

QO-100

Geostationær amatør satellit

Es'hail-2 satellitten

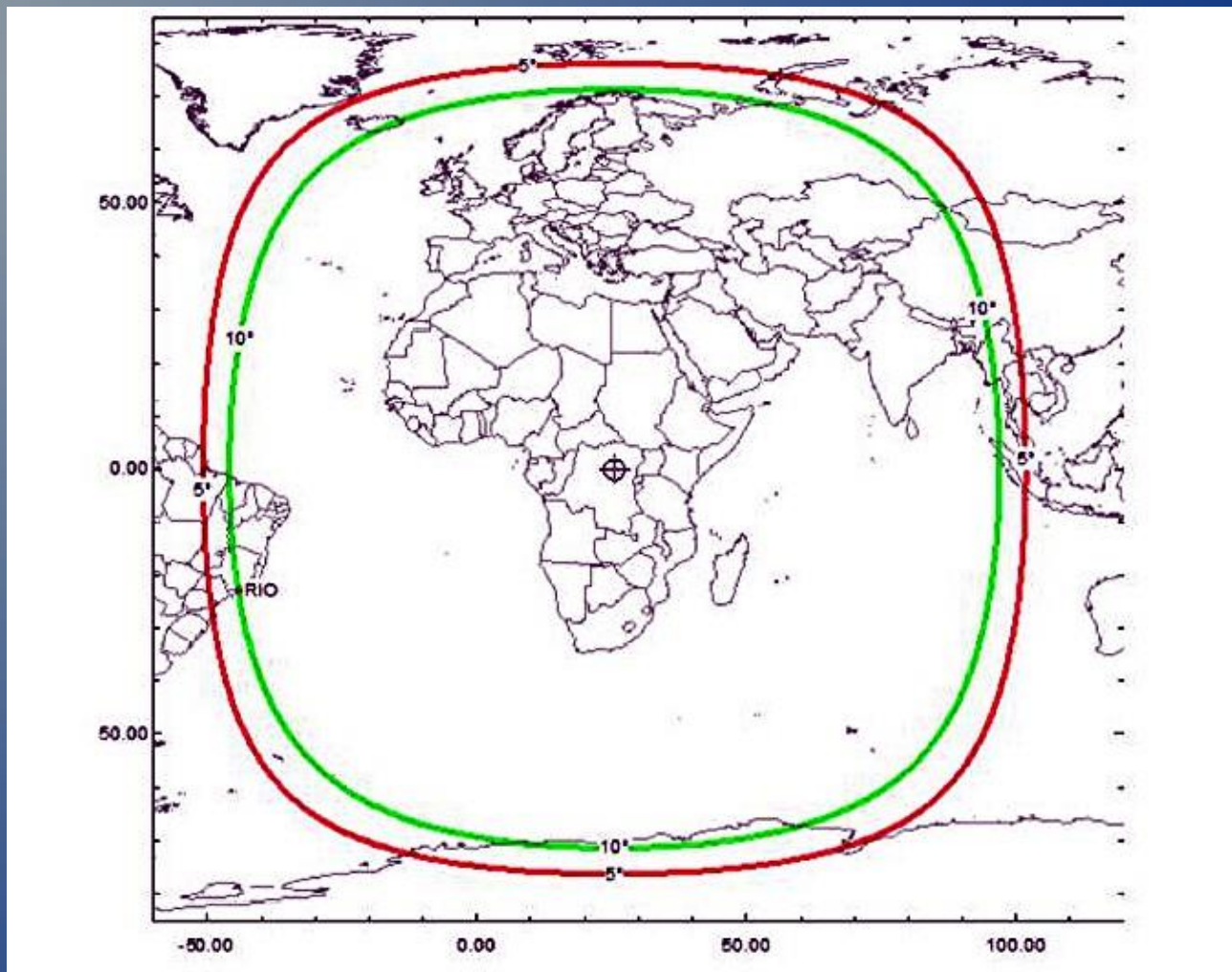


QO-100 er en – lille – del af TV satellitten Es'hail2, der sender TV prog

QO-100 består af to lineære transpondere. Narrow Band og Wide Ban

Es'hailSat betaler og AMSAT DL bistår med kontrolstation mv.

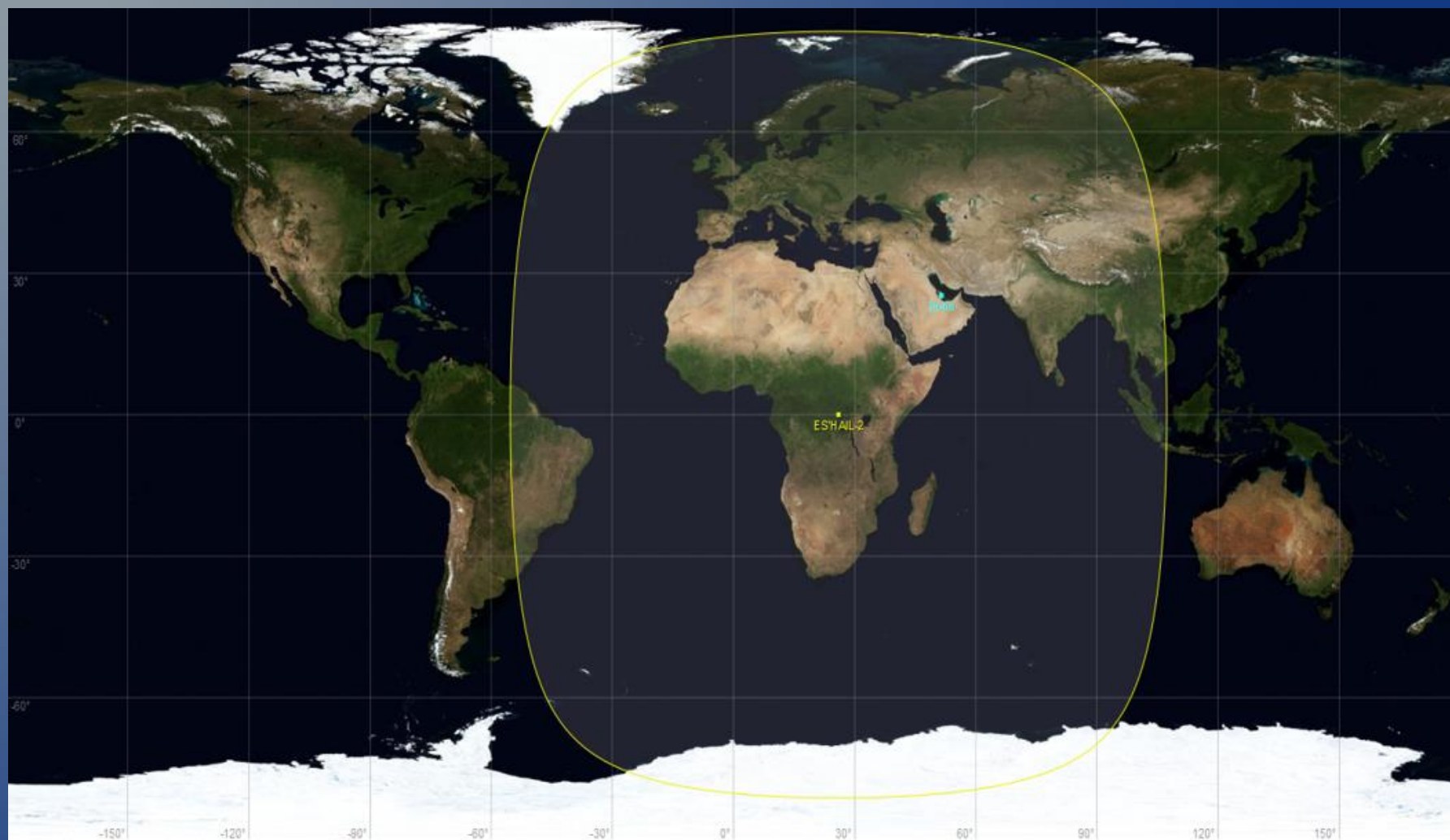
Placering og dækning



Fra en positionen over ækvator på 25,9 grader øst, dækkes ca. 1/3 af jordens overflade.

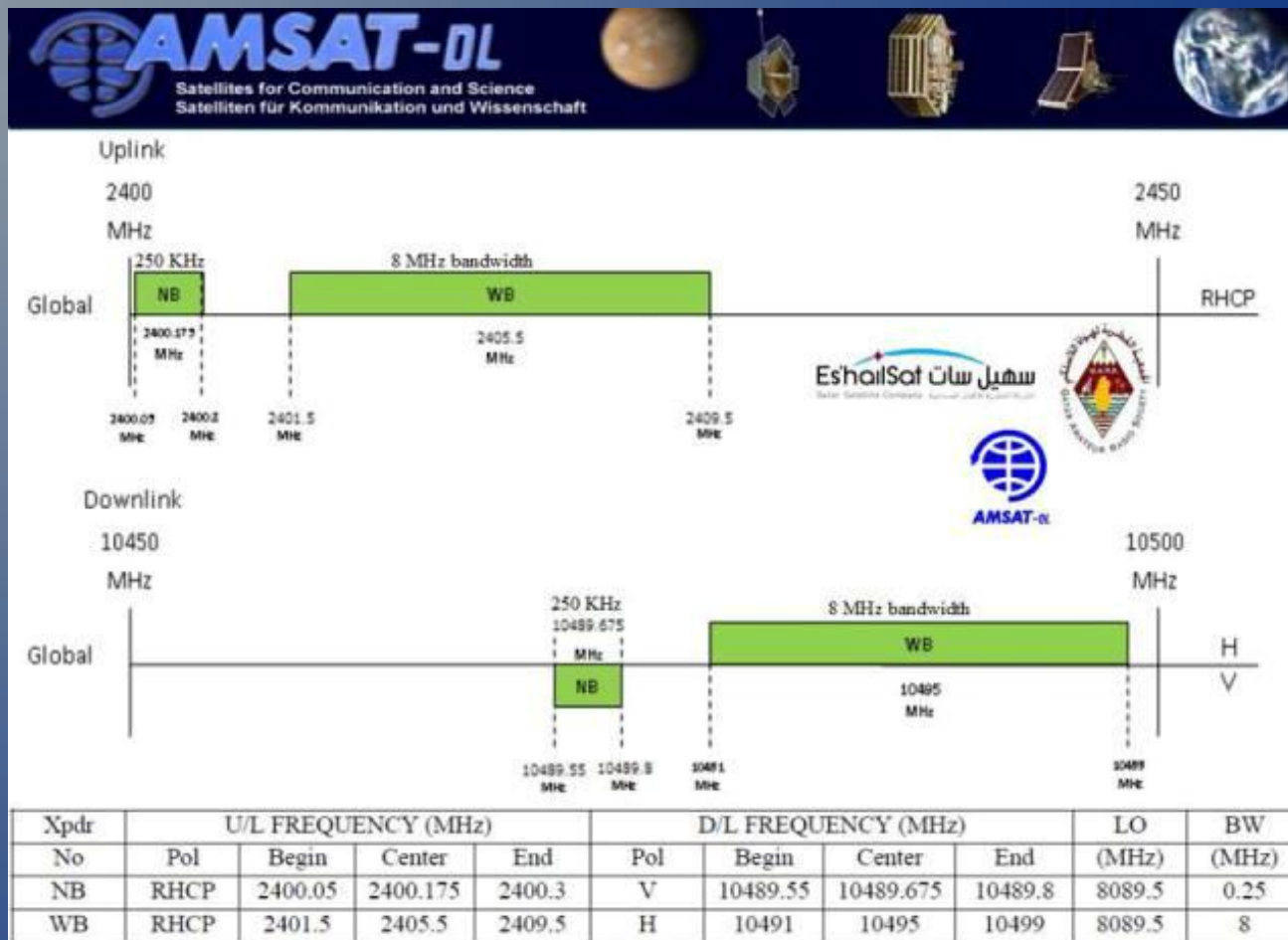
Rød streg angiver 5 grader elevation, grøn 10 grader elev.

