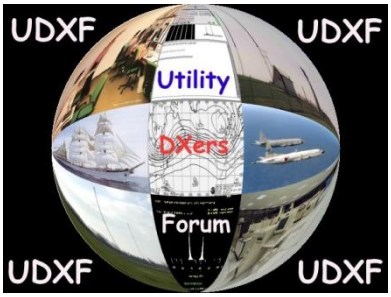


# *UTILITY DX BEGINNERS GIDS*
# *UTILITY DX BEGINNER'S GUIDE*


**UTILITY DX BEGINNERS GIDS**
**UTILITY DX BEGINNER'S GUIDE**

for BDXC - Benelux DX-Club
and UDXF - Utility DXers Forum
door/by Ary Boender

Version 1.1
Revision date: 23 April 2019

## Inhoud / Contents

# Introductie / Introduction

De Utility DX Beginners Gids is bedoeld voor mensen die geen of weinig kennis hebben van utility radio stations.

Utility radio is een uitgebreid gebied waarbij buiten de ontvangers ook decoders een hoofdrol spelen. Of je nu van luchtvaart houdt, van scheepvaart, bakens, nummer stations of fax-stations, er is voor iedereen wel wat te vinden. Omdat het zo uitgebreid is kan ik onmogelijk alles bespreken. Ik probeer hier de belangrijkste punten weer te geven. Mocht je verdere vragen hebben neem dan contact op met de Benelux DX-Club www.bdxc.nl of Utility DXers Forum www.udxf.nl

**Ontvangers en antennes**
Omdat ontvangers en antennes bij alle delen van de hobby nodig zijn zal ik ze hier niet verder bespreken.

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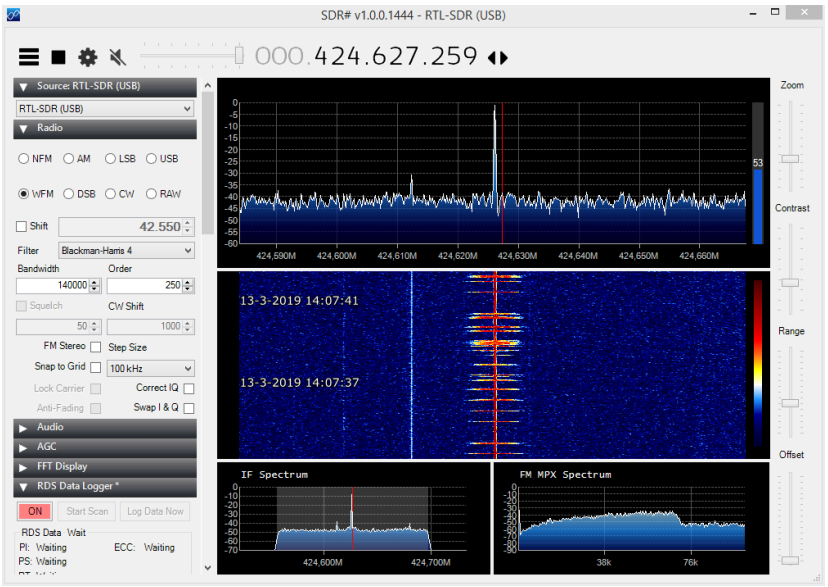
The Utility DX Beginners Guide is for people without any knowledge or with little knowledge of utility radio stations.

Utility radio is an extensive area where decoders play a leading role in addition to the receivers. Whether you like aviation, shipping, beacons, number stations or fax stations, everyone can find something to listen to. Because it is so extensive I cannot possibly discuss everything. I will try to mention the most important items here. If you have any further questions, please contact the Benelux DX Club www.bdxc.nl or Utility DXers Forum www.udxf.nl

**Receivers and antennas**
Because receivers and antennas are needed for every aspect of the hobby I will not discuss them in this article.




SDR# interface connected to a RTL DVB-T DAB 820T2 SDR

# Utility DX (Nederlands)

***U vraagt zich misschien af: "Wat is een utility station?"***
Die vraag is gemakkelijk te beantwoorden. Met uitzondering van omroep stations, piraten stations en radio amateurs, zijn alle radiostations Utility Radio Stations. Deze stations zijn meestal niet bedoeld voor ontvangst door het grote publiek. De stations zenden op LF, MW, HF, VHF, UHF en hoger via satelliet. Je kunt ze overal vinden. De stations zenden in allerlei modes: voice in LSB, USB, AM, NFM, Morse, Fax en heel veel verschillende digitale modes.

Hoewel veel digitale uitzendingen gecodeerd zijn, is het toch leuk om ernaar te luisteren. Vooral ook de sport om uit te vinden wie je nu eigenlijk hoort. Gelukkig zijn daar middelen voor als websdrs, mailinglijsten en websites, radio clubs zoals de Benelux DX-Club. De meeste radio clubs houden zich niet bezig met utility DX. De BDXC is een uitzondering, evenals de Australian Radio DX Club, DX-Antwerp en een hand vol andere clubs. Verder kun je veel informatie vinden op forums en het internet. Een goed voorbeeld is UDXF – Utility DXers Forum www.udxf.nl waar veel utility dxers te vinden zijn. Vergeet ook de chatboxen niet als b.v. #WUNclub en de chat boxen op UDXF. Delen van informatie via mailing lists, forums en clubs is belangrijk voor de hobby. Op die manier kun je vaak onbekende stations identificeren. Via diezelfde kanalen kun je vaak hulp krijgen wanneer je problemen hebt met een radio, antenne of decoder.

Helaas zijn sinds de jaren negentig veel stations uit de lucht verdwenen. Toen ik aan deze hobby begon, zonden veel nieuwsagentschappen hun nieuws in de rtty- en faxmodes. Interpol was nog steeds in de lucht, evenals vele telefoondiensten. De meeste kuststations zijn nu ter ziele, maar in mijn vroege radiojaren kon je ze vanuit alle delen van de wereld horen, evenals de vissers die zich dagelijks meldden. Maar hoewel veel utility-stations de ether hebben verlaten, zijn er nog steeds genoeg om naar te luisteren. Sterker nog, er komen er steeds meer bij.

Wat voor stations kun je dan horen? Onderstaan een lijstje, zeker niet compleet.
Luchtvaartstations, zowel grondstations als vliegtuigen met verschillende soorten uitzendingen en modes. Denk aan weerberichten, verkeersleiding en bakens. Je hoort piloten praten met grondstations, je hoort transponders, HF-Datalink, Selcalls, Volmet, ACARS, VDL2, etc.

De maritieme bakens zijn helaas weg maar voor de luchtvaart zijn er nog aardig wat, hoewel ze langzaam maar zeker uitgefaseerd zullen worden. Maar er zijn ook andere bakens. Denk aan Driftnet bakens, Propagatie bakens, Hi Frequency bakens (v.n. piraten).

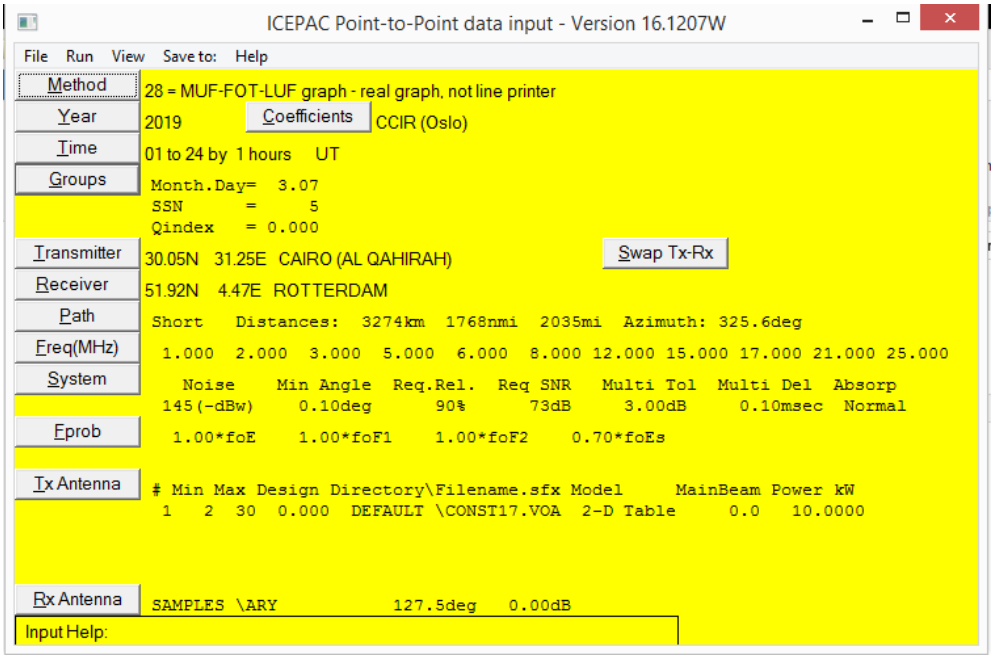
Verder systemen om automatisch contact te maken zoals ALE (Automatic Link Establishment), Selcall-systemen, en Tone calls. Experimentele stations, Fax stations, overheid stations als Ministeries van Buitenlandse Zaken en consulaten/ambassades. Ministeries van Binnenlandse Zaken, Veiligheidsdiensten, Geheime Diensten, Politie, Highway Advisory Radio (HAR), Ionosondes, Chirpsounders, Maritieme stations, zowel kuststations als schepen in diverse modes als Sitor-A, Sitor-B (incl. Navtex), DSC, voice, Morse. Verder Militaire stations, Nummerstations, Radars, Spoorwegen, Ruimtevaart (ISS, satellieten, ruimtevaartuigen), Standard frequency & time stations, Travelers Information Stations (TIS) en nog heel veel meer. Meer dan genoeg te horen dus.

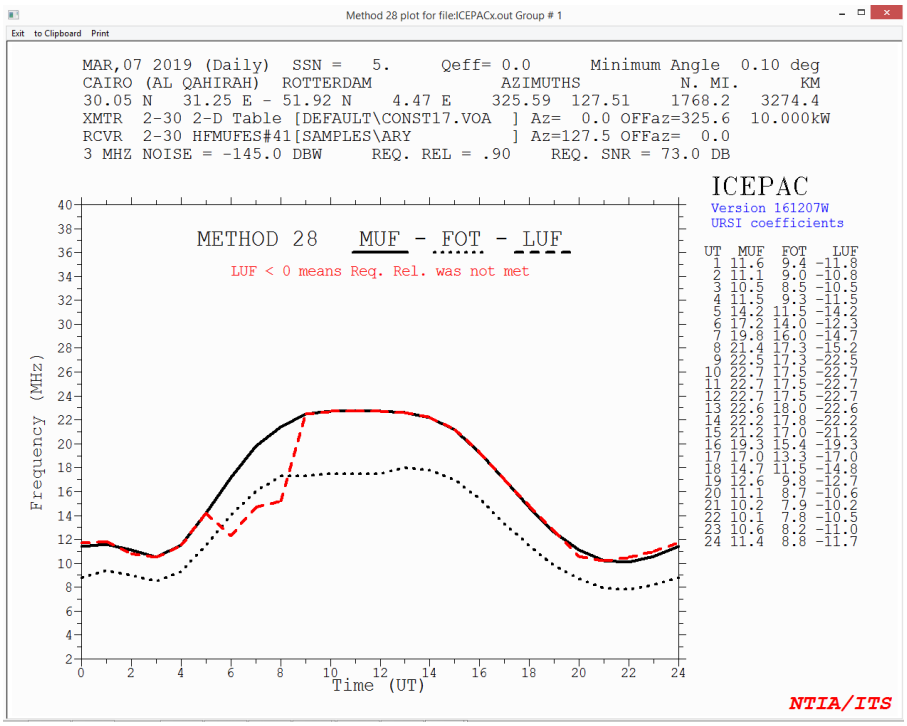
Voor veel modes heb je software nodig om de signalen te decoderen. Daarvoor moet je wel je radio koppelen met deze software. Radio's, decoders en andere software kun je koppelen middels fysieke kabels of Virtuele Seriële Poorten. Geluid kun je doorsluizen d.m.v. virtuele kabels zoals VB Cable en VAC – Virtual Audio Cable. Op deze manier kun je zelfs meerdere radio's en decoders tegelijkertijd en onafhankelijk van elkaar laten werken.

