 KiB	02/18/2024 08:58
Radio med RPI Våren 2024.pptx	5.7 MiB	02/17/2024 08:52

HF SIGNALS – The Hom

hfsignals.com

Apps | HF SIGNALS –... | sBitx.net | RaspberryPi.d... | BITX20@grou...

Home

sBitx v3 – Integrated 25 watts SDR ($399)

Inbox - sm0jzt@gmail.com - Mozilla Thund

Inbox - sm0jzt@gmail.c | Account Settings

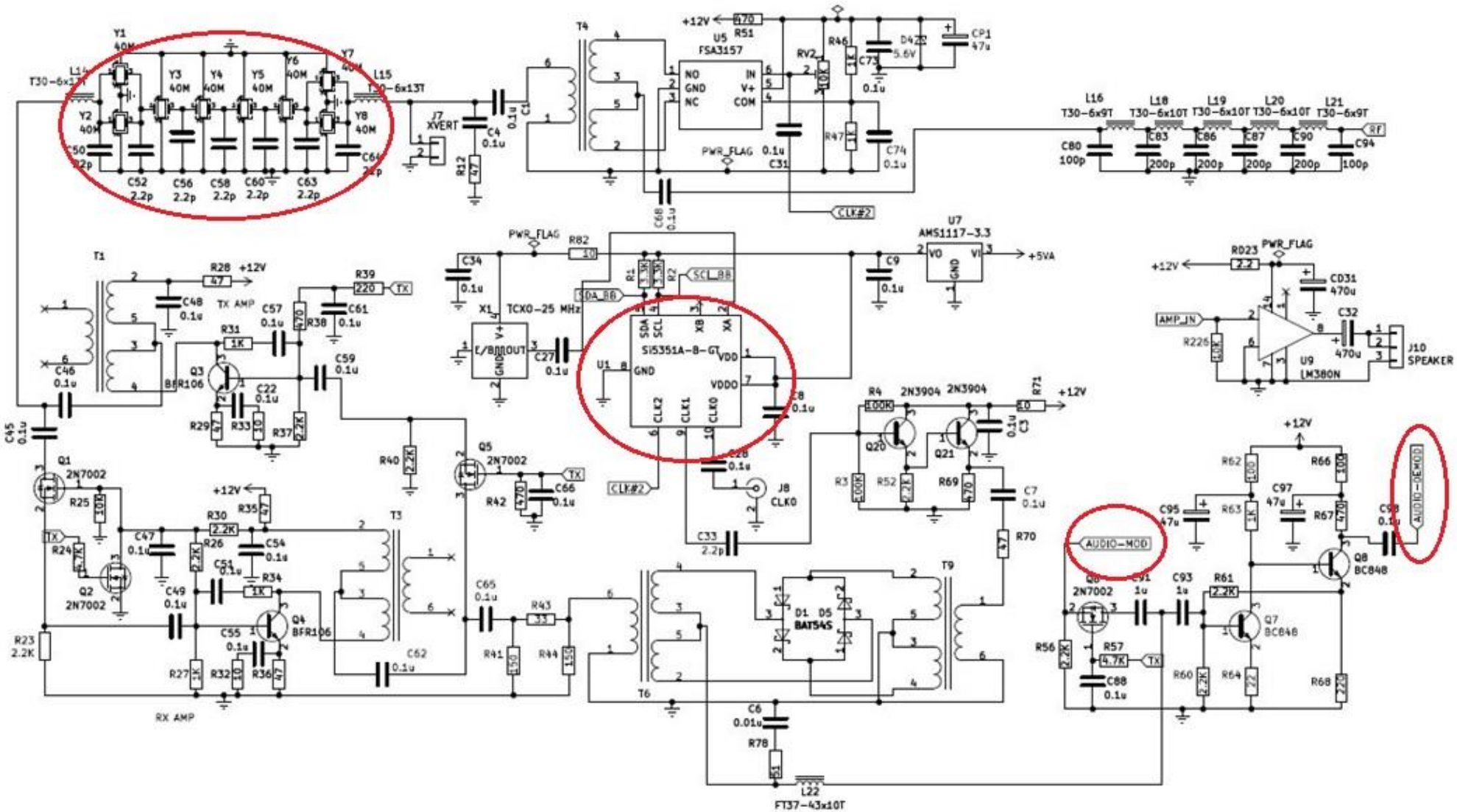
Get Messages | Write | Chat | Address Book | Tag | Quick Filter

sm0jzt@gmail.con
Inbox
Drafts
Junk
[Gmail]
Drafts
Sent Mail
All Mail
Spam
Trash
Important
Starred