Placering og dækning



Dækningen ved 0 grader elevation – interessant for eksperimenterende amatører!

Frekvenser

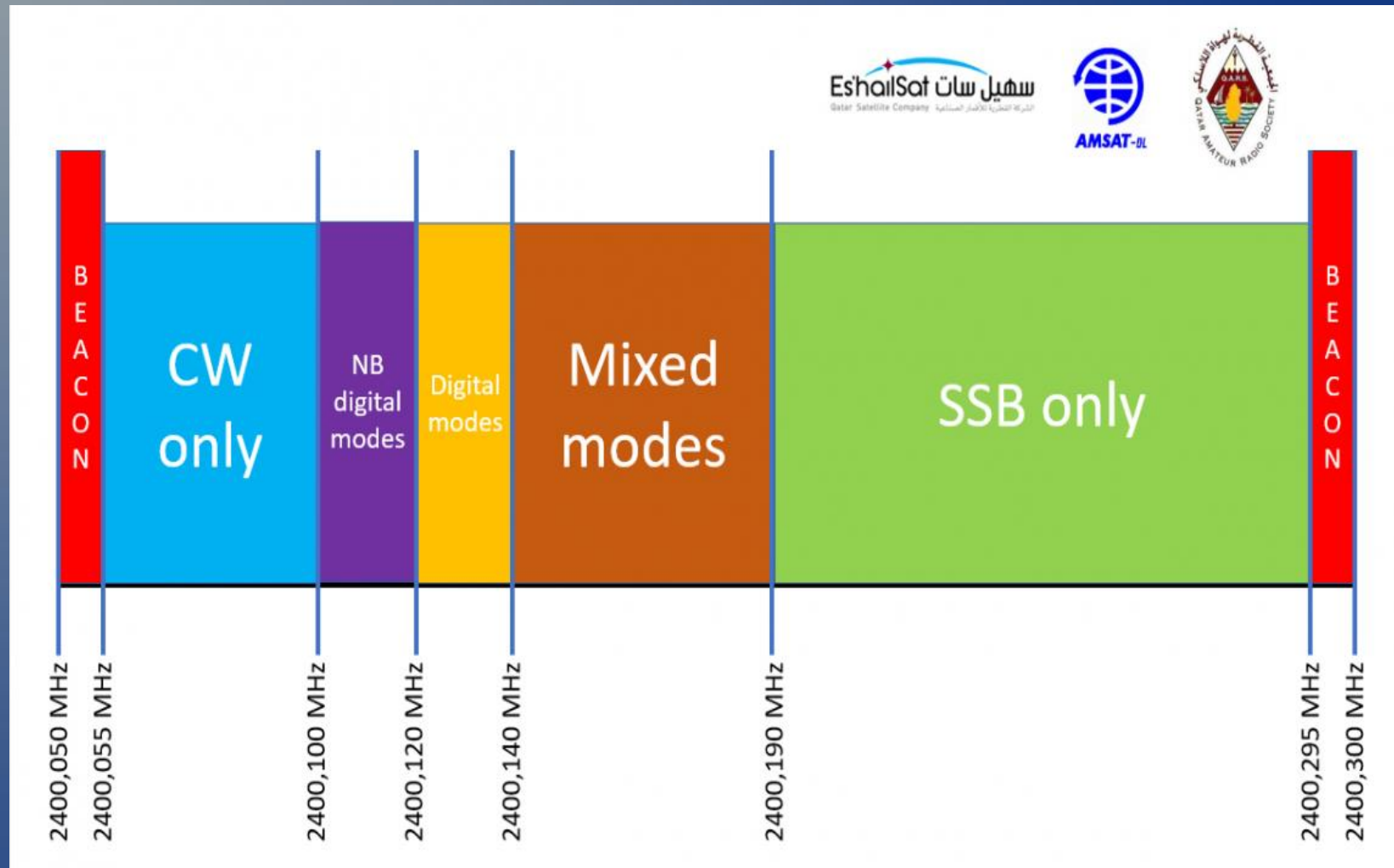


Uplink på 2,4 GHz og downlink på 10,4 GHz

Narrow band transponder 250 kHz bred – CW, SSB, digimode

Wideband transponder 8 MHz bred – digital TV

Narrow Band - uplink



NB – bliver snart udvidet fra 250 kHz til 500 kHz båndbredde!

Krav til udstyr

Minimum setup for **SSB** communications:

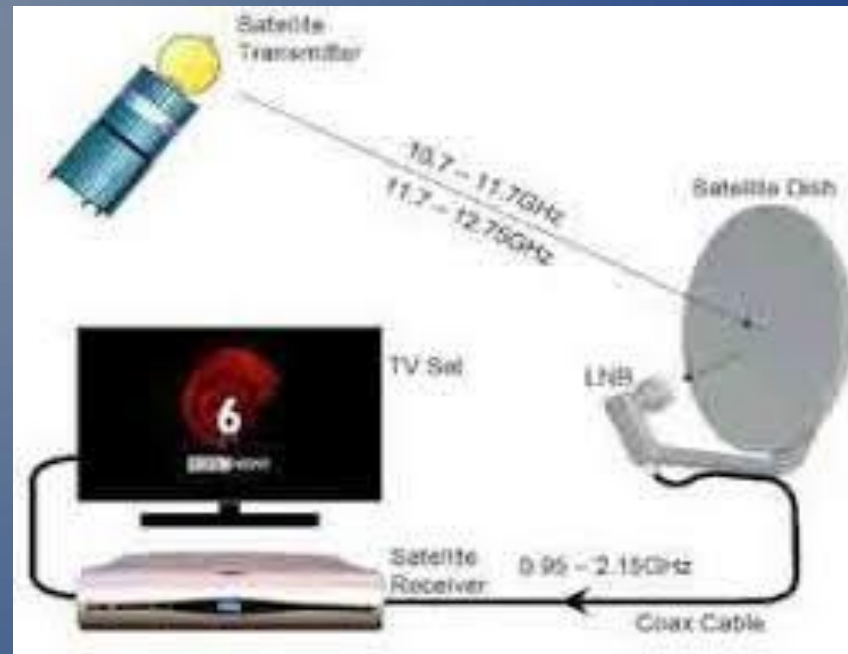
RX Antenna	60-90 cm SAT-TV dish
Receiver	LNB with power injector and DVB-T dongle + SDR software (for example SDR#) OR 3 cm LNA with downconverter to 70cm
Transmitter	10W PEP in 60-90 cm dish plus upconverter from 144 MHz

Minimum setup for **DATV** (DVB-S2) communications:

RX Antenna	60-90 cm SAT-TV dish
Receiver	modified LNB with standard satellite receiver box (DVB-S2) OR modified LNB with PCI DVB-S2 cards for PC use
Transmitter	25W PEP in 2.4m dish plus DVB-S2 modulator for a 2MSym/s videostream

Downconverter: 10,4 GHz til en modtager på 739/432/144/70 MHz
Upconverter: SSB/CW fra 70/144/432 MHz til 2,4 GHz

Modtages ligesom SatTV



SatTV modtages af millioner og elektronikken er billig og god.
Vi kan bruge almindelige LNB og paraboler

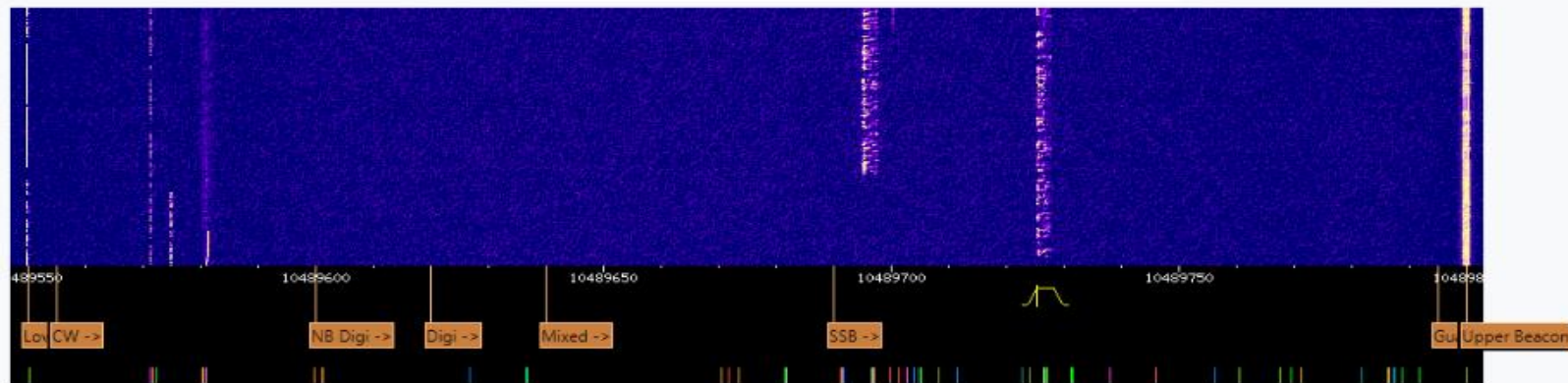
- TV og set-top boks skiftes ud med SSB/CW modtager

QO-100 WebSDR

You can read more about the WebSDR & Spectrum Viewer station at wiki.batc.org.uk/Es'hail-2 Ground Station

- For more details on Qatar-OSCAR 100 see amsat-dl.org/eshail-2-amsat-phase-4-a
- The QO-100 wideband spectrum monitor can be found here eshail.batc.org.uk/wb/
- More information about the WebSDR software can be found on www.websdr.org
- Dish Pointing Calculator & Map: eshail.batc.org.uk/point/
- [QO-100 Bandplan & Operating Guidelines](#)