Decoders kennen we in diverse vormen. Bekende terminal units zijn o.a. de oude POCOM decoders en de Universal 8000. De huidige hardware decoders zijn over het algemeen nogal prijzig en zijn vooral voor de professionele markt. De meeste decoders, professioneel zowel als voor de hobby zijn echter software pakketten voor de PC die gekoppeld wordt aan je radio via een kabel of via de soundcard van de PC. Zie verder het hoofdstuk "Decoders"

Hoe weet je nu waar je moet zoeken als je een station wilt horen? Mede DXers kunnen helpen. Je kunt uiteraard ook gewoon zoeken. Frequentieboeken of databases kunnen helpen, hoewel er niet veel echt goede frequentieboeken zijn. Kijk voor een lijstje onder het hoofdstuk “Boeken”.

Propagatie is iets waar je rekening mee moet houden. Je kunt niet op alle tijden van de dag of het hele jaar door op dezelfde frequentie stations horen. Er zijn programma’s waarmee je vrij aardig kunt bepalen welke frequentie bruikbaar is. De VoA programma’s zowel voor de PC als online zijn simpel te gebruiken en goed. Zie voor programma’s het hoofdstuk “Diverse programma’s” en uitleg over propagatie kun je vinden op het internet. Links vind je in het hoofdstuk “Utility radio related links”.




VoA ICEPAC propagation program for the PC.

# Utility DX (English)

***You may ask yourself: "What is a utility station?"***
That question is easy to answer. With the exception of broadcasting stations, pirate stations and radio amateurs, all radio stations are Utility Radio Stations. These stations are usually not intended for reception by the general public. The stations transmit on LF, MW, HF, VHF, UHF and higher via satellite. You can find them everywhere. The stations transmit in all kinds of modes: voice in LSB, USB, AM, NFM, Morse, Fax and many different digital modes.

Many digital signals are coded, but it is still fun to listen to them and to find out who you actually heard although that isn't always easy. Fortunately, there are resources such as websdrs, mailing lists, websites, and radio clubs such as the Benelux DX Club. Most radio clubs do not cover utility DX. The BDXC is an exception, as is the Australian Radio DX Club, DX-Antwerp and a hand full of other clubs. You can also find a lot of information on forums and the internet. A good example is UDXF - Utility DXers Forum www.udxf.nl where many utility dxers can be found. Do not forget the chat boxes like #WUNclub and the chat boxes on UDXF. Sharing information via mailing lists, forums and clubs is important for the hobby. It may help you to identify unknown stations. Through the same channels you can often get help when you have problems with a radio, antenna or decoder.

Many stations have disappeared from the air since the 1990's. When I started this hobby, many news agencies sent their news in rtty and fax modes. Interpol was still on the air, as were many telephone services. Most coastal stations are now defunct, but in my early radio years you could hear them from all parts of the world. The same goes for the Dutch fishing boats. They reported their position daily on Scheveningen Radio, but alas, that is also a long time ago. But although many ute stations have left the air, there are still stations enough to listen to. In fact, HF seems to become more popular lately.

What kind of stations can you hear? Below a list, certainly not complete.
Aviation stations, both ground stations and airplanes with different types of transmissions and modes. Think of weather reports, traffic control and beacons. You hear pilots talking to ground stations, you can hear transponders, HF Datalink, Selcalls, Volmet, ACARS, VDL2, etc.

The maritime beacons are unfortunately gone, but there are still quite a few beacons for aviation, although they will slowly but surely be phased out. But there are also other beacons. Think of Driftnet beacons, Propagation beacons, Hi Frequency beacons (pirates).

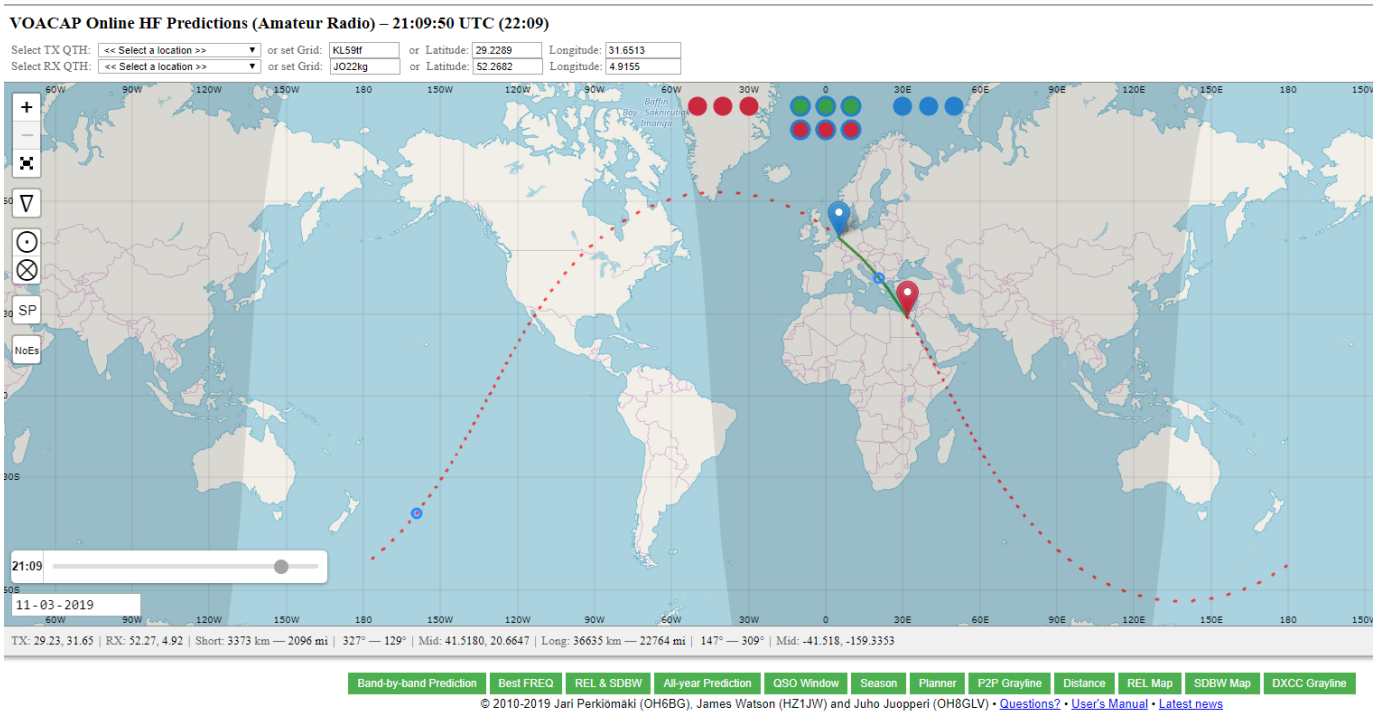
There are systems to make automatic contact such as ALE (Automatic Link Establishment), Selcall systems, and Tone calls. Experimental stations, Fax stations, government stations such as Ministries of Foreign Affairs and consulates / embassies. Ministries of the Interior, Security Services, Secret Services, Police, Highway Advisory Radio (HAR), Ionosondes, Chirpsounders, Maritime stations, both coastal stations and ships in various modes such as Sitor-A, Sitor-B (including Navtex), DSC, voice Morse. Furthermore, Military stations, Number stations, Radars, Railways, Space (ISS, satellites, spacecraft), Standard frequency & time stations, Travelers Information Stations (TIS) and much, much more.

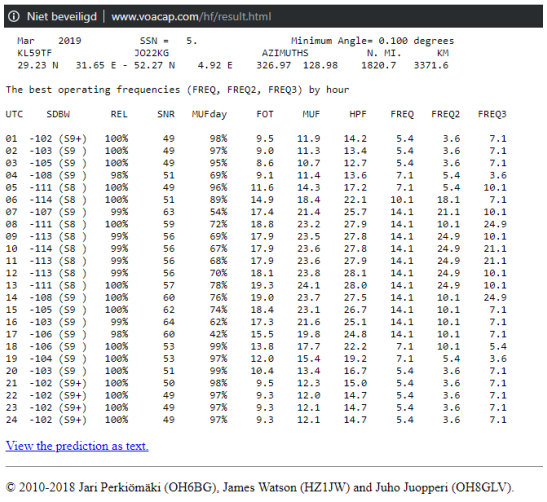
For many modes you need software to decode the signals. You need to link your radio to this software. You can connect radios, decoders and other software via physical cables or Virtual Serial Ports. Sound can be transferred through virtual cables such as VB Cable and VAC - Virtual Audio Cable. In this way you can even operate several radios and decoders simultaneously and independently of each other.

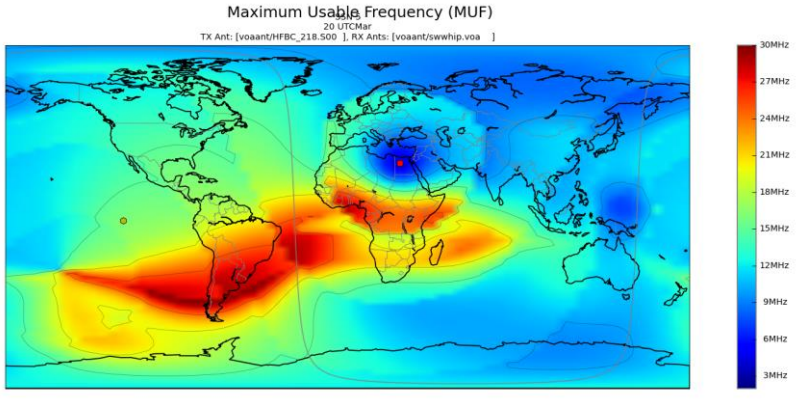
We know decoders in various forms. Well known terminal units include the old POCOM decoders and the Universal 8000. The current hardware decoders are generally quite expensive and are mainly for the professional market. Most decoders, both professional and hobby, however, are software packages for the PC connected to your radio via a cable or via the soundcard of the PC.  Check also the chapter "Decoders".

How do you know where to look for a station? Fellow DXers can help you but you can also simply search. Frequency books or databases can help, but note that there are not many good frequency books. Check chapter "Books".

Propagation is something that you have to take into account. You cannot hear stations on the same frequency at all times of the day or year-round. There are propagation programs with which you can calculate which frequency is usable. The VoA programs for both the PC and online are easy to use and good. For programs and links to articles about propagation, see the chapters "Various Programs" and "Utility radio related links".




Screenshots from the online VoA propagation program

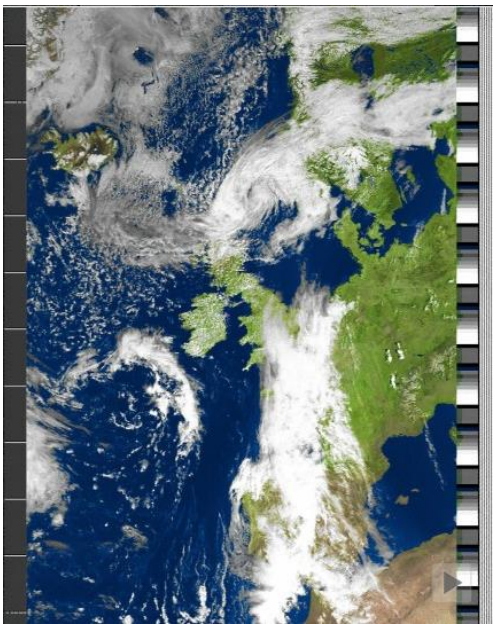
# Waveforms

**Digital Waveforms**

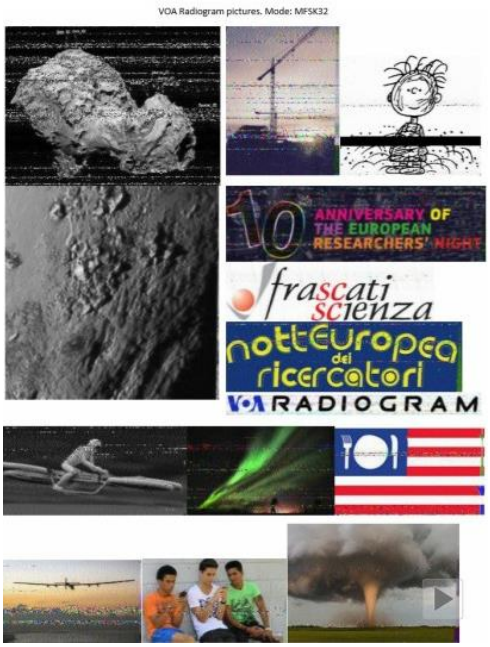
| | |
|---|---|
| ASK | Amplitude Shift Keying |
| OOK | On-Off-Keying |
| FSK | Frequency Shift Keying |
| CPFSK | Continuous Phase Frequency Shift Keying |
| DFSK | Double Frequency Shift Keying |
| C4FM | Constant Envelope 4-Level Frequency Modulation |
| MSK | Minimum Shift Keying |
| TFM | Tamed Frequency modulation |
| GMSK | Gaussian Minimum Shift Keying |
| MFSK | Multi Frequency Shift Keying |
| BPSK | Binary Phase Shift Keying (PSK) |
| QPSK | Quadrature Phase Shift Keying |
| OQPSK | Offset Quadrature Phase Shift Keying |
| SQPSK | Staggered Quadrature Phase Shift Keying |
| CQPSK | Compatible Differential Offset Quadrature Phase Shift Keying |
| CPSK | Coherent Phase Shift Keying |
| DCPSK | Differential Coherent Phase Shift Keying |
| DPSK | Differential Phase Shift Keying |
| DBPSK | Differential Binary Phase Shift Keying |
| DQPSK | Differential Quadrature Phase Shift Keying |
| D8PSK | Differential 8 Phase Shift Keying |
| QAM | Quadrature Amplitude Modulation |
| OFDM | Orthogonal Frequency Division Multiplexing |
| SS | Spread Spectrum |
| DSSS | Direct Sequence Spread Spectrum |
| FHSS | Frequency Hopping Spread Spectrum |
| IFK | Incremental Frequency Keying |
| PAM | Pulse Amplitude Modulation |
| PWM | Pulse Width Modulation |
| PPM | Pulse Position Modulation |
| PCM | Pulse Code Modulation |