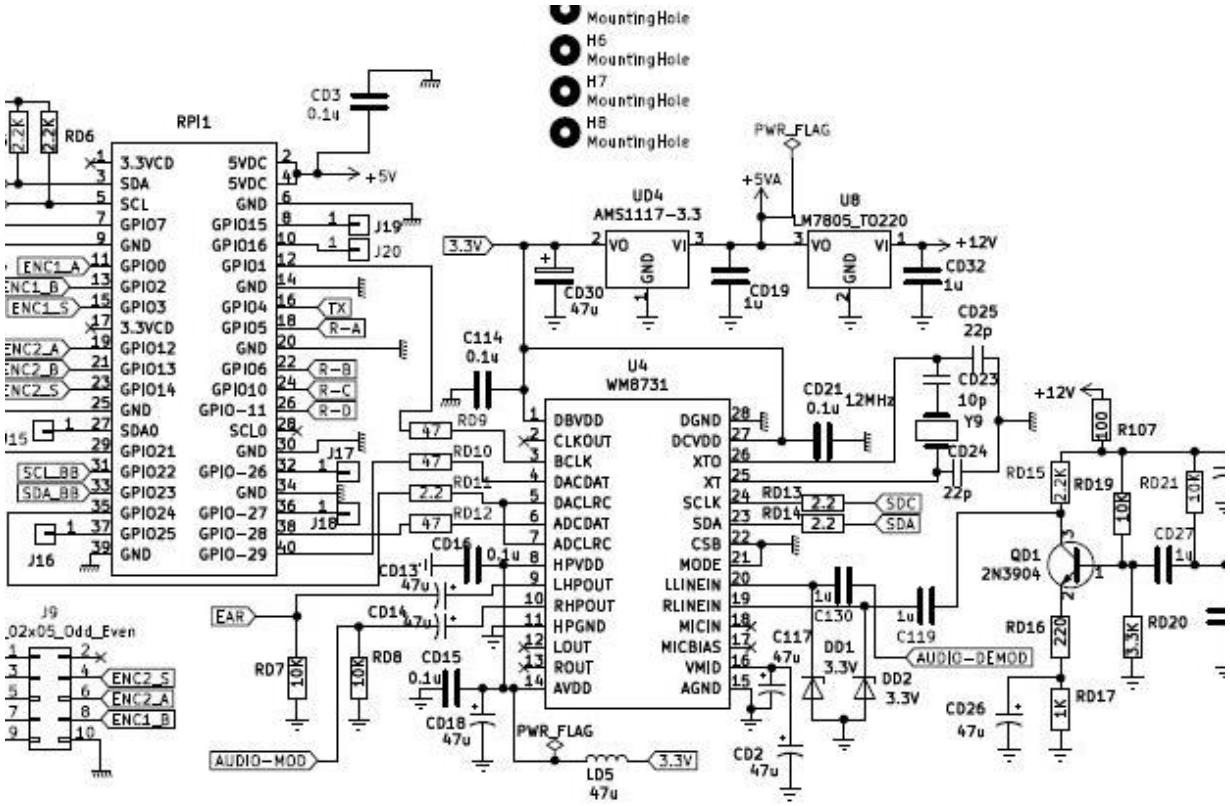
Unread | Starred | Contact | Tags | Attach