View: waterfall blind Allow keyboard: Waterfall: HTML5 Sound: HTML5 [Click to start sound!](#) Narrowband listeners: 98



10489725.35 kHz labels

--- -- - + ++ +++

CW LSB **USB**

Memories:
recall erase store (new)

Filter: 2.70 kHz - +

squelch autonotch

Audio recording
start

Waterfall zoom
- +
> < <>

Speed: slow

Size: large

View: waterfall

Volume: mute

Signal strength plot: slow

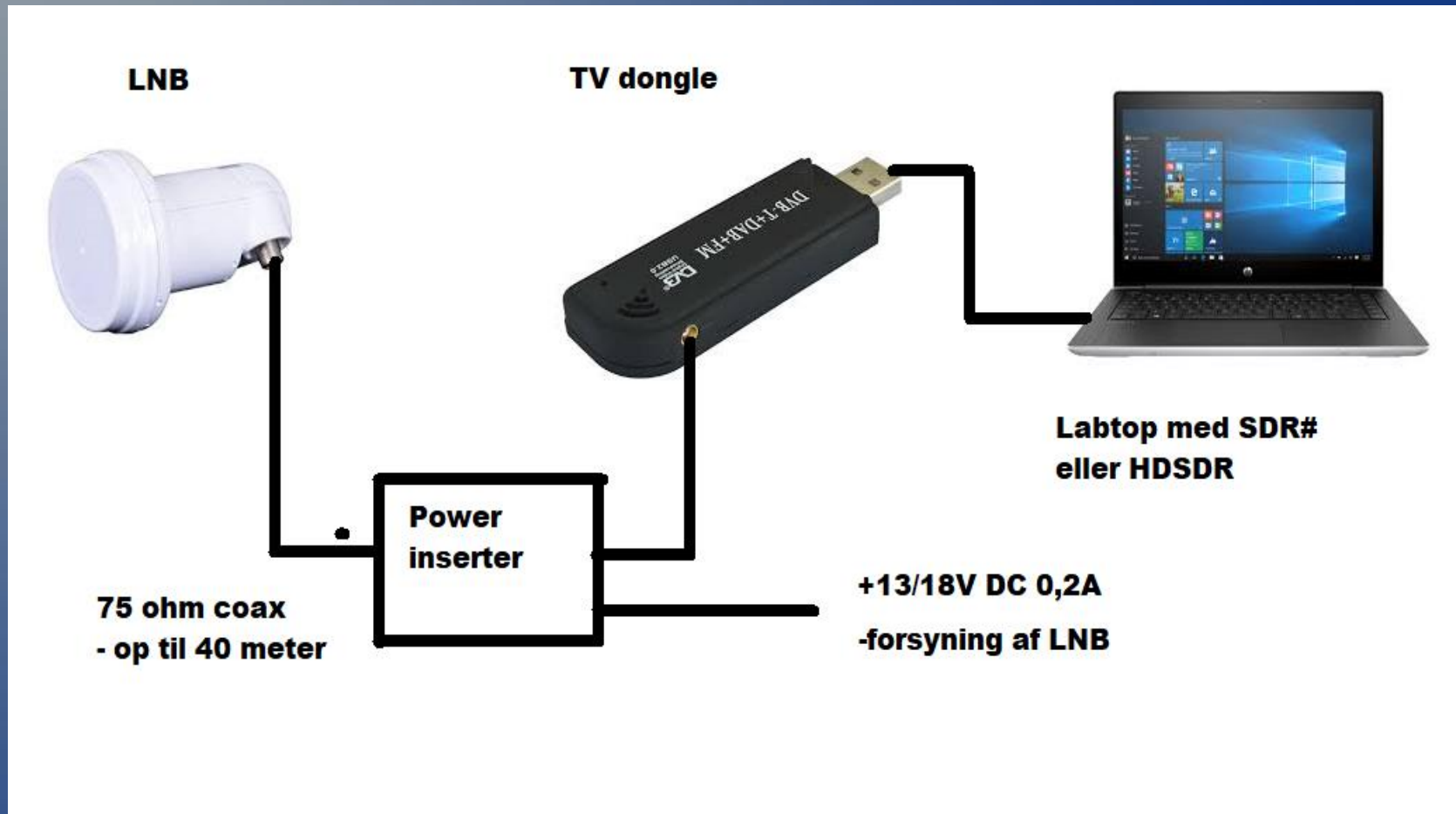
Goonhilly WebSDR: <https://eshail.batc.org.uk/nb/>

Udstyr til modtagning



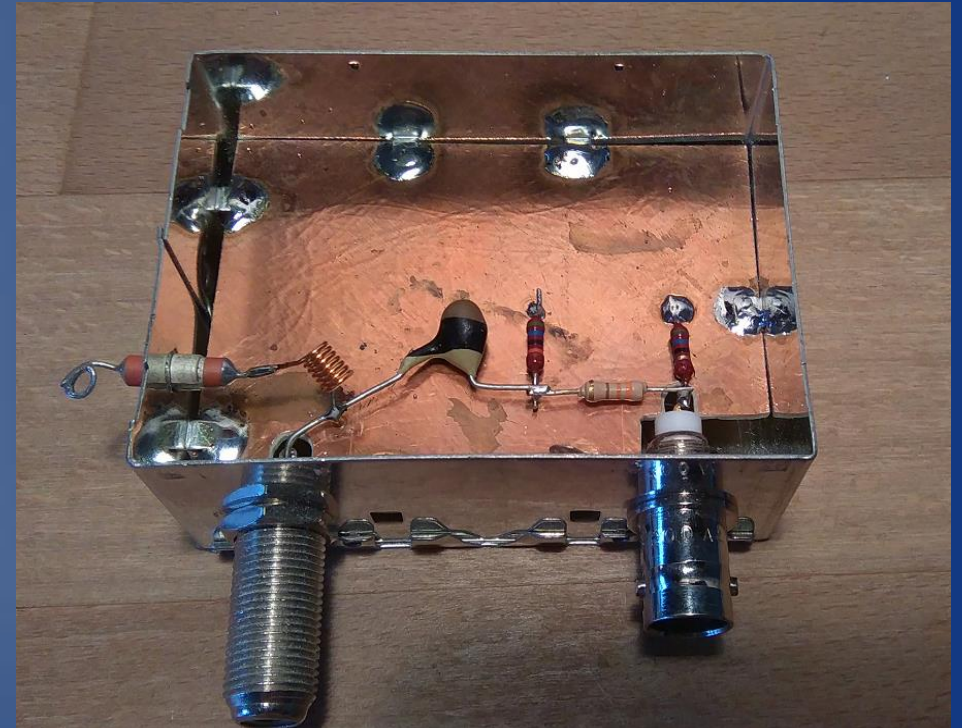
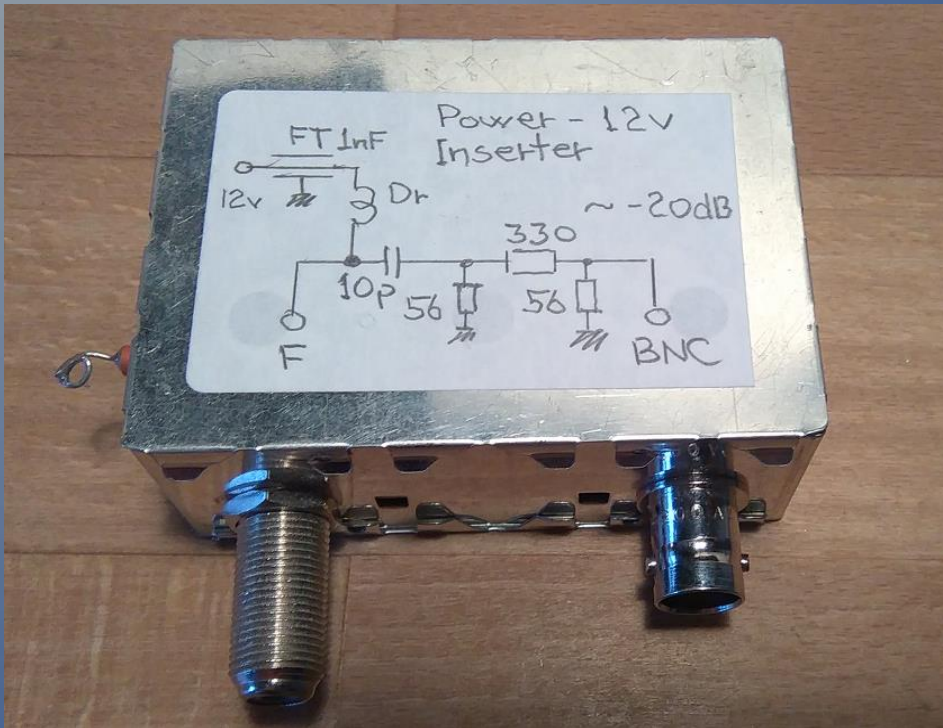
Parabol – 60 til 80 cm – gammel TV parabol er fin
Almindelig Sat-TV LNB. Skal være PLL type!
TV dongle + PC med f.eks SDR# eller HDSDR installeret.
- eller scanner som dækker IF frekvensen ca. 739 MHz

Opbygning



LNB anbringes i parabolens brændpunkt
Power inserter forsyner LNB med 13/18V igennem coaxkablet
Coaxkablet kan være op til 40 meter uden problem

Power inserter

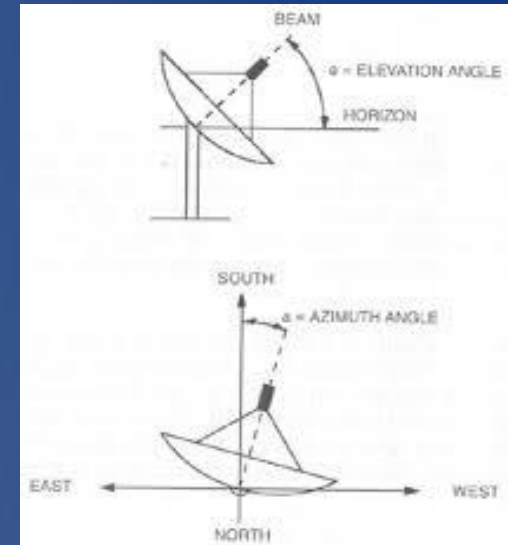
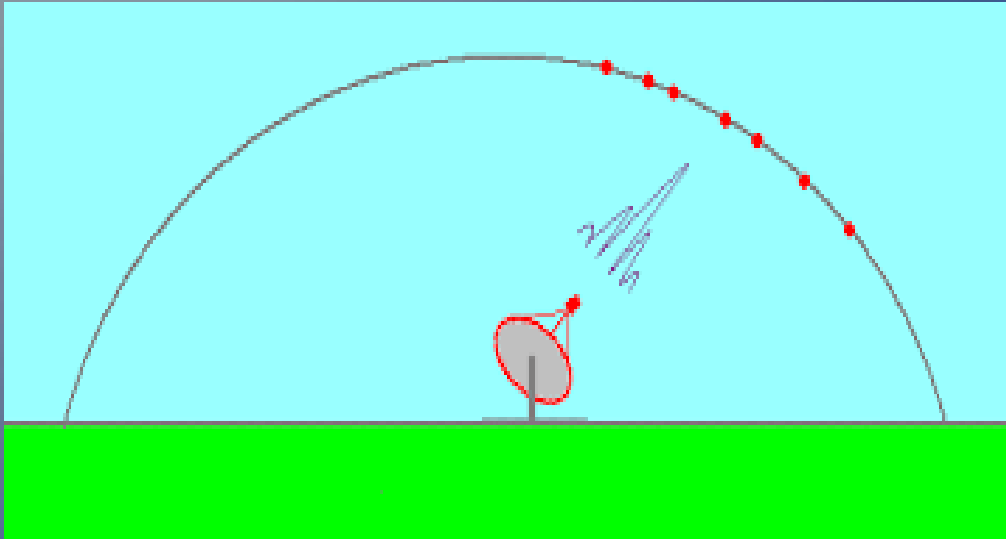


Forsyner LNB'en med spænding

Output fra LNB på 740 MHz føres igennem 10 pF til modtager
Dæmpeled 20 dB da LNB har >60 dB forstærkning

Bygget som "fuglerede". Ikke kritisk

Indstilling af antenne



Elevations vinkel = "højde"

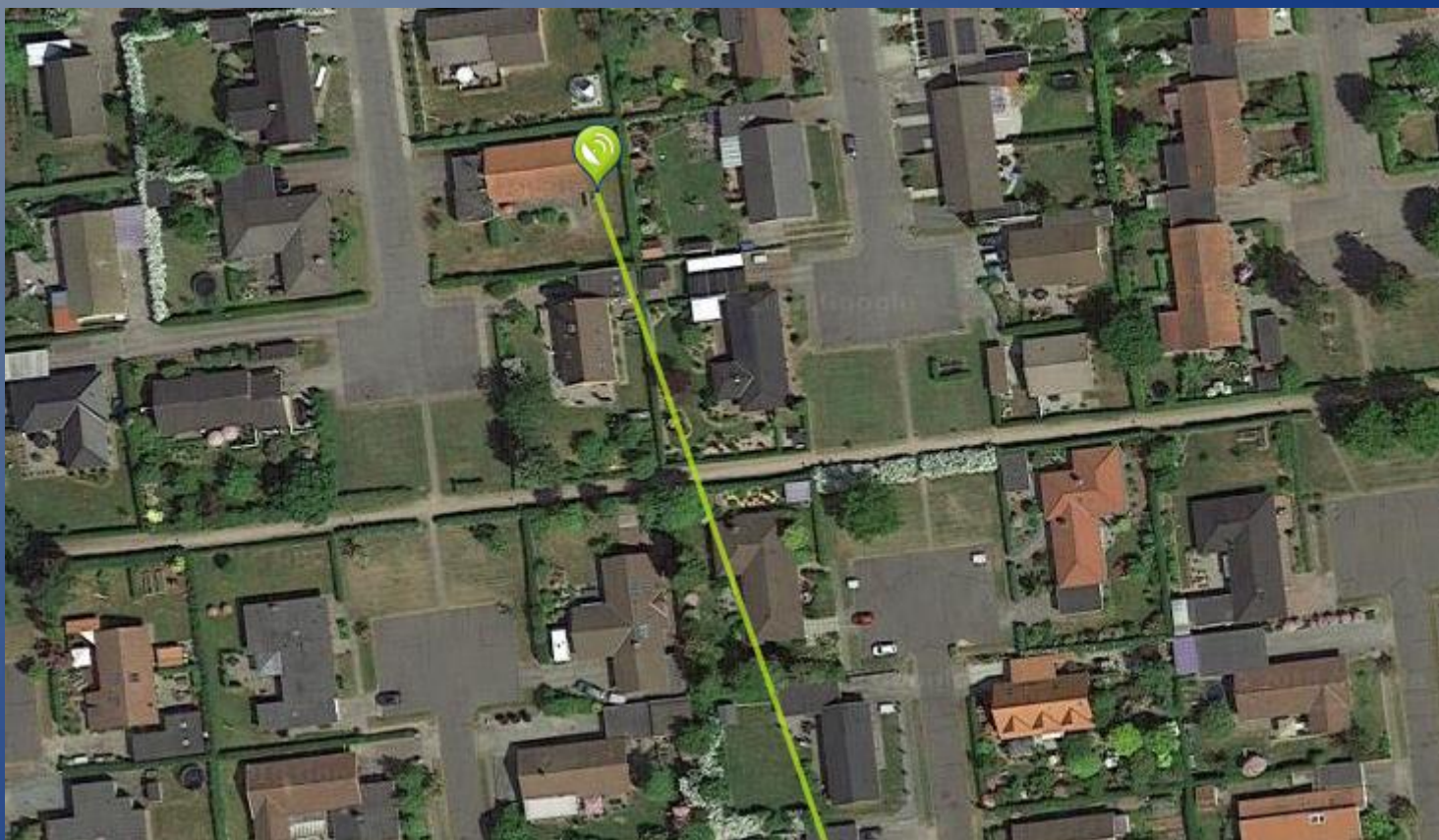
Azimuth vinkel = "kompasretning"

SatFinder "kan" bruges?

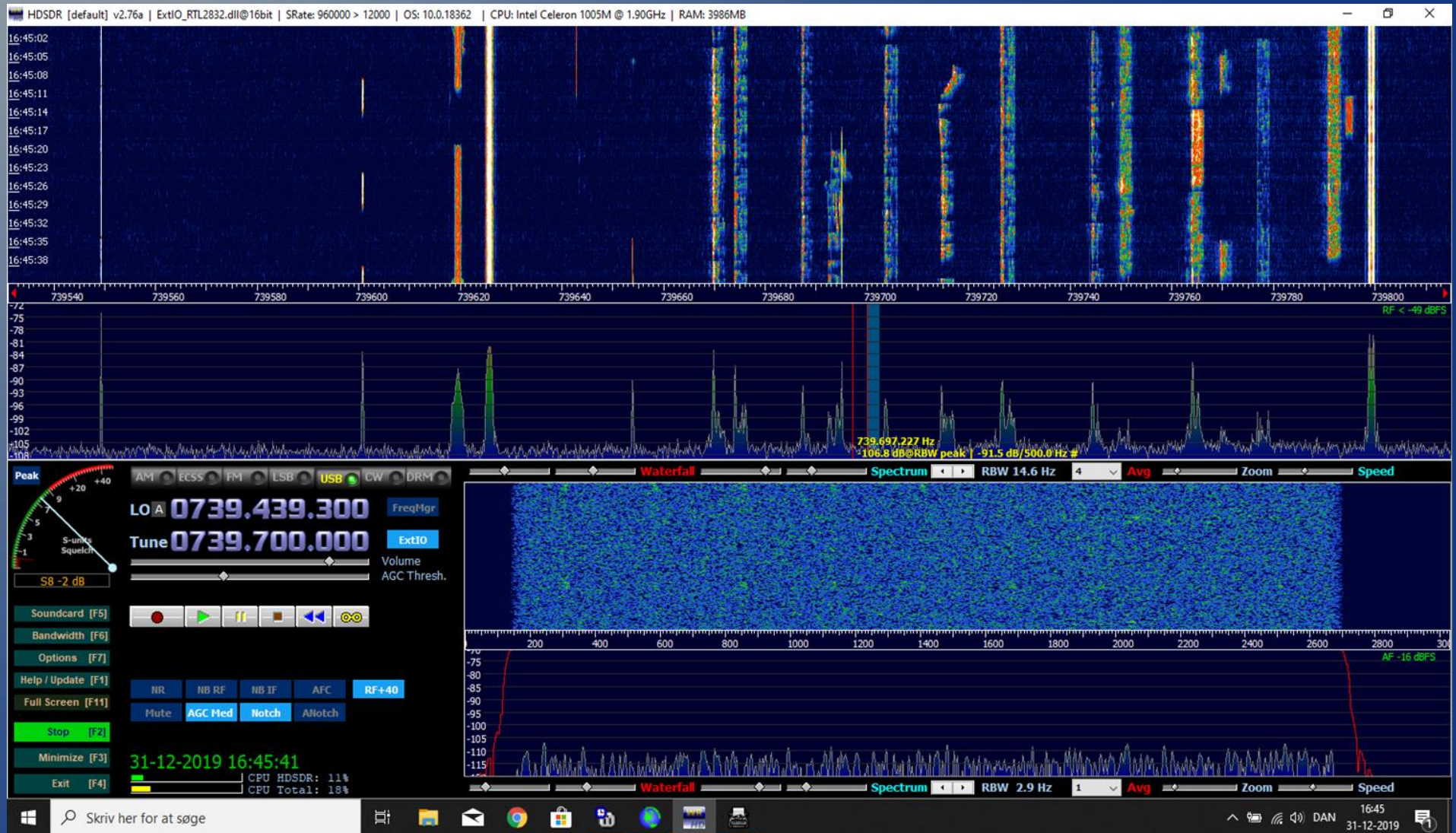


Hvordan finde retning?

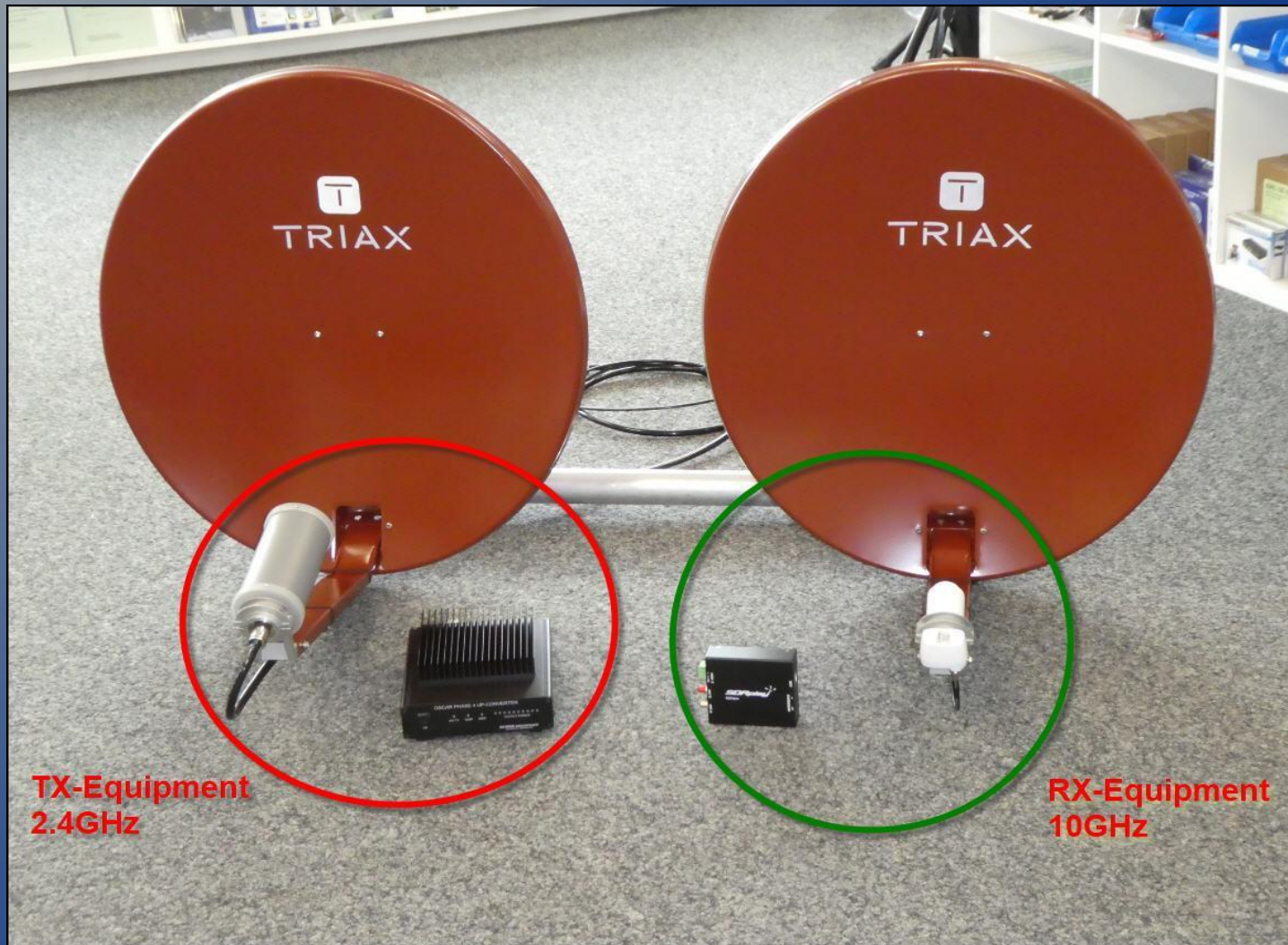
Internettet: www.dishpointer.com - giver Az, El og et kort



Aktivitet – stadig ledige pladser!



Udstyr til QO-100



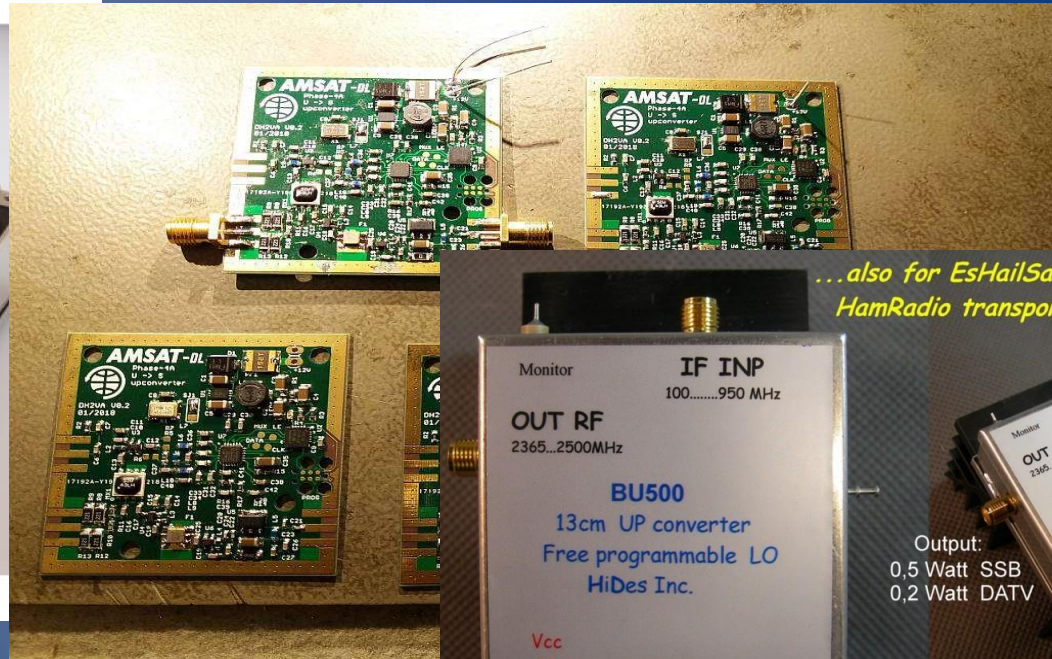
Købe færdigt – komplet sender, modtager og antenner.

Udstyr til QO-100



Købe færdig up-converter og LNB med 23 cm IF (DB6NT).

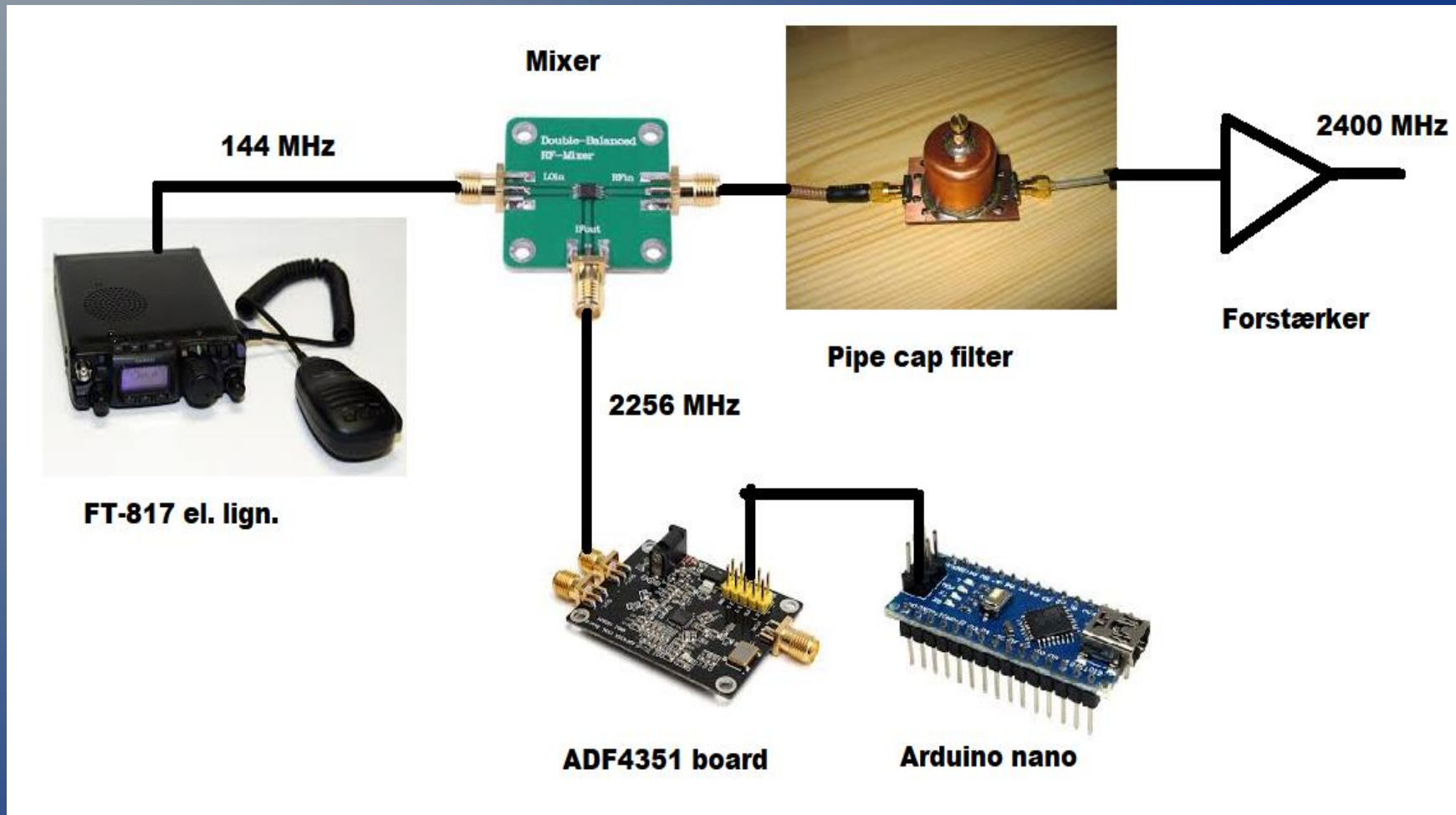
Upconverter til 2400 MHz



SG Lab 13 cm transverter. RX og TX
AMSAT DL upconverter – kun TX
DX Patrol – kun TX
BU-500 converter – kun TX

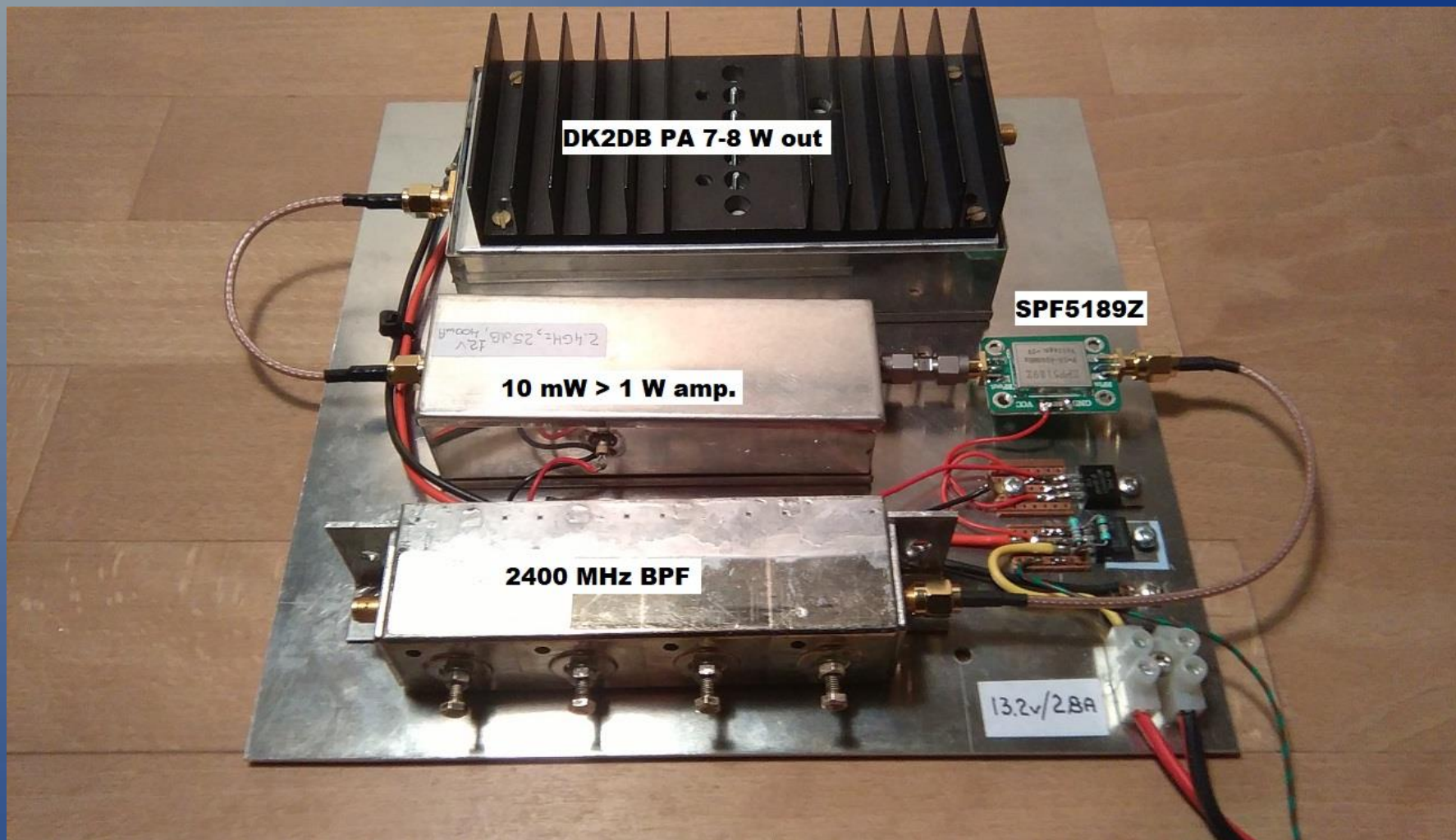


Bygge selv til 2400 MHz



Upconverter 144 til 2400 MHz. Samlet af moduler fra Kina.

Brug "gamle" 13 cm moduler



Styres fra gammel 13 cm transverter med ca. 1 mW

Antennetyper

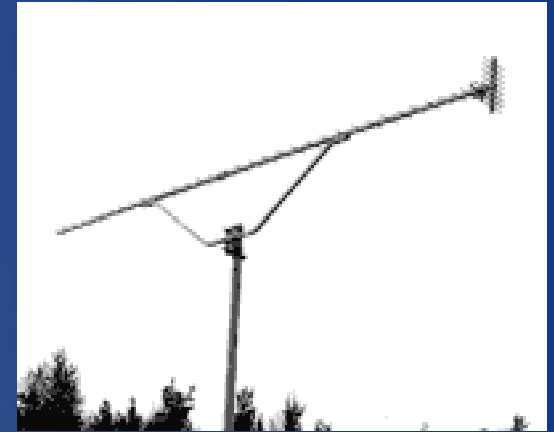
Uplink 2400 MHz

22-23 dB gain v/4W

Cirkulær polariseret RHCP

(-eller lineær og mere pwr)

(-eller yagi og endnu mere pwr)



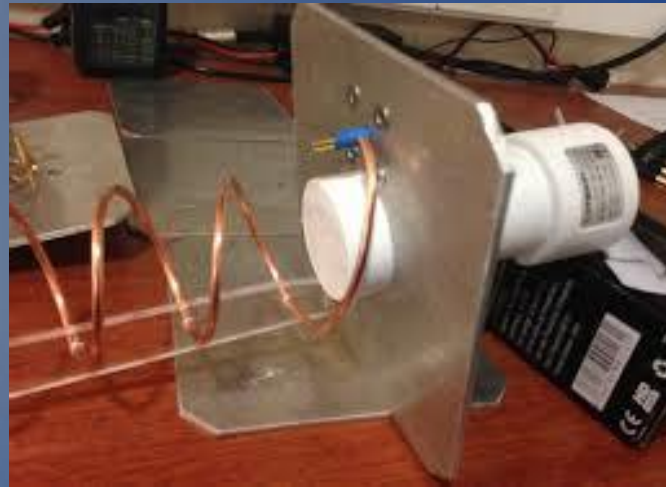
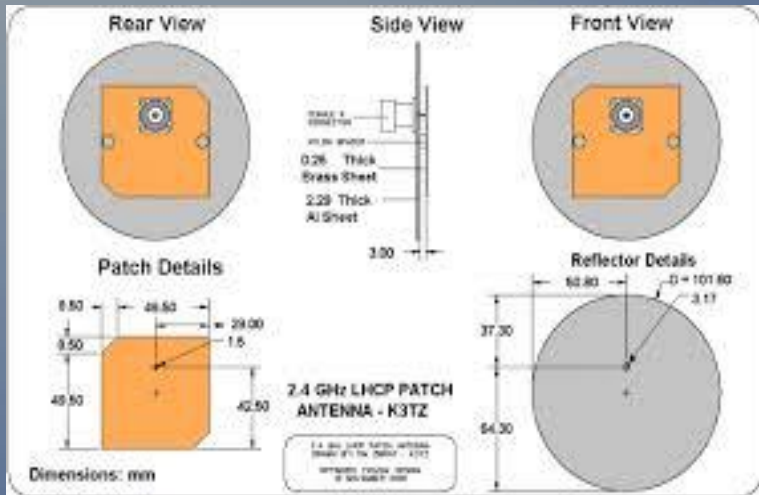
Downlink 10,4 GHz

60-90 cm parabol

Lineær polariseret



Fødeantenner



Downlink 10,4 GHz er lineær "vandret" polariseret. Passer med LNB, så ikke noget problem (-dog husk skew)

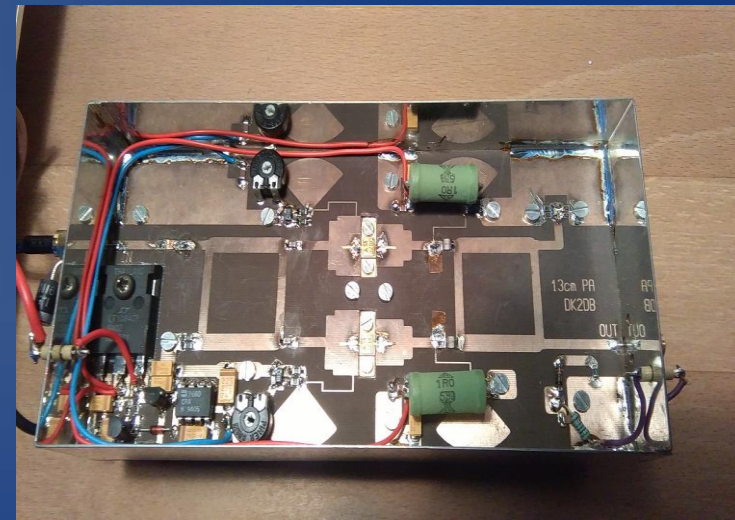
Uplink 2400 MHz er bedst med RHCP. Lineær feed mister 3 dB

Patch- og helical antenner er cirkulært polariserede

Kombi fødeantenne helical+LNB og patch+LNB kan bygges

Med kombifeed skal der kun bruges én parabol!

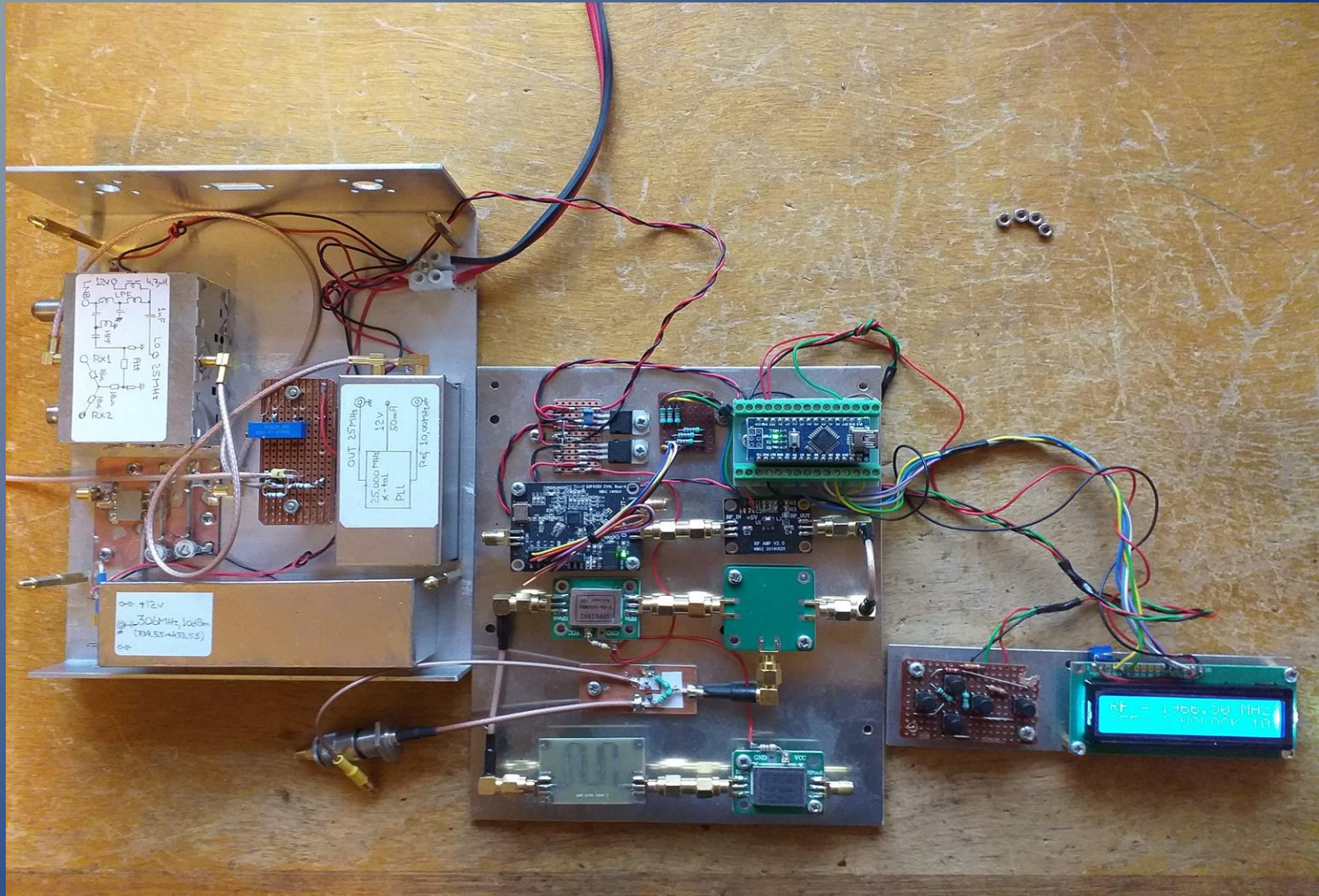
Mit 1. setup



85 cm SatTV parabol og 1 m prime focus netparabol (lin pol.)

Fuld duplex: RX 10,4 GHz LNB + TV dongle, TX modificeret 13 cm transverter og ca. 7 W PA.

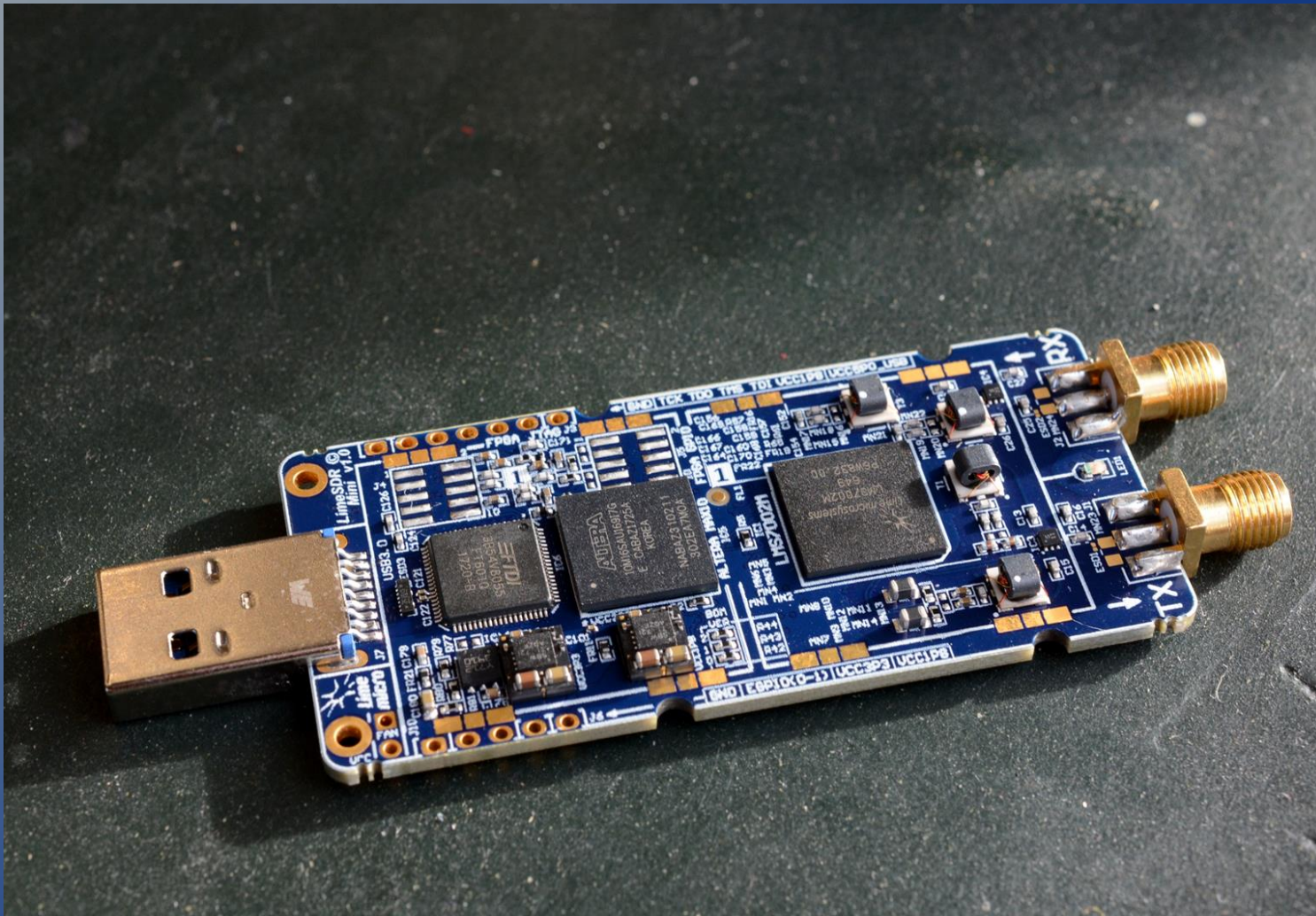
Portabel setup - 432 MHz IF



Baseret på "Kina-stumper" og IF 433,55 til 433,80 MHz. (FT857)

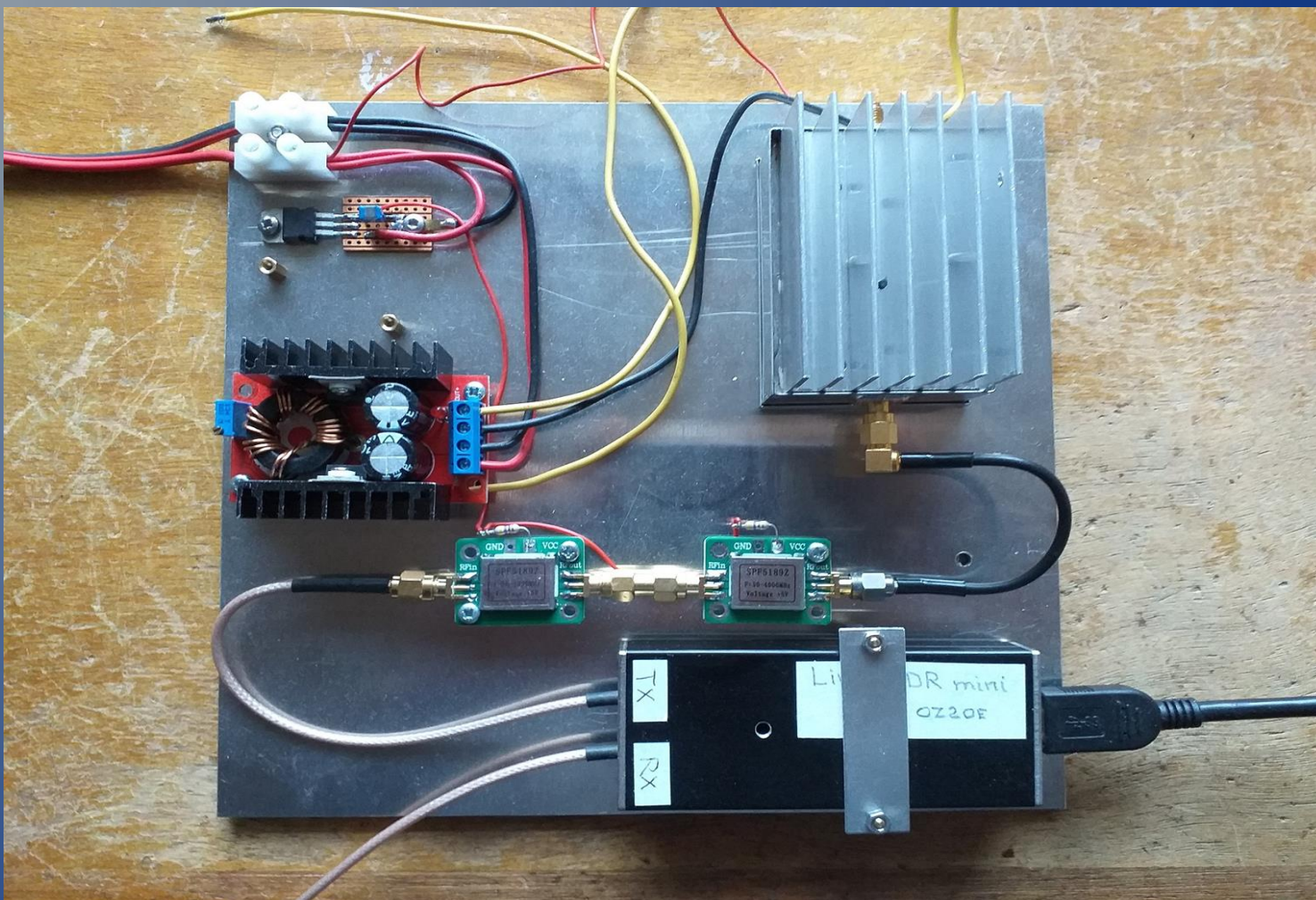
Uplink 433,5 til 2400,5 MHz. Down 10489,5 til 739,5 til 433,5 MHz

Løsning med SDR



Lime Mini er en fuld duplex SDR i området 10 – 3500 MHz. Kan køre alle modes incl. DATV. Kan bruges til meget andet end QO-100. Pris 159 \$.

SDR løsning til QO-100



QO-100 transceiver baseret på Lime Mini SDR. Kører fuld duplex 2400/739,5 MHz. Styres af SDR Console software. PA er hjemmebygget 20 – 25 W.

Digital Amatør TV



WB transponder er 8 MHz bred og kan overføre mange samtidige tv signaler. Modtages på samme måde som NB transponderen.

QO-100 WB transponder

The screenshot displays the 'Qatar-OSCAR 100 Wideband Spectrum Monitor' website. The page features logos for BATC, AMSAT-DL, and GOONHILLY EARTH STATION. The main heading is 'Qatar-OSCAR 100 Wideband Spectrum Monitor'. Below the heading, there is a brief description of the monitor and a list of links for more information.

Qatar-OSCAR 100 Wideband Spectrum Monitor

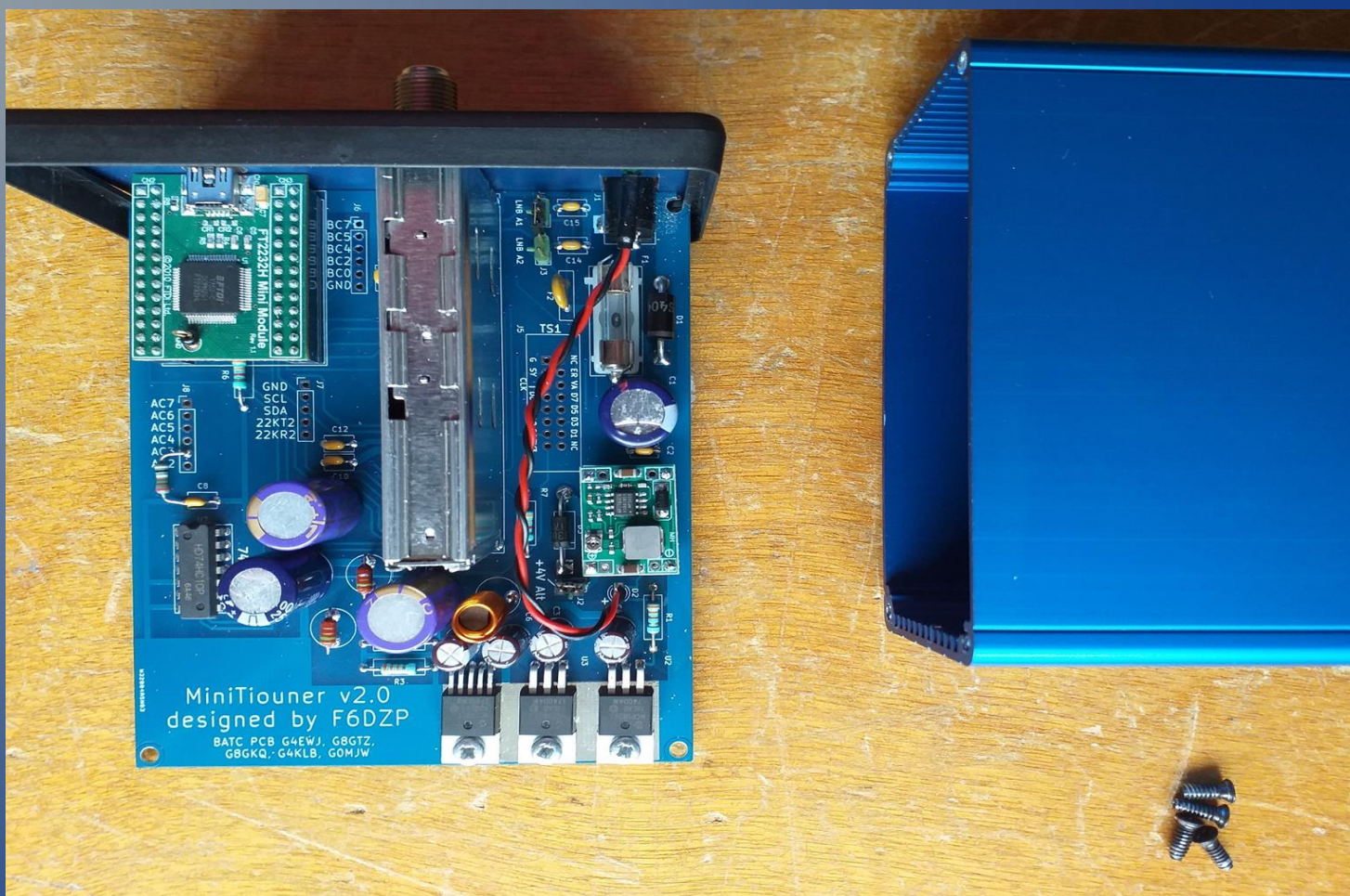
This spectrum monitor, hosted at Goonhilly Earth Station in Cornwall, shows the Qatar-OSCAR 100 wideband transponder onboard the Es'hail-2 satellite. You can read more about the WebSDR & Spectrum Viewer station at wiki.batc.org.uk/Es'hail-2 Ground Station

- For more details on Qatar-OSCAR 100 see amsat-dl.org/eshail-2-amsat-phase-4-a
- The QO-100 narrowband websdr can be found here eshail.batc.org.uk/nb/
- Dish Pointing Calculator & Map: eshail.batc.org.uk/point/
- DATV Operator Station List: wiki.batc.org.uk/QO100_DATV_Users

The spectrum plot shows a wideband signal (green) and a narrowband signal (blue) at 333KS, 497.788. The plot is labeled 'A71A DATV Beacon (10492.500, 2MS/s QPSK, 2/3)' and 'Wide & Narrow DATV'. The chat log on the right shows a conversation between users, including 'DC2TH_Wolfgang', 'dg1maj', and 'F5oep René'.

Brug Goonhilly Spectrum Monitor til at se aktiviteter.

Tuner til DATV



Byggesæt fra BATC indeholder de vigtigste komponenter (dækker 144 MHz til 2400 MHz, så kan også bruges til terrestisk DATV forsøg)

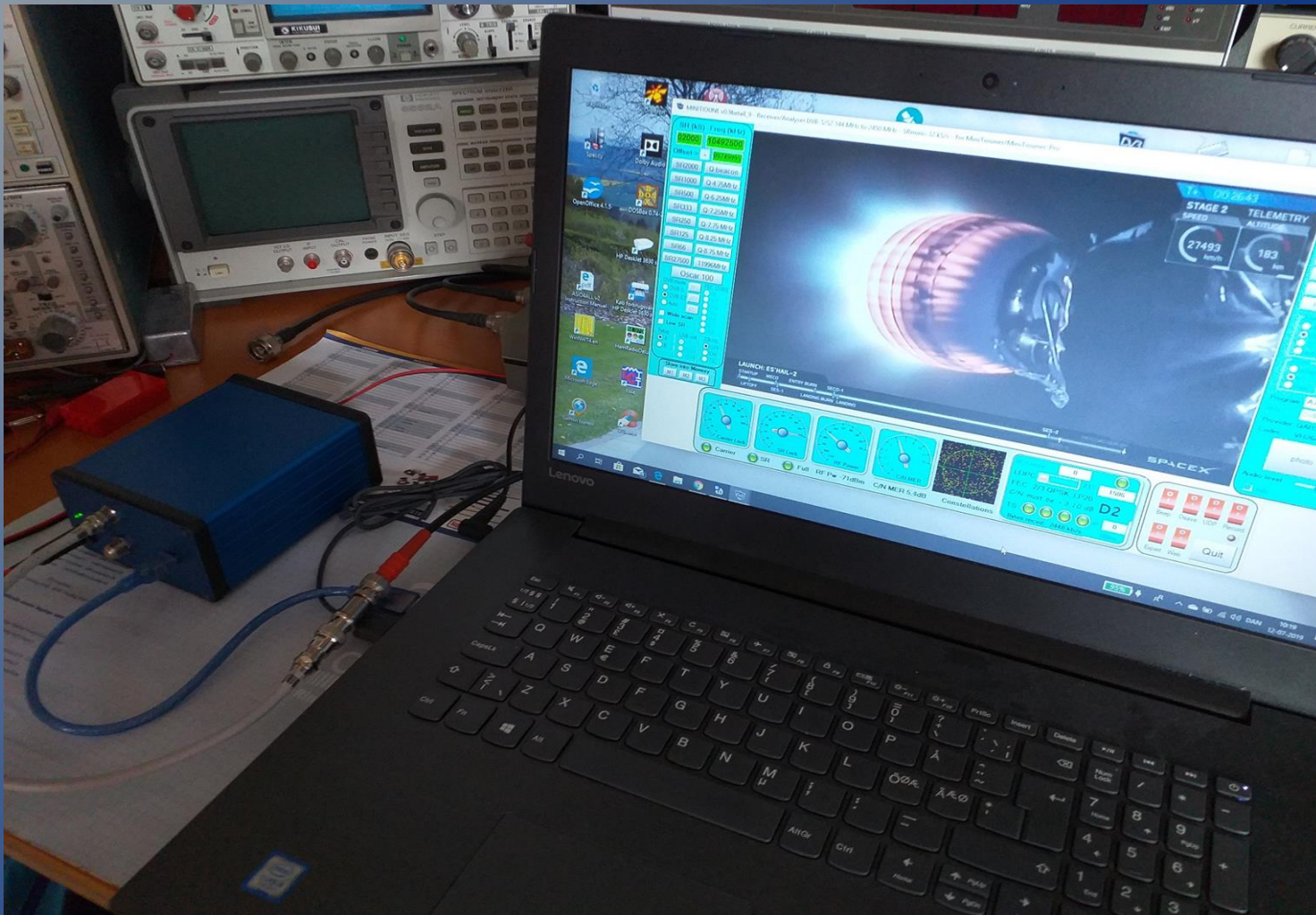
Software til modtagelse af DATV

The screenshot displays the MiniTouner V2 software interface, which is used for receiving and analyzing DVB-S/S2 signals. The interface is divided into several sections:

- Top Left:** Shows the current signal rate (SR) and frequency (Freq). The SR is set to 2000 kS and the Freq is 10492500 kHz. The offset is 09749995.
- Top Center:** Displays the MiniTouner V2 logo and the device name: NIM: Serit FTS-4334L.
- Top Right:** Shows the PID (Program ID) list, currently set to A71A. It also displays the PID video (00257) and PID audio (00258) settings.
- Middle Left:** Contains a list of signal rates (SR) and their corresponding Q-factors, such as SR2000 (Q-beacon), SR1000 (Q-4.75MHz), and SR27500 (11996MHz).
- Middle Center:** Shows the Symbolrate (SR) set to 2000 kS/s and the Frequency (kHz) set to 10492516 kHz. It also displays the LNA gain (13.0 dB) and the Carrier Width (2400 Khz).
- Middle Right:** Features a noise graph and a constellation diagram. The noise graph shows the signal-to-noise ratio (SNR) and the constellation diagram shows the signal constellation.
- Bottom Left:** Displays the Web Station ID (MYCALL) and the MY CITY (MY CITY). It also shows the Ant. Dir. (East) and Gain (12 dB).
- Bottom Center:** Shows the BCH errors (2) and the LDPC (32%) status. It also displays the FEC (2/3 QPSK_LP20) and the C/N MER (4.6dB).
- Bottom Right:** Contains a control panel with buttons for Beep, Dsave, UDP, Record, and Quit. It also shows the Bytes recvd (2497 kb/s) and the Time (11-07-2019 14:20).

MiniTouner software fra F6DZP

WB transponder - DATV



Modtaget på 85 cm antenne af MiniTiouner og PC
(billedet viser QO-100 TV-beacon. 2MS QPSK signal)

Live TV fra Kina

The screenshot displays the MiniTiouner v0.9beta8_9 software interface. The main window shows a live video stream of a sunset over a city. The interface is divided into several sections:

- Left Panel:** Contains settings for SR (kS) and Freq (kHz). The current SR is 00250 and Freq is 10497750. Below this are buttons for different SR values (SR2000, SR1000, SR500, SR333, SR250, SR125, SR66, SR27500) and a selection for 'Oscar 100'. There are also options for DVB mode (DVB-S, DVB-S2, Auto) and FEC DVBS (M1, M2, M3).
- Center:** The main video display showing a sunset over a city.
- Right Panel:** Contains PID settings (PID Video: 00256, PID audio: 00257) and video/audio format options (Format: 4/3, 16/9, 1/1, auto; Audio: MPA, AAC, AC3). It also has a 'GRAPH' button and a 'photo' button.
- Bottom Panel:** Features several gauges and meters: Carrier Lock, SR Lock, RF Power, C/N MER, and Constellations. It also displays BCH errors (8), LDPC (15%), FEC (2/3 QPSK_S20), C/N (3.10 dB), and Bytes recvd (201 kb/s).
- Bottom Right:** A spectrum analyzer showing a sharp peak at 10.497 MHz and 10.498 MHz. The y-axis represents signal strength in dB (5dB, 10dB, 15dB).

Billedet er sendt med QPSK 250 kS – reduceret båndbredde kræver ikke så stor effekt

Eksperimenter



Antenner, elektronik, modulationsarter.

Portabel satellitterminal – 60 cm med kombifeed.
- DXpedition via satellit?

Eksperiment med små antenner og digimode
- f.eks $\varnothing 30$ cm og FT4/8 via satellit?