**Analogue Waveforms**

| | |
|---|---|
| AM | Amplitude Modulation |
| DSB-RC | Double Sideband reduced Carrier |
| DSB-SC | Double Sideband suppressed Carrier |
| SSB-FC | Single Sideband full Carrier |
| SSB-RC | Single Sideband reduced Carrier |
| SSB-SC | Single Sideband suppressed Carrier |
| SSB | Single Sideband Modulation |
| ISB | Independent Sideband Modulation |
| VSB | Vestigial Sideband Modulation |
| FM | Frequency Modulation |
| WFM | Wide Frequency Modulation |



Decoded satellite weather fax




Decoded VoA Radiogram pictures

# HF Modes

AFS Navy FSK
ALE 3G
ALE400
ALG MIL Bell103 Modem
ALIS
ALIS 2
ARD9800 OFDM 36ch Modem
ARQ-E
ARQ-E3
ARQ-M2
ARQ-M4
ASCII
AUM-13
AUS MIL ISB Modem
Baudot ITA No.2
- Baudot Code
- Murray Code
- Western Union Code
- ITA2 Code

Baudot–ARQ System
Baudot F7B
Baudot Sync
BEE
BR 6028
BR 6029C Time Diversity Modem
CCIR 493 SELCALL
CHN ARQ Modem
CHN Broadcast Jammer
CHN MIL 4FSK
CHN MIL 8FSK 83.6 Bd
CHN MIL 8FSK 100 Bd
CHN MIL 8PSK Modem 1627 Bd
CHN MIL 8PSK Modem 2400 Bd
CHN MIL 64FSK
CHN MIL Datalink 30 tone
CHN MIL Datalink 39 tone
CHN MIL Hybrid Modem (4FSK-OFDM20)
CHN MIL Hybrid Modem (4FSK-8FSK-OFDM19)
CHN MIL Hybrid Modem (8FSK-PSK)
CHN 4+4 Modem
CHIP 64/128
CIS 11
CIS 12
CIS 12 ARQ
CIS 14
CIS 150 Bd SELCAL
CIS VFT 3 Channels 144 Bd
CIS 16x75 Bd
CIS 36-50
CIS 405-3915
CIS 50-17 Baudot
CIS 50-50
CIS 81-29
CIS 81-81
CIS 200-1000
CIS 500 Bd FSK Burst Modem
CIS 640 Bd MSK Modem
CIS 1280 Bd MSK Modem
CIS 1280 Bd PSK Modem
CIS 2560 Bd MSK Modem
CIS 3000 Bd Modem
CIS 4FSK 96 Bd
CIS 4FSK 100 Bd
CIS 4FSK 150 Bd
CIS 7FSK 200 Bd
CIS 7FSK 300 Bd
CIS-ARQ
CIS AT-3004 Modem
CIS BPSK
CIS Hybrid Modem DBPSK and MFSK 16
CIS MFSK 1 + 12
CIS MFSK 1 + 10 + 1
CIS MFSK-11 125 Bd
CIS MFSK-12 10 Bd
CIS MFSK 12 + 1
CIS MFSK-14
CIS MFSK-17
CIS MFSK-20
CIS MFSK-36
CIS MFSK-36 Selective Calling
CIS MFSK-68
CIS OFDM 35/45/60/93/112/128 Channel
35 tone OFDM
45 tone OFDM variant 1
45 tone OFDM variant 2
45 tone OFDM variant 3
45 tone OFDM variant 4
60 tone OFDM variant 1
60 tone OFDM variant 2
93 tone OFDM
112 tone OFDM
128 tone OFDM

- CIS QPSK 2 x 62.5 Bd
- CIS VFT 3 Channels 100 Bd
- CIS VFT 3 Channels 100 Bd
- CIS VFT 3 Channels 144 Bd
- Clansman FSK Modem
- Clover
- Clover II
- Clover 2000
- Clover 2500
- Coachwhip
- CODAN
  - CODAN 4 Channel mode
  - CODAN 8 Channel Mode
  - CODAN 12 Channel Mode
- CODAN 3212 Mil Modem
- CODAN Chirp mode
- CODAN Selcall
- Contestia
- CROWD
- CW-F1B
- D AF VFT
- DGPS
- DominoF
- DominoEX
- DPRK ARQ 600 Bd
- DPRK ARQ 1200 Bd
- DPRK FSK 600 FEC
- DPRK BPSK Modem
  - DPRK 150 Bd BPSK
  - DPRK 300 Bd BPSK
  - DPRK 600 Bd BPSK
  - DPRK 1200 Bd BPSK
- DRM
- DRM – WinDRM
- ECHOTEL 1810 HF Modem
- ECHOTEL 1820 HF Modem
- Fax
- FEC-A
- F Navy FSK
- G-TOR
- GRC MIL FSK
- GMDSS-DSC HF
- Harris Analogue Voice Security (AVS)
- Harris Autolink-I
- HDSSTV
- HFDVL73
- HFDL
- HELL
  - F-Hell, Press-Hell
  - Feld-Hell
  - GL-Hell
  - Hell-80
  - PC-Hell
  - PSK-Hell and FM-Hell
  - FSK-Hell
  - Duplo-Hell
  - Sequential Multi-Tone Hell
  - Concurrent Multi-Tone Hell
  - Slow-Feld
- ICAO Selcal
- IRN Navy 16 x 75 Bd
- IRN Navy QPSK 207 Bd
- IRN Navy Adaptive Modem V1
- IRN Navy Adaptive Modem V2
- ISR N Hybrid Modem
- Italian MIL 1200 Bd FSK
- Italian MIL 1200 Bd PSK
- Japan 8-Tone ASK
- Japan 16-tone PSK
- Japan 1500 Bd QPSK
- Japan 32-tone OFDM
- Japan 32 Channel Modem
- JT2
- JT4 A-G
- JT44
- JT6M
- JT65A/JT65B/JT65C
- JT9 A-H
- LINCOMPEX
- LINEA Sitor
- LINK 1
- LINK 10
- LINK 11 CLEW
- LINK 11 SLEW
- LINK 14
- LINK 22
- LINK Y
- LINK Z
- Mazielka
- MD 522 NB
- MD 522 WB
- MD 522 DIV
- MD 1061
- MD 1142

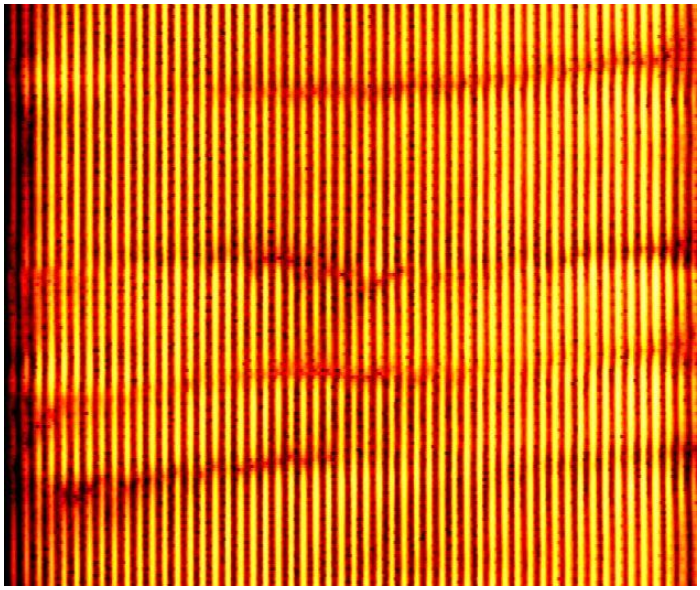
- MD 1280
- MFSK-8
- MFSK-16
- MFSK AFS Navy Modem
- MFSK Modem ALCATEL 801
  - MFSK 4-TONE ARQ SYSTEM 150 to 1200 Bd
  - MFSK 8-TONE ARQ SYSTEM 16.7 & 100 Bd
- MFSK TADIRAN HF Modem
- MFSK TE-204/USC-11 Modem
- MIL STD 188-110A ser
- MIL STD 188-110A Appendix A 16-Tone
- MIL STD 188-110A Appendix B 39-Tone
- MIL STD 188-110B Appendix C
- MIL STD 188-110B Appendix F
- MIL STD 188-110C Appendix D
- MIL STD 188-141A
  - Linking Protection
    - AL-0
    - AL-1
    - AL-2
    - AL-3
    - AL-4 (classified application level)
  - Alternate Quick Call (AQC) ALE
- MIL STD 188-141B
- MIL STD 188-141B App. A
- MIL STD 188-141B Appendix C
- MIL STD 188-203-1A
- MIL STD 188-203-3
- MIL STD 188-212
- MIL STD 188-342
- MLA Navy Baudot
- MT 63
- Nokia Adaptive MSG Terminal M/90
- NUM 13
- Olivia
- PACTOR I
- PACTOR II
- PACTOR II-FEC
- PACTOR III
- PACTOR IV
- PACTOR VI 2-Tone-Chirp
- PACTOR IV Spread Modulation
- Packet Radio
- Panther-H FH Modem
- PAX/PAX2
- POL INTEL FSK
- PSK 10
- PSK 31
- PSK 63 FEC
- PSK 125 FEC
- PSK 220 FEC
- PSKAM 10/31/50
- Q15x25
- RFSM 2400/8000
- RFSM-2400 Modem
- RFSM-8000 Modem
- Robust Packet Radio RPR
- ROS
- RS-ARQ
- RS-ARQ II
- RS GM2xxx Modem
- RS GN2130 Modem
- RTTYM
- RUS Mil Voice Scrambler
- Selenia Parallel Tone Modem
- Siemens CHX-200 FSK Modem
- SITOR ARQ mode A
- SITOR FEC mode B
- SKYFAX
- SSTV
  - SSTV VIS-Code
- STANAG 4197
- STANAG 4198
- STANAG 4202
- STANAG 4285
- STANAG 4415
- STANAG 4444
- STANAG 4479
- STANAG 4481 FSK
- STANAG 4481 PSK
- STANAG 4529
- STANAG 4538
- STANAG 4539
- STANAG 4591
- STANAG 5031
- STANAG 5035
- STANAG 5065
- Systeme 3000 HF Modem
- Tadiran AutoCall
- Tadiran Data Mode
- TFM3/5
- Thales Voice Scrambler
- Thor
- Throb/Throb-X
- TMS-430 Modem
- VFT
- WINMOR
- Yaktah Russian Voice Scrambler

**Polish Intelligence modes**
200Bd/400Hz MFSK-4
BFSK 400/800
BPSK-63
FSK 100/200
FSK 200/400
FSK 400/800
FSK 400/960
FSK-4 100Bd
MFSK-4 100/200
QPSK-125

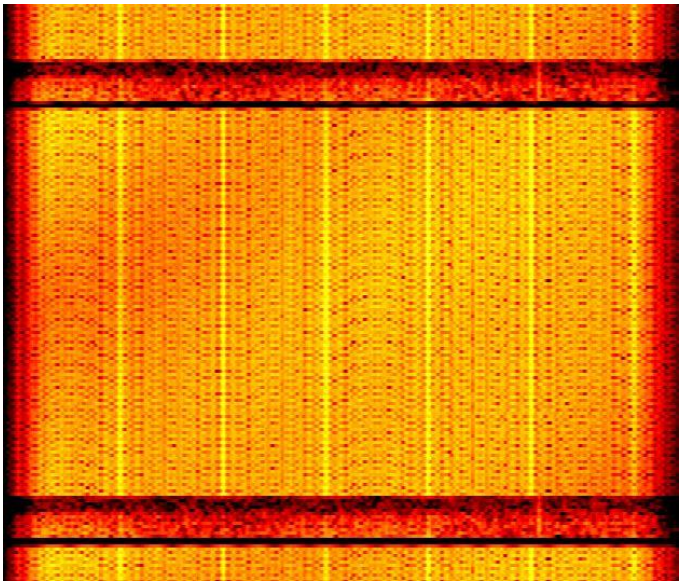
**Modes used by Russian diplomatic stations, intelligence and military**
16X5 MFSK
Akula (Russian Navy 500 Baud/1000)
AT3004D (CIS-12, FIRE, MS5, Russian 12 Tone Modem)
CIS-11 (TORG 11)
CIS-112
CIS-14 (AMOR, AMOR96, PARITY-14)
CIS-16
CIS-3000
CIS-45
CIS-48
CIS-60
CIS-79 (TANDEME)
CIS-8181 (CIS-81, FROST)
CIS-VFT
FSK200/1000 (Aquarius)
FSK200/500
Mazielka selcall
MFSK-16/20Bd (NUM13, CIS MFSK16)
MFSK-20/10Bd (CIS MFSK20)
MFSK-4
MFSK-56
MFSK-64
MFSK-66
RUS-ARQ
Russian 50bd/500 FSK
Russian 75 Baud
Russian 96 Baud
Russian MOI 54 Baud
Serdolik MFSK (CROWD-36, CIS-36)
T206 (Moroz, Russian 53.8bd/500 FSK)
T600 (Bee 36/500, CIS 36-50, Russian 50bd Secure)
VARA mFSK+OFDM-52 (Dragon)
and many, many, experimental modes

**Radars**
16x64 Sounder
Burst OTH Radar 6 sweeps/sec
Canadian HF Surface Wave
Chirpsounder
Coastal radar 2.6 sweeps/sec
CODAR HF Radar short range, 2 sweeps/sec
JORN OTH Radar
Lowell Digisounders
Ocean Surface Radar
OTH PLUTO Radar 12.5 sweeps/sec
OTH PLUTO Radar 25 sweeps/sec
OTH PLUTO Radar 50 sweeps/sec
OTH Radar 10 sweeps/sec
OTH Radar 160 kHz wijd, 10 sweeps/sec
OTH Radar 43 sweeps/sec
OTH Radar 50 sweeps/sec, Turkije
OTH Radar 66 sweeps/sec
OTH Radar 87 sweeps/sec
OTH Radar Kontayner, 50 sweeps/sec
OTH Radar Nostradamus, 33 sweeps/sec
Podsolnukh-E OTH kustradar op 3540 en 3600 kHz, 43 sweeps/sec
Radar 150 and 313 sweeps/sec, Iran
Skiymet Meteor
SuperDARN
US Military Sounder
US Relocatable OTHR
WERA Remote Ocean Sensing, Germany

**Pluto radar**



**SuperDARN radar**



# VHF Modes

- ACARS
- ADS-B
- AIS
- AMPS
- APCO 25
- ARDIS
- ATCS
- ATIS
- BIIS
- Bluetooth
  - Bluetooth 1.0 and 1.0B
  - Bluetooth 1.1
  - Bluetooth 1.2
  - Bluetooth 2.0 + EDR
  - Bluetooth 2.1 + EDR
  - Bluetooth 3.0 + HS
  - Bluetooth 4.0
- Broadcast WFM
  - Pre-emphasis and de-emphasis
- Car Keys
  - Audi A4 Station Wagon
  - Landrover
  - Mercedes Sprinter
- CCIR-1
- CCIR-2
- CCITT
- CDMA One
- CDMA2000
- CDPD
- Cordless Phone
  - Analogue Standard CT0
  - Analogue Standard CT0 (Extended)
  - Analogue Standard CT1
  - Analogue Standard CT1+
  - Digital Standard CT2
  - Digital Standard CT2+
  - Digital Standard CT3
- CTCSS
- DAB
- DAB+
- D-AMPS
- DARC
- DCSS
- DECT
- DMR
- DPMR
  - DPMR Mode 1
  - DPMR Mode 2
  - DPMR Mode 3
- DSTAR
- DTMB
- DTMF
- EEA
- EIA
- EPIRB
- EPLRS
- ERMES
- EUROSIGNAL
- EXICOM EX7100
- Family Radio Service
- FLEX
- FMS BOS
- FSK 441
- GMDSS-DSC VHF
- GMRS
- GSM
- ISCAT
- ITU Fax and Modem Standards
  - Modem Standards
    - V.19 Modem Standard
    - V.21 Modem Standard
    - V.22 Modem Standard
    - V.22 bis Modem Standard
    - V.23 Modem Standard
    - V.26 Modem Standard
    - V.26bis Modem Standard
    - V.26ter Modem Standard
    - V.27 Modem Standard
    - V.32 Modem Standard
    - V.32bis Modem Standard
    - V.33 Modem Standard
    - V.36 Modem Standard
    - V.37 Modem Standard
    - V.38 Modem Standard
    - V.90 Modem Standard
- Fax Standards
  - V.17 FAX Standard
  - V.29 FAX Standard
  - V.27bis FAX Standard
  - V.27ter FAX Standard
  - V.34 FAX Standard
- DSVD and H.324 Standards

JT2
JT44
JT6M
JT65A/JT65B/JT65C
LINK 4A
LINK 4C
LINK 11 CLEW
LINK 11 SLEW
LINK 14
LINK Y
LINK Z
LINK 16
LINK 22
Long Range Communication
LTE
LTE+
MDC-600/MDC-1200
MDC-4800
Mobitex-1200
Mobitex-8000
MPT 1327
MSK144
NATEL
NMT-450
NOAA Weather Radio
NXDN
Packet Radio
PMR
POCSAG
QRA64
Radio Controlled Traffic Light
Radio Remote Control
  Holtek Chipset TE89TP16N, HT46R01T3
  Princeton Chipset PT2262, PT2272, HX2262, SC5262, SC5272
  RATO Chipset EV1527, RT1527, FP1527, HS1527, HT12E
Radiosondes
  VAISALA RS80 15GH
  VAISALA RS92 KL
  VAISALA RS92 SGPD
  M2 K2
Railnet
RD-LAP
RDS/RBDS
Remote Controlled Drones
Harris RF 7800V
SEM93
SENOA MSK Hopping System
TACAN
TETRA
TETRA II
TETRAPOL
Trunked Radio
VDEW
VHF Digital Link Modes
  VDL Mode 1
  VDL Mode 2
  VDL Mode 3
  VDL Mode 4
ZigBee
ZVEI 1
ZVEI 2
ZVEI 2 xx tones


**Discriminator USB interface**


**Pocom AFR 2000 decoder**

# Afkortingen / Abbreviations

| | |
|---|---|
| ##/### | Baud/Shift |
| // | Parallel with Frequency |
| 3SC | Third-shift Cyrillic |
| 5FGs | 5-Figure Groups |
| 5LGs | 5-Letter Groups |
| A/A | Air to Air |
| a/c | Aircraft |
| A/G | Air to Ground |
| AA | Arabic Language |
| AAF | Army AirField |
| AGE | Aircraft Ground Equipment |
| AM | Amplitude Modulation |
| ANG | Air National Guard |
| ARNG | Army National Guard |
| ARP | AIREP or Air Report |
| ARTCC | Air Route Traffic Control Center |
| ARW | Aerial Refueling Wing |
| ATCC | Air Traffic Control Center |
| ATIS | Automatic Terminal Information Service |
| c/s | Callsign |
| CC | Chinese Language |
| CdV | Controle de Voie |
| CW | Continuous Wave |
| CZ | Czech Language |
| dep | Departed |
| DSB | Double Side Band |
| dx | Duplex |
| EAM | Emergency Action Message |
| EE | English Language |
| enrt | En route |
| FF | French Language / French Forces |
| FN | French Navy |
| FSS | Flight Service Station |
| GG | German Language |
| hrd | Heard |
| ISB | Independent Side Bands |
| JJ | Japanese Language |
| LSB | Lower Sideband |
| MIB | Marine Information Broadcast |
| msg | Message |
| nx | News |
| OM | Male Operator |
| Posn | Position |
| pp | Phone Patch |
| PP | Portuguese Language |
| R/T | Radiotelephone |
| rdo | Radio |
| RDR | Radar |
| re | Reference / Regarding |
| req | Request |
| rpt | Reportchk Check |
| RR | Russian language |
| SAR | Search and Rescue |
| sc | SELCAL |
| SS | Spanish |
| sx | Simplex |
| tfc | Traffic |
| TGs | Telegrams |
| tlx | Telex |
| unid | Unidentified |
| unk | Unknown |
| USB | Upper Sideband |
| vsl | Vessel |
| w/ | With |
| wkg | Working |
| wx | Weather |
| YL | Female Operator |

# Decoders

Decoders kennen we in diverse vormen. Bekende terminal units zijn o.a. de oude POCOM decoders en de Universal 8000. De huidige hardware decoders zijn over het algemeen nogal prijzig en zijn vooral voor de professionele markt. De meeste decoders, professioneel zowel als voor de hobby zijn echter software pakketten voor de PC die gekoppeld wordt aan je radio via een kabel of via de soundcard van de PC. Ik beperk me daarom voornamelijk tot de software decoders. Tussen haakjes geef ik aan wanneer het een professionele decoder betreft. Noot: niet alle decoders werken onder Microsoft Windows.

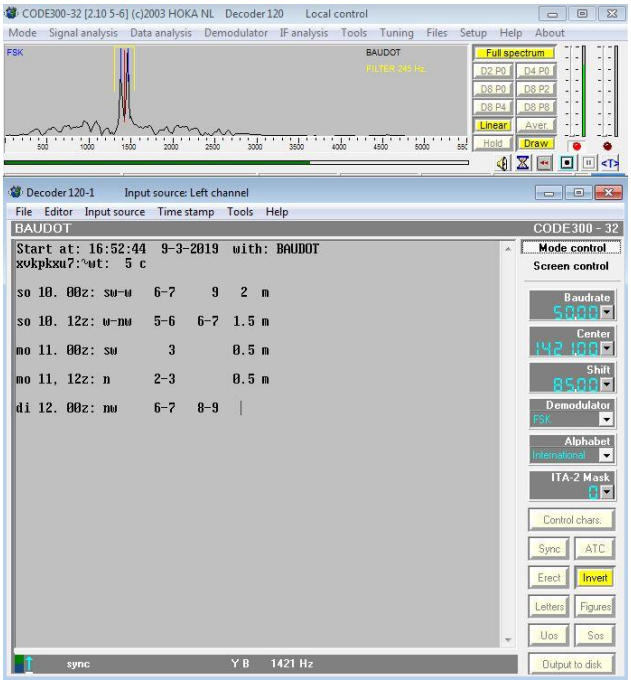
There are several types of decoders. Well known terminal units include the old POCOM decoders and the Universal 8000. The current hardware decoders are generally quite expensive and are mainly for the professional market. Most decoders, both professional and hobby, however, are software packages for the PC connected to your radio via a cable or via the soundcard of the PC. Therefore I will confine myself to the software decoders. Between brackets a note when it concerns a professional decoder. Note: not all decoders work on Microsoft Windows computers.

**Hardware decoders**
SBS Radarbox
AirNav Radarbox

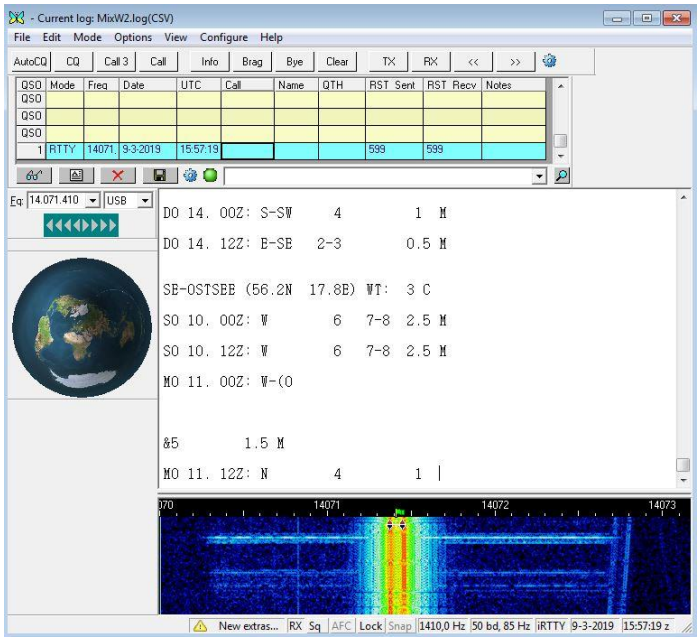
**Software decoders**
AirNav ACARS Decoder
AirNav Selcal Decoder
Amalgamated DGPS (also for the Macintosh)
CW Skimmer
DIGTRX
DSC Decoder
FLDigi
Frisnit NAVTEX decoder
Go2decode (pro)
Go2monitor (pro)
Hoka Code 300-32 (pro)
JVComm32
Krypto500 (pro)
MARS ALE (pro)
MixW
MRP40 CW Decoder
MScan
MS-DMT
Multimode (for the Macintosh)
MultiPSK
PC-ALE
PC-HFDL
PC-NAVTEX
PDW Paging Decoder
Radiocom 6
Rivet
SeaTTY
Sigmira
Sorcerer
TrueTTY
Wavecom W-Code (pro)
Wavecom W-Spectra (pro)
Winradio Advanced Digital Suite
Winradio Universal FSK Decoder
Yet Another DSC Decoder (YADD)
Yet Another NAVTEX Decoder (YAND)

**Decoders voor de RTL sdr / Decoders for the RTL sdr**
ADSB Scope: Mode-S decoder
RTL1090: Mode-S decoder

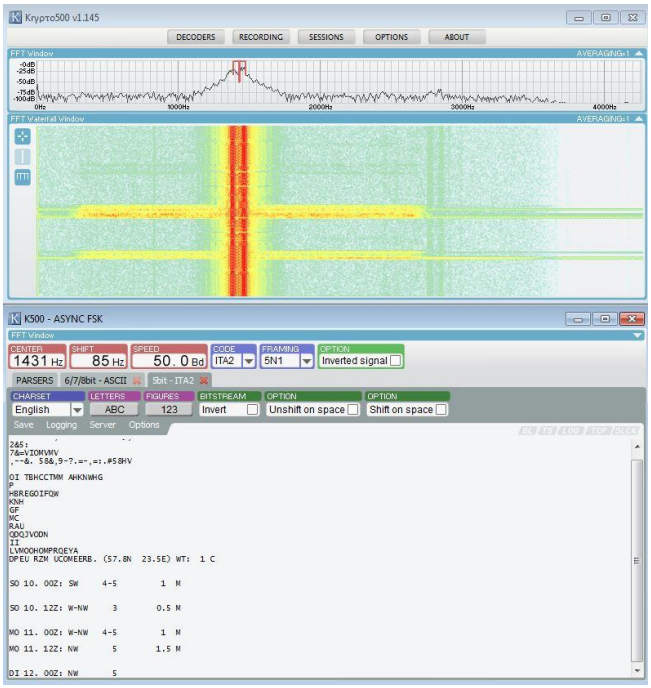
**Code 300**



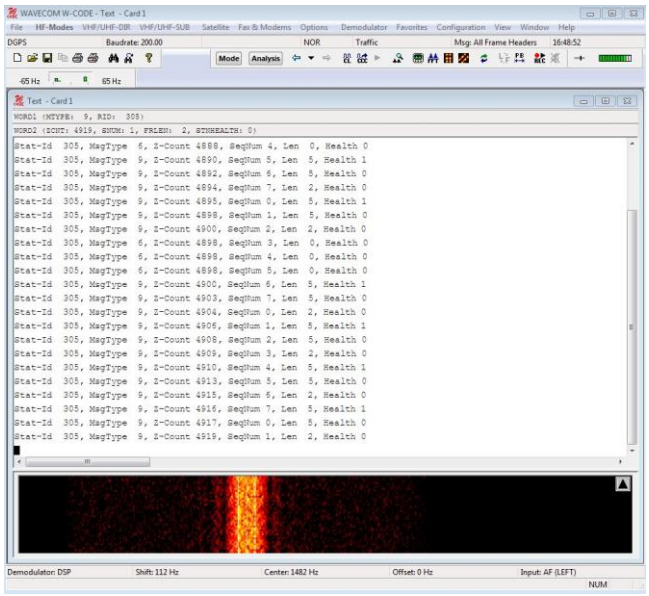
## MixW



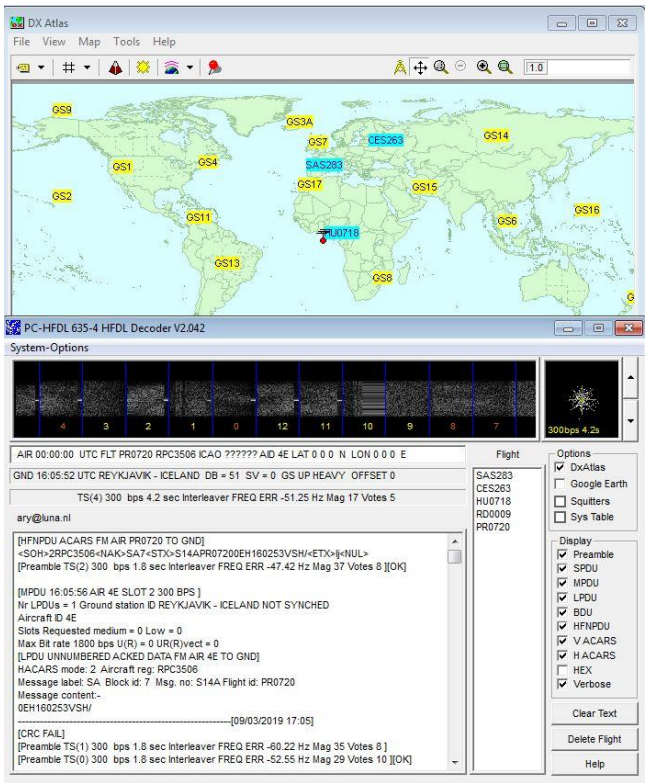

## Krypto



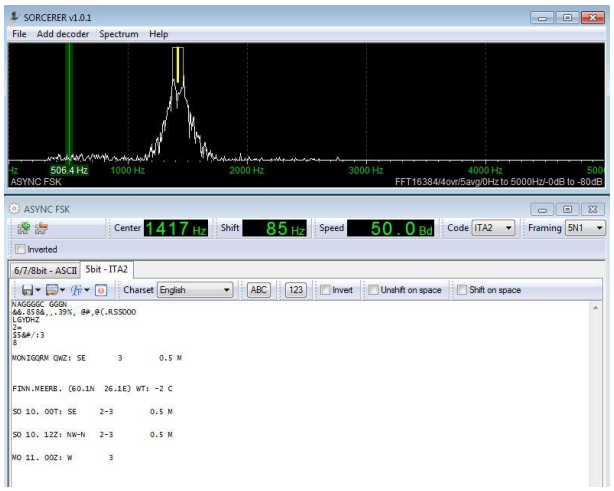

## W-Code



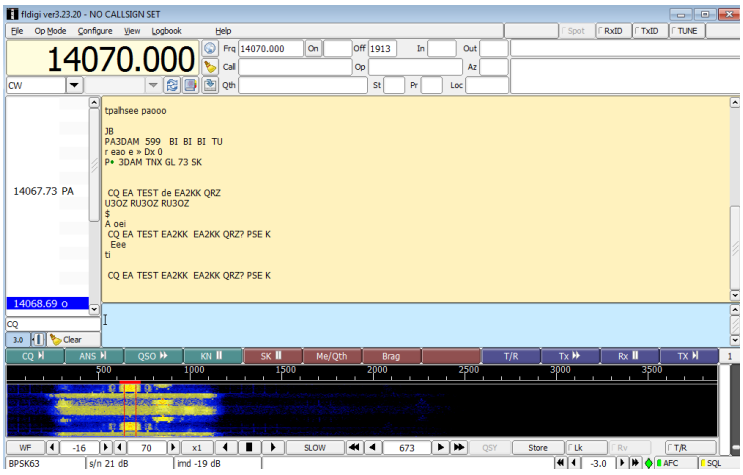

## PC-HFDL + DX Atlas



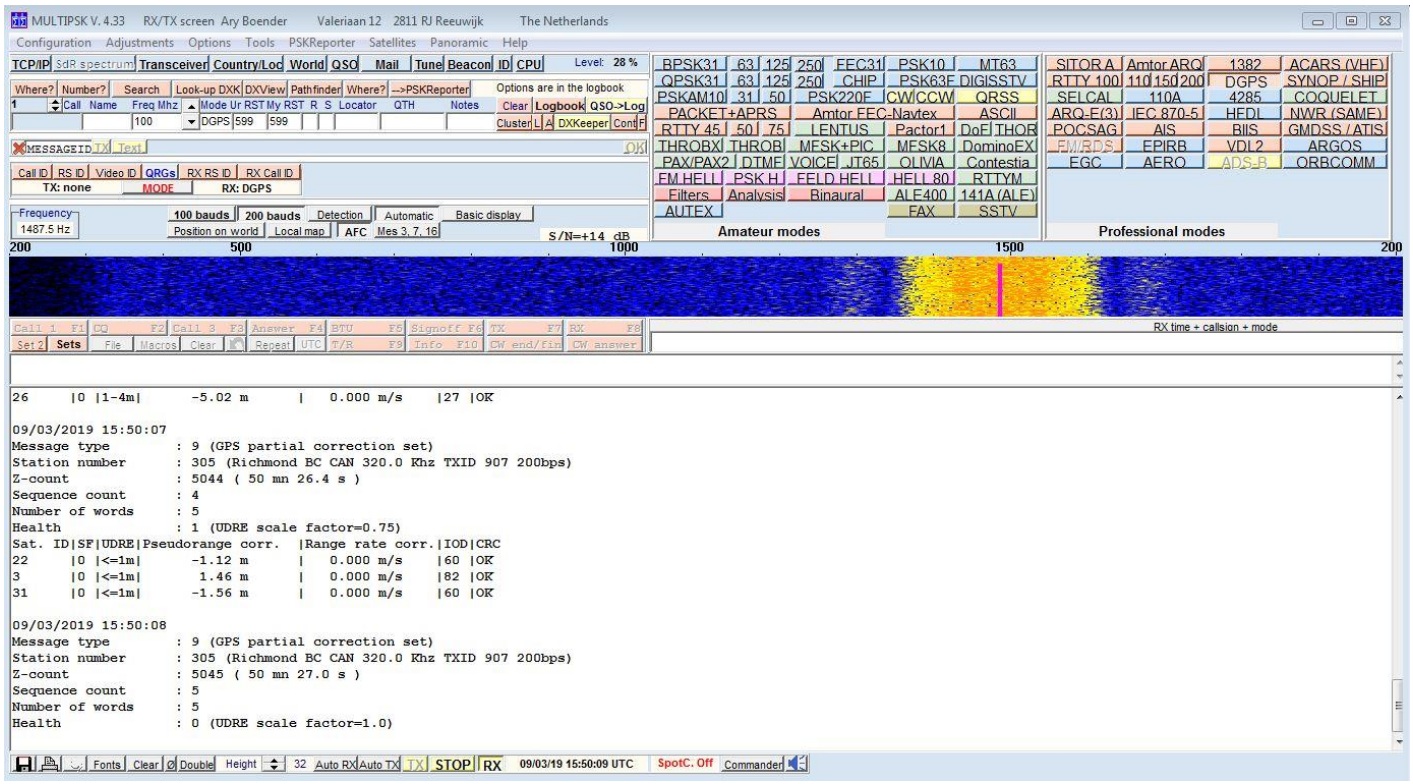
## Sorcerer




## FLdigi




## Multipsk



# Software

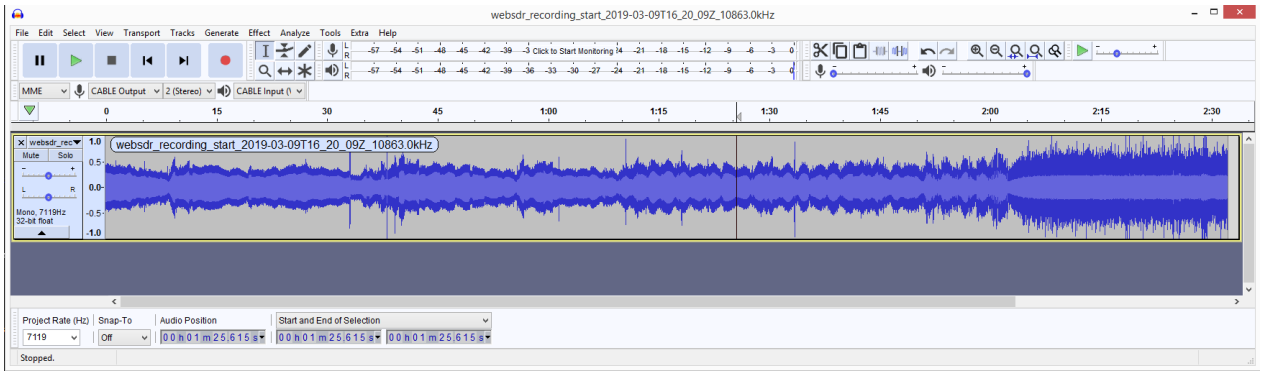
## Propagatie software / Propagation software

**DX Prop**
DX Prop propagation software

**VoA propagation software**
HFWIN32 Propagation software for Windows-95 & NT systems

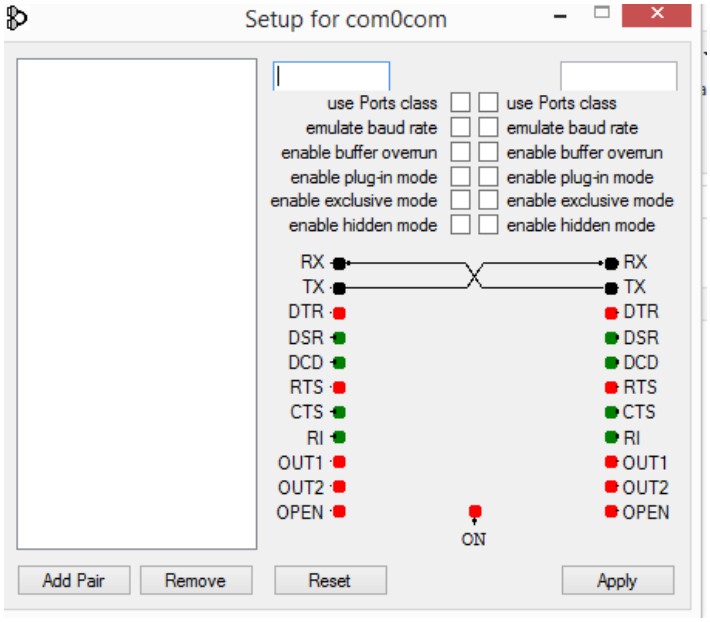
## Mediaspelers en recorders / Media players and recorders

**Audacity**
Multi-track audio editor en recorder. Multi-track audio editor and recorder.
https://sourceforge.net/projects/audacity/




**VLC VideoLAN**
VLC mediaspeler / VLC media player
https://www.videolan.org/

## Virtuele Seriële Poort Drivers / Virtual Serial Port Drivers



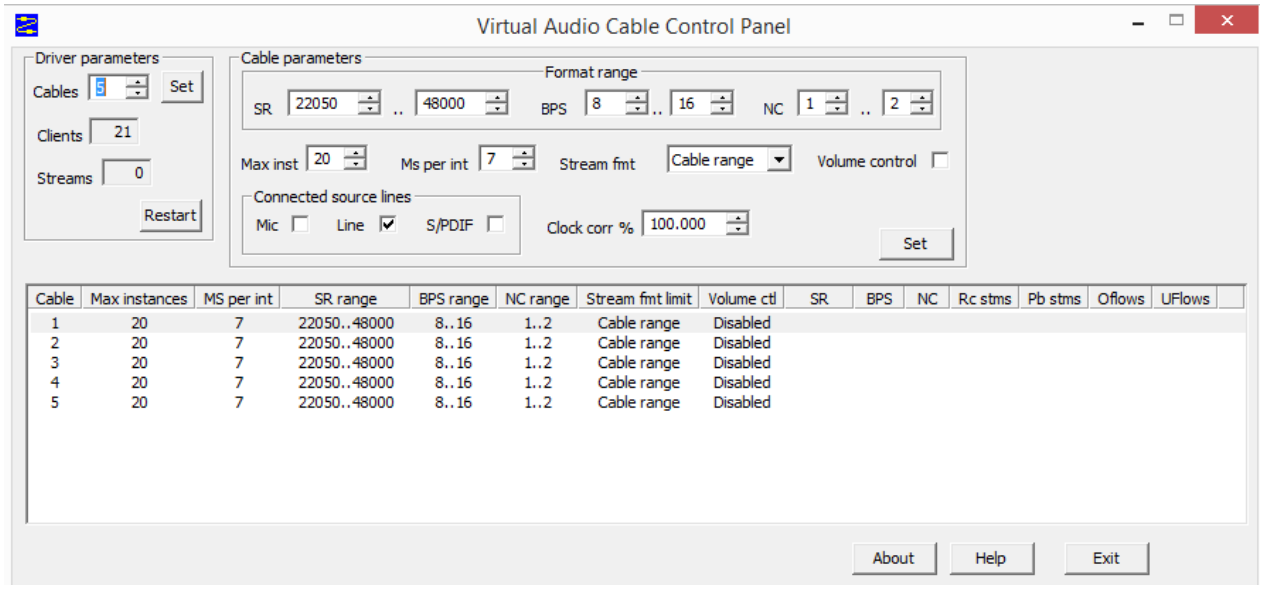

**VSPD Standard en VSPD Pro**
https://www.eltima.com/products/

**com0com**
Gratis versie van VSPD / Free version of VSPD
http://com0com.sourceforge.net/

## Virtuele Audio Kabels / Virtual Audio Cables

**VB Audio Cable**
https://www.vb-audio.com/


**VAC Virtual Audio Cable**
https://vac.muzychenko.net/en/




**Jack Audio**
Runs on Windows, Linux and MacOS
http://jackaudio.org/

**Virtual Audio Capture Device**
Runs on XP, Windows 7 and Vista.
https://github.com/rdp/virtual-audio-capture-grabber-device

**Vsound for Linux**
http://www.vsound.org/

**Soundflower for MacOS**
https://rogueamoeba.com/freebies/soundflower/

## Spectrum Analyse software / Spectrum Analysis software

Software voor spectrum analyse is vaak handig en hoort wat mij betreft bij de standaard uitrusting. Ook deze zijn er in diverse gradaties, van simpel en gratis, tot heel uitgebreid en duur. Onderstaand een paar gratis programma's.

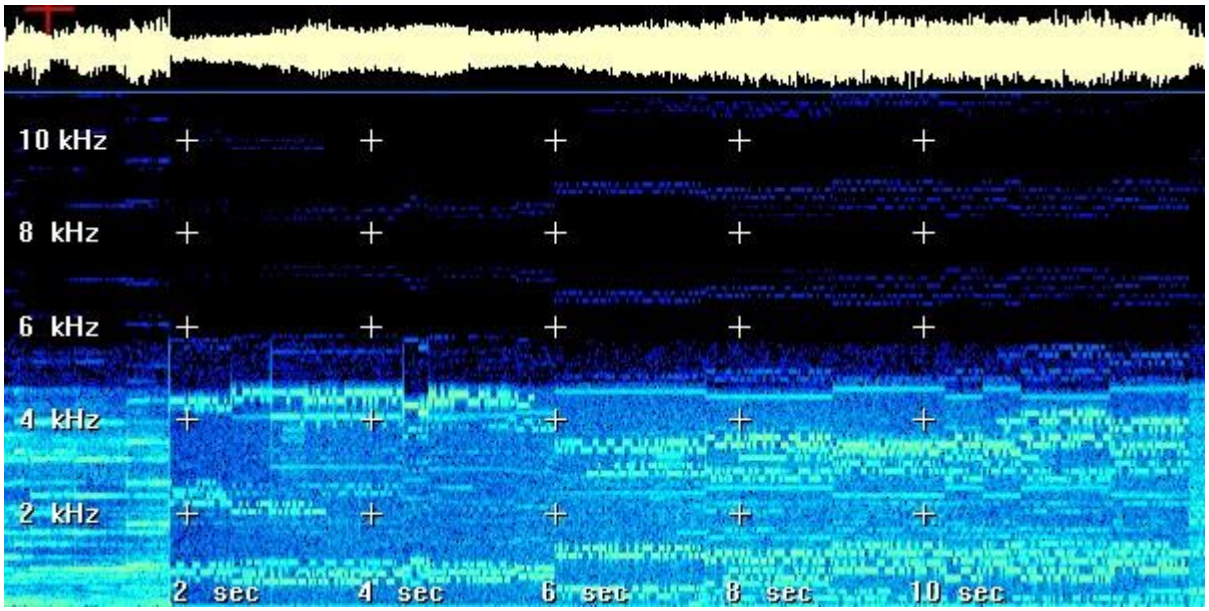
Software for spectrum analysis is often handy and should be part of the standard equipment. These programs are also available in various grades, from simple and free, to very advanced and expensive. Below a few free programs.

**Audio Spectrum Analyser**
http://www.techmind.org/audio/specanaly.html

**Spectravue**
http://www.moetronix.com/spectravue.htm

**Spectrum Laboratory**
https://www.qsl.net/dl4yhf/spectra1.html

**Spectogram**
Freeware. Wat gedateerd en simpel. Versie 1.5 werkt overigens beter dan versie 5.0 (grotere window)
http://www.bro.lsu.edu/radio/Spectogram/sgram.html
http://www.electronicslab.com/downloads/pc/003/index.html

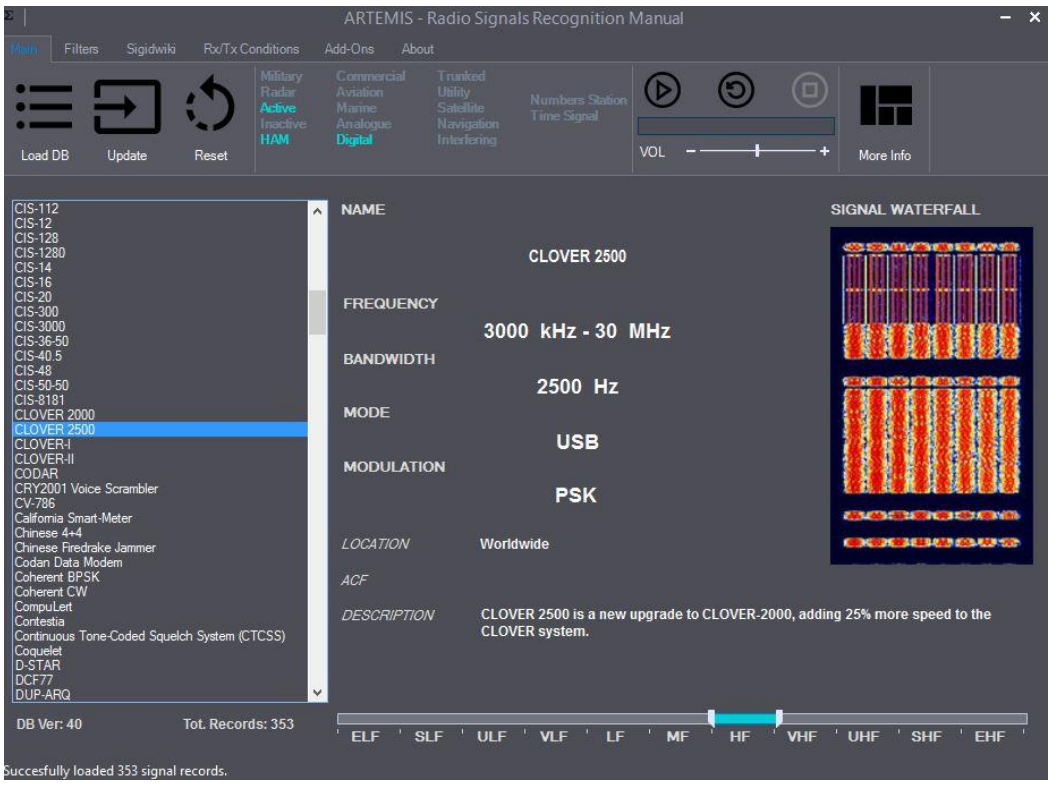



Spectrogram v5.0

## Identificatie / Identification software

**Signal Identification Guide**
Een website met een groot aantal digitale modes met veelal geluid en waterfall plaatjes.
A website with a large amount of modes with recordings and waterfall images.
https://www.sigidwiki.com/wiki/Signal_Identification_Guide

**Artemis**
PC database programma met dezelfde gegevens als de Signal Identification Guide.
PC database program including the same modes and images as the Signal Identification Guide.
https://aresvalley.com




Artemis 2.0

## Utilities

**DX Atlas**
Elektronische wereldkaart voor Radio Amateurs. Kan gekoppeld worden aan Multipsk, PC-HFDL, etc.
Electronic World atlas for Radio Amateurs. Can be connected to Multipsk, PC-HFDL, eyc.
http://www.dxatlas.com/

**Display Launcher**
Dit is een pakket hulpprogramma's voor mensen dia naar digitale maritieme en luchtvaart stations op SW en VHF luisteren. De programma's gebruiken de data van decoders zoals PC-HFDL en MultiPSK en geven uitgebreide details weer op een spreadsheetachtige manier.

This is a suite of utilities for listeners to digital Aviation and Shipping networks on SW and VHF. The utilities take the output from decoders such as PC-HFDL and MultiPSK and display expanded details on a spreadsheet type of grid. http://www.agenetools.com

# Boeken, databases, tijdschriften / Books, databases, magazines

## ILGRadio

**ILG – International  Listening Guide**

- Frequency database in CSV, text and dBase formats. Covers broadcasting stations and utility stations.
- Frequentie database in CSV, tekst en dBase formaten. Omvat omroep en utility station.

https://www.ilgradio.com/

## Klingenfuss Publications

**Guide to Utility Radio Stations.**

- Voornamelijk een frequentielijst maar bestaat voor een groot deel uit plaatjes van decoder schermen.
- Mainly a frequency list but a large part of the book are screenshots of decoder output.

**Shortwave Frequency Guide**

- Bevat zendschema's van lokale, internationale en clandestiene stations.
- Contains schedules of domestic, international and clandestine broadcasting stations.

**Super Frequency List on CD**

- Bevat de Utility Guide en de Shortwave Frequency Guide en oude frequenties.
- Contains the Utility Guide and Shortwave Frequency Guide and old frequencies.

**Radio Data Code Manual**

- Omschrijft modes en systemen die op de kortegolf gehoord kunnen worden. Niet meer bijgewerkt sinds 2008.
- Describes modes and systems that can be heard on short wave. It hasn't been updated since 2008.

http://www.klingenfuss.org/homepage.htm

## Roland Proesch

**Signal Analysis for Radio Monitoring**

- Dit boek is bedoeld voor de korte golf luisteraar, die geïnteresseerd is in digitale signalen. Op meer dan 400 pagina's met veel figuren en tabellen maakt de lezer kennis met de wereld van de signaalanalyse.
- This book is aimed to the shortwave listener, who is interested in digital signals. On more than 400 pages with many figures and tables the reader is introduced to the world of signal analysis.

**Frequency Handbook for Radio Monitoring HF**

- Dit boek omvat meer dan 18.000 frequenties van utility stations tussen 82 Hz en 30 MHz.
- This book contains more than 18,000 frequencies of utility stations from 82 Hz to 30 MHz.

**Technical Handbook for Radio Monitoring HF**

- Het technische handboek voor HF-monitoring is gericht op korte golf luisteraars, die geïnteresseerd zijn in digitale signalen. Op meer dan 500 pagina's met veel tabellen worden de meeste digitale golfvormen beschreven. Het boek zal de korte golf luisteraar helpen om deze digitale signalen die vandaag de dag te horen zijn te identificeren
- The Technical Handbook for Radio Monitoring HF is aimed to shortwave listeners, who are interested in digital signals. On over 500 pages with many figures and tables most digital waveforms are described. The book shall help shortwave listener to identify these digital signals which can be heard today.

**Technical Handbook for Satellite Monitoring**

- Dit boek beschrijft satellieten, satellietsystemen en de gebruikte golfvormen. Het zal helpen onbekende signalen te identificeren die vandaag kunnen worden ontvangen.
- This book describes satellites, satellites systems and the used waveforms. It shall help to identify unknown signals which can be received today.

**Technical Handbook for Radio Monitoring VHF/UHF**

- Dit boek beschrijft algemene golfvormen die worden gebruikt op VHF- en UHF. Het zal de geïnteresseerde lezer helpen deze golfvormen te identificeren. Systemen zoals AIS, ACARS, GMS, THURAYA en anderen worden beschreven met spectrum plaatjes en gedetailleerde technische parameters.
- This book is describing common waveforms used on VHF- and UHF. It shall help the interested reader to identify these waveforms. Systems like AIS, ACARS, GMS, THURAYA and others are described with spectrum pictures and detailed technical parameter.

http://frequencymanager.de/
https://www.bod.de/

## Siebel/VTH

**Not- und Katastrophenfunk auf Kurzwelle**

- Frequenties van kuststations en reddingsdiensten, GMDSS en achtergrondverhalen. Het boek is in het Duits en is sinds 2006 niet meer bijgewerkt.
- Frequencies of coastal stations and search & rescue services, GMDSS, and background stories. The book is in German and hasn't been updated since 2006.

**Zeit und Frequenz**

- Beschrijft Tijd- en Frequentiezenders. Het boek is in het Duits. Het is niet meer bijgewerkt sinds 2009.
- Covers Time & Frequency stations. The language is German. It hasn't been updated since 2009.

**Seefunk**

- Informatie over maritieme stations. Het boek is in het Duits. Voor het laatst bijgewerkt in 2009.
- Information about maritime stations in German + frequency list. Last update: 2009.

Website: http://shop.vth.de/bucher/siebel-verlag.html

## UK Hydrographic Office

- Het UK Hydrographic Office publiceert de ADMIRALTY List of Radio Signals. Professionele boeken voor de scheepvaart, maar ook interessant voor de utility dxer. Deel 6 is niet interessant voor dxers. De boeken zijn verkrijgbaar bij scheepvaartbedrijven of via internetwinkels.
- The UK Hydrographic Office publishes the ADMIRALTY List of Radio Signals. Professional books for the shipping industry but also interesting for the utility dxer. Volume 6 is not of interest for dxers. The books are available from ship chandlers or via internet stores.

ADMIRALTY List of Radio Signals Volume 1 (NP281)
Maritime Radio Stations (Parts 1 & 2)

ADMIRALTY List of Radio Signals Volume 2 (NP282)
Radio Aids to Navigation, Differential GPS (DGPS), Legal Time, Radio Time Signals and Electronic Position Fixing System (Parts 1 & 2)

ADMIRALTY List of Radio Signals Volume 3 (NP283)
Maritime Safety Information Services (Parts 1 & 2)

ADMIRALTY List of Radio Signals Volume 4 (NP284)
Meteorological Observation Stations

ADMIRALTY List of Radio Signals Volume 5 (NP285)
Global Maritime Distress and Safety System (GMDSS)

ADMIRALTY List of Radio Signals Volume 6 (NP286)
Pilot Services, Vessel Traffic Services and Port Operations (Parts 1 - 8)

Website: https://www.admiralty.co.uk/

## ITU - International Telecommunication Union

- De ITU heft verschillende interessante publicaties. Ze kunnen direkt bij de ITU besteld worden.
- The ITU has several interesting publications. They can be ordered directly from the ITU.

**List V - List of Ship Stations and Maritime Mobile Service Identity Assignments**
- Beschikbaar op cd en papier. Bevat alle geregistreerde schepen van de wereld. Inbegrepen zijn de namen, roepletters, GMDSS-informatie, enz.
- Available on CD and paper. Contains all registered ships of the world. Included are the names, callsigns, GMDSS information, etc.

**List IV - List of Coast Stations and Special Service Stations**
- Bevat informatie over alle nog bestaande kuststations.
- Contains information of all still existing coastal radio stations.

Website: https://www.itu.int

- Diverse gratis handboeken in pdf format kun je downloaden bij de ITU.
- Various free downloadable ITU Handbooks.

Website: https://www.itu.int/pub/R-HDB

## Magazines

The Spectrum Monitor (pdf only) https://www.thespectrummonitor.com/
Radio User (printed and pdf) https://www.radioenthusiast.co.uk/

Free historic radio magazines including Monitoring Times, Popular Communications and many others. All in pdf format. https://www.americanradiohistory.com/

When you look for it you will find many more magazines but all are radio amateur magazines and do not cover utility stations.

# Links: Radio related hardware & software

## Radio related hard- & software

AboutTime Propagation beacons
AirNav Homepage
Argo Spectrum Analyzer
Artemis - Mark's Lab
Aviation Retail Direct
Balloon Track
BayCom
BCT15-X easy to read Scanner Manual
BCT15X UnidenMan4 TWiki
Charles Brains
COAA
Computer Aided Technology
CrypTool
CW Skimmer
Digital Radio Mondiale The future of global radio
DIGTRX 3
DL4YHF's Audio Spectrum Analyser
Dream - User Guide
Dream DRM Software
DX Atlas etc.
DX Cluster - Show spots • SK6AW
DXsoft.com (oa CW Get)
F6GQK [DXPSK)
Fileheap radio software and utilities
fldigi - Browse Files at SourceForge.net
FldigiContents
Great Circle Mapper
Ham Radio Deluxe Downloads
HamSphere Radio Software
HFlink.com-software-
Hoka Electronics
HOKA Italia
iDXCluster DX Cluster Software
Jan Arkesteijn
JVComm32.de Homepage
MFJ Enterprises
Mike's Utility Programs
MixW Homepage
MM Hamsoft
MRP40 CW Decoder
Multi PSK
NLSA Home Page
Oliver Welp_ Amateur Radio SB Software
PC-ALE Download
PC-ALE file support site
PDW Paging Decoder
POCSAG Protocol Decoder
ProScan
Radioscanner Russia
Reichelt elektronik
Rivet - GitHub
Rohde & Schwarz
ROS v5.5.7 Beta
RTTY Software - DXZone.com
rx-sstv Freeware SSTV Software and SSTV Decoder
shipplotter ShipPlotter AIS decoder
Shoc
Sigmira
Signals Analysis
Signals Analyzer Secure order page
Signals Analyzer`s (SA) description in English
Software for Short Wave Listeners
Sonic Visualiser
SORCERER decoder Radioaficion Ham Radio
Spectran
Spectran - A Spectral Analysis Tool
SpectraVue™ License Agreement
TrueTTY Page
TrunkView MPT1327 Protocol Decoder
Universal Radio, Inc
W1HKJ Software
Wavecom
WSJT Home Page
YADD & YAND
Zadig

## SBS1 radarbox

BS Recording Search – Files Listing of http
bsrs.jetvision.de
Gatwick Aviation Society
jetvision.de - SBS-1 outlines waypoints
SBS-1 & SBS-3 Mode-S forum

## SDR radio related software

ADSBscope
SonicGoose How to Setup ADSBScope
RTL1090 ADS-B software

Elad Online Shop
Perseus SDR Home Page
Perseus Support Software by Alessio Miani (hosted on SheevaPlug)
HDSDR
Installing and using HDSDR - g4zfqradio
SDR-Radio.com for SDR Console and Simon's World Map
SDR# - Software Defined Radio
SdrDx OS-X and Windows software

DAB Player - Software für USB Sticks mit RTL Chipset
DAB Player von Andreas Gsinn - www.ukwtv.de - UKW-TV-Arbeitskreis e.V.
SDR-J Decoding DAB Radio in Software using RTL-SDR - rtl-sdr.com

Big List of RTL-SDR Supported Software - rtl-sdr.com
JB's Stationlist
List of SDRSharp Plugins - rtl-sdr.com
radio-portal Software Defined Radio
rtl-sdr – OsmoSDR
RTLSDR Scanner Ear to Ear Oak
RTL-SDR Tutorial POCSAG Pager Decoding - rtl-sdr.com

## Antennas

Grahn Spezialantennen
HCDX Antenna Lab
LF Engineering
Wellbrook Communications Loop Antennas
WiMo Antenna, Amateur Radio and more

## Other useful programs

Agent Ransack - Free File Searching Utility
Notepad++ - Free text editor
LibreOffice - Free counterpart of MS Office

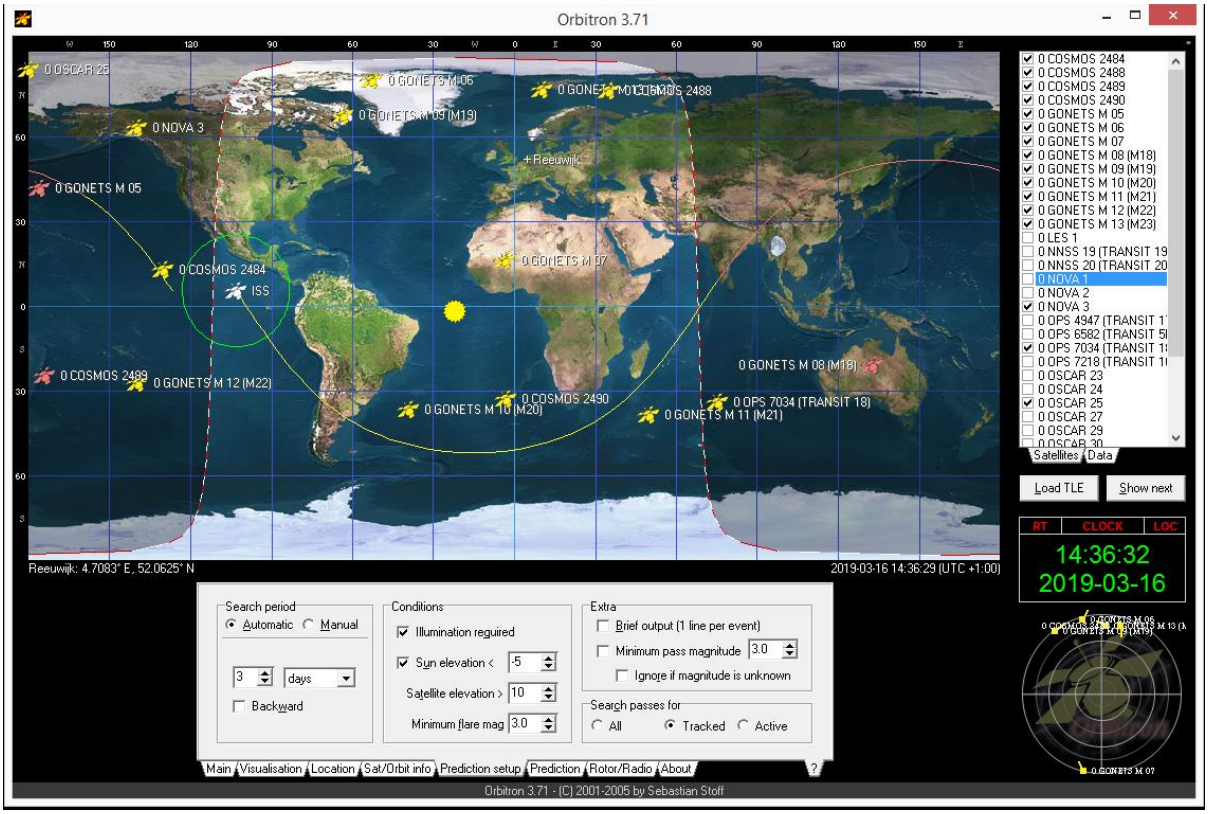
COMport utilities
com0com Null-modem emulator
VSDP - Virtual Serial Port Driver
Open Port Check Tool
Router Port Forwarding Guides

Audio players and recorders
Audacity Audio recorder and editor
VLC - VideoLAN media player
Total Recorder

Virtual Audio Cables
VB-Audio Virtual Cables
Virtual Audio Cable
Jack Audio
Virtual Audio Capture Device
Vsound for Linux
Soundflower for MacOS

## Weather satellite decoding

[Orbitron satellite Tracking System]
[Satellite Tools - from David Taylor, Edinburgh]
[WXSat Beginner's Guide]
[WXSat-Software Page]
[WXtoImg software to decode APT and WEFAX signals from weather satellites]
[WXtrack]




Orbitron satelliet tracking programma / Orbitron satellite tracking program

## Dutch radio shops

[Alle Kabels]
[AMCOM]
[AND / NAD Benelux - Home]
[Baco Army Goods]
[Circuits Online - Shops]
[Classic International]
[Communicatie Centrum Venhorst]
[Conrad Nederland]
[De Radiowinkel]
[Deltron]
[Dile online]
[Discriminator.nl]
[Dolstra Elektronika]
[Elbenk]
[Flash Aviation website]
[Haje Electronics]
[HamShop]
[HOKA]
[Jacobs Breda Electronics]
[Luchtvaart Hobby Shop]
[Radio Correct]
[RYS Electronics]
[Scanman Eindhoven]
[Schaart Communications]
[Truckerswereld]
[Van Dijken Elektronica - Van Dijken Electronics]
[Weerspecialist]

## Links: Web SDRs and streams

argon.printf.cc:8000/buzzer.ogg
CAMRAS - WebSDR
De Leidsche SDR!
Delicast
ERcomER KiwiSDR Warschau
GlobalTuners
IK1QFK Monitoring Station - Live data
Kiwi Groningen
KiwiSDR Japan
KiwiSDR Khabarovsk
KNRM Ter Heijde scanner
Live Tunable Receivers - The RadioReference Wiki
Northland Radio ZMH292 | Bay of Islands remote receiver
Online Receivers - Internet and Radio Online Receivers
Radio Garden – Radio Présence
SDR.hu
SDRSPACE.com
SK3W KiwiSDR Sweden
SUWS Farnham WebSDR
UVB-76 Live Stream Blog
WebSDR in Hilversum, NL
WebSDR in KO04SD Poland
WebSDR on 160m in Bratsk, LOC OO06UB
WebSDR on 80m,40m,20m in Cherepovets City (Russia)
WebSDR on Gerbrandy Tower in IJsselstein, NL
websdr.org
Wide-band WebSDR in Enschede, the Netherlands

## Links: Utility radio related links

### Numbers stations related links

Adachi's Numbers page
Asian Broadcasting Institute
Conet Project
Cuban numbers station HM01
Daily Beast - The Stupidly Simple Spy Messages No Computer Could Decode
Deutscher Freiheitssender 904 auf www.radiohistory.de
DX International radio From the archives The numbers station game Part 1
ENIGMA2000
Enigma2000 mailing list
Four Zulu Five Tango Oscar
Geheimezender.com • Ontvangst Rapporten
Glenn's Computer Museum
HF Underground - A look into shortwave number stations
Mysteries Of The Short Wave
New Star Broadcasting
Numbers & Oddities (Ary Boender)
Numbers station - Wikipedia, the free encyclopedia
Numbers Stations (Dirk Reijmenants)

One-Time Pad Generators
Phone Trips
Priyom.org schedule
Radio Jamming
Running a numbers station
Simon Mason - Short Wave Espionage
Spy Centre _ Spy Numbers Stations
Spy Numbers Station Database
Spy Stations and Cryptography
The Spooks Newsletter
Tomonori Izumi BBS
V24 Korean Numbers Station
Was RNI een cijferzender
YouTube - Kanaal van X06Shadow
Zahlensender - fading.de

**Various blogs, forums, events, intruder watch, etc.**

Antonio, JN52QV
DARC Bandwacht
DX Listening Digest (Glenn Hauser)
EAM Watch
HF Underground
HFradio.org
IARU
IARUMS Region 1
IARUMS Region 2
IARUMS Region 3
International Beacon Project Transmission Schedule
International Lighthouse Lightship Weekend
ITU home page
ITU International monitoring
ITU Radio Regulations
ITU Reference Tables
Militarischer Funkgerate Bilder-Gallerie
MT Milcom Monitoring Blog
Museum Ships Weekend Event
Night of Nights
Now On The Radio [Spy Numbers Station BBS]
Priyom.org
Radio Reference Homepage
Radiohobby Forum
RadioReference Wiki
Radioscanner
Scannerforum
Shortwave Central
solarix.net · Listen Beyond the Horizon
UDXF - Utility Dxers Forum (Ary Boender)
UTDX
Utility Listening - The RadioReference.com Forums
Vintage Military Radio

## LF, VLF, Navaids

AirNav
Alex's Longwave Page
Hyperbolic Radionavigation Systems
Johan Veldhuis (bakens)
Low-frequency radio time signals
LW Navtex Broadcasts
Martin Francis - DX Radio Pages
NASA online VLF receiver
Natural VLF Radio - Sounds of Space Weather - Stephen P. McGreevy
NDB List Information Page
REU signals
Robert Connolly
Royal Institute of Navigation
SAQ Alexander - Grimeton
The 500 KC Amateur Radio Experimental Group
VLF.it
Wim van Beek (bakens)
List of Navtex stations - Wikipedia

## Propagation

DX World propagation logger
HF Propagation en Solar-Terrestrial Data Website
HFradio.org - Propagation
High Frequency Radio Propagation - Current Optimal Frequency Chart (AUSTRALIA) for Shortwave (SWL) and HF Radio
IPS Home Page
NCDXF_IARU Beacon Transmission Schedule
Radio - Propagation - Chirperlist
Radio Propagation & Aurora
Radio propagation explained
Radio Propagation wiki
UMLCAR digisonde
VOACAP Online HFBC - professional-grade high-frequency (3-30 MHz) point-to-point propagation predictions
VOACAP Propagation Planner - HF contest & DX expedition planning tool

## Timesignal stations

BIPM
BSF
CHU Inst For Nat Measurement Standards
DCF77 - Atomzeit mit DCF77
MIKES - Mittatekniikan keskus
Nat. Physical Lab
National Institute of Standards and Technology | NIST
NICT - National Institute of Information and Communications Technology
OK0EPB
Servicio de Hidrografía Naval (LOL)
Time & Frequency Standard Stations
Time and Standard Frequency Station TDF (France)
VNIIFTRI - State Scientific Metrology Institute, Russia

**Utility radio related**

CODAR
CODAR Ocean Sensors
Digital Modes samples
Digital Modes used in HAM radio
Digital Sounds
DigitalModes
Don Schimmel's Radio Intrigue
Duitse communicatie historie
DWD Deutsche Wetterdienst
DX Info Centre
EFR Internet
EISCAT Scientific Association Tromsoe
Fascinating Shortwaves
Fishnetbeacons
Global ALE HF Network
HF Asia
HFIA
HFLINK - HF ALE automatic link establishment HF Link
High Frequency Beacon - HF Underground
Hurricane Watch Net
IARUMS sound samples
JMH schedules
Kurzwelle info Oesterreich
MF Marinefunk - Amateurfunk , ( RNARS , MARAC , INORC ) - Introduction
MFSK16
Military Standards (MIL-STD), Military specifications, handbooks Free
Morse Code Operating Aids
National HF RADAR Network » Surface Currents
Nils Schiffhauer – DK8OK HF – All you can eat from zero to 30 MHz.
NOAA Home Page
Norkring Digital Radio
NWS Radiofax
Percoms HF & VHF modes
planesandstuff Tony Roper
PY1VHF Monitoring
Radio Communications and Signals Intelligence in the RCN
Radio Sonde
RadioReference.com
RailroadRadio.net
Remote Imaging Group (wefax)
RTTY.com
SailMail
SATERN (official website)
Scanner page (digi modes)
Shortwave Radiogram
SIGINT Group Germany
Signal Identification Wiki
Signal Identification Wiki unids
Signals - The HF monitoring site
SOS 112 Europe
Sound samples examples digi modes
Spherix Systems

USAF callsign list
Utility Monitoring Central
Utility World
weerballonnen Nederlandse stations waar weerballonnen worden opgelaten
WERA HF-Radar
World Meteorological Organization (WMO)
World of Fuzzy and Modern Digital Modes

**Spacecraft, Satellites**

**NASA**
HSF - ISS _ Shuttle tracking
Human Space Flight (HSF) - International Space Station
International Space Station Reference
ISS Fan Club
ISSTracker ~ Real-Time Location Tracking of the International Space Station
Johnson Space Center
NASA - NSSDC - Master Catalog - Spacecraft Query
NASA Homepage
NASA's Radio JOVE Project Home Page
New Horizons NASA
Science @ NASA
Space Shuttle
Ulysses project

**ESA**
ESA Portal
EUROSPACE - The Association of European Space Industry
Space Expo

**Rusland / Russia**
Baikonur Cosmodrome - The Big Picture - Boston.com
Gonets
Russian Mars mission
Russian Space Web
Space Research Institute(IKI) Home Page
Zarya - Soviet and Russian Space Programmes

**Andere websites / Other websites**
AMSAT USA
CelesTrak WWW
COSPAS-SARSAT
DK3WN SatBlog
DLR - German Space Operations Center
Encyclopedia Astronautica
Feedhunter (Rini de Weijze)
Group for Earth Observation (GEO)
Gunter's Space Page
Jonathan's Space Home Page
Kunstmanen
Mike Rupprecht - Amateurfunk - Satelliten
National Space Laboratory
Nederlandse Vereniging voor Ruimtevaart
NOAA Satellite Operating Status and Information

ORBCOMM
Radio Astronomy
RIG - Weather Satellite Information
Ruimtevaart Nieuws en Technologie
Satellite Ground Tracks
Satellitenwelt
Signals from space
SKY Online
Space.com
SpaceDaily.Com
Spaceflight Now
Spacepage - Ontdek het heelal
Space-Track
SPUTNIK home page
SUPSI SpaceLab Project TISAT-1
Sven's Space Place
Tables of operational military satellites
The Spacecrafts Encyclopedia
Tier One - SpaceShipOne Home Page
TLE - TS Kelso
Tokyo Institute of Technology LSS CubeSat CUTE-I
TSE The Satellite Encyclopedia
UCS Satellite Database Union of Concerned Scientists
UHF-Satcom.com - the online place for VHF to EHF satcom monitoring
United Space Alliance (NASA tv)
University of Calgary - Institute for Space Research
Visual Satellite Observer's Home Page
Weathersatellites

**Shipping related links, Lighthouses, etc.**

**Vuurtorens