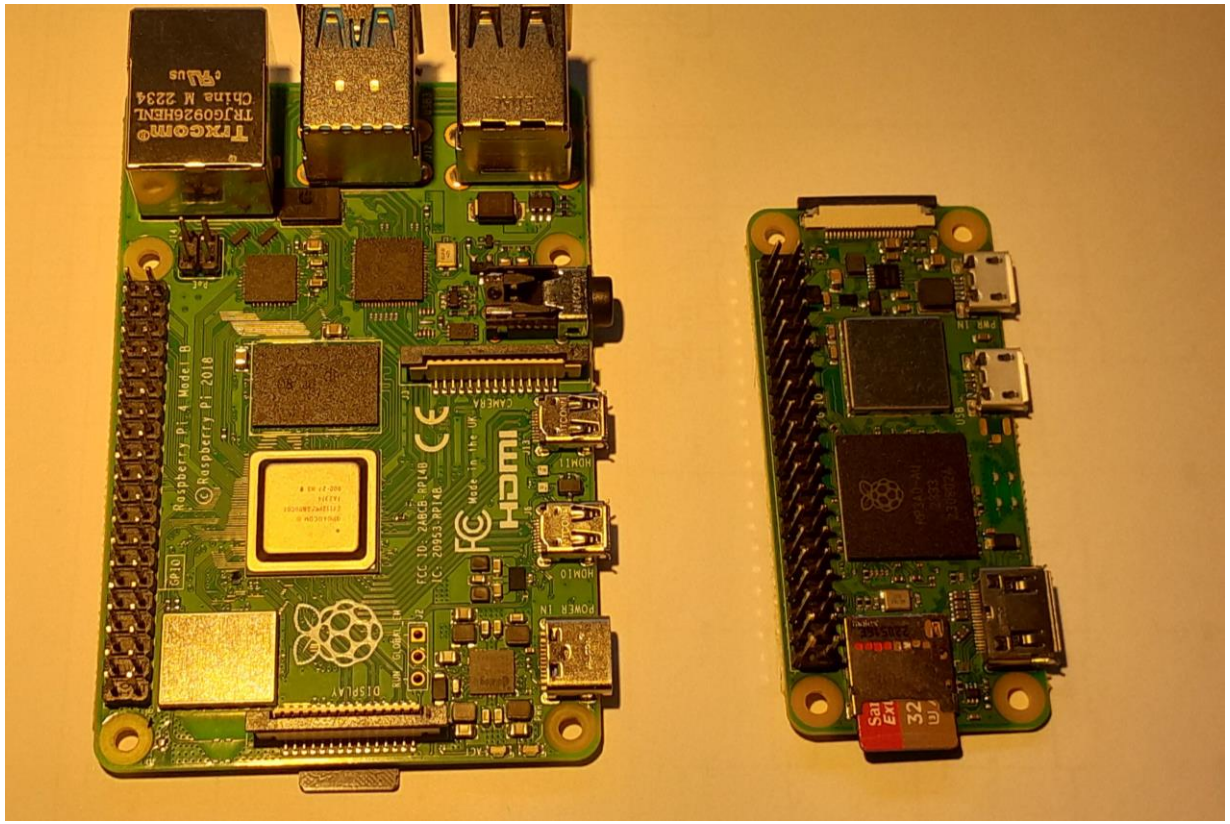
Subject	Corre
[QRPLabs] QRP Labs - Daily Summ...	QRPL
Re: Foredrag på NHAM 23-24 febru...	Bjørn
Kvitto 9184244809	dono
Re: Foredrag på NHAM 23-24 febru...	Bjørn
Digitalt servicekvitto 2024-02-12 El...	norep
Important: 30 days left in your free ...	Goog
Re: Fortsatt litt utstyr på staburet	Svein
Re: Fortsatt litt utstyr på staburet	Svein
Re: Jag kommer till Hameeting	Kjell
Fortsatt litt utstyr på staburet	Svein
Re: Jag kommer till Hammeeting ;-)	Svein

SBITX - Radioteknik



SBITX – “radioteknik”





WM8731

ADC – DAC – sampling 8 – 96 kHz

RPI

PI 4 alt PI Zero 2W

Summering.....

- Raspberry PI – en mycket kompetent UNIX/LINUXdator till billig peng.
- Kan användas till bland annat
  - Radioberry (RPI-Hat)
    - SändTagare (Kortvåg)
  - openwebrx+
    - SDR-mottagaren (en eller flera) tillgängliga på nätet
  - SBITX v3
    - SändTagare (kortvåg) styrd av en RPI
    - Hybrid SDR
- Jag finns i utställningen för frågor / demo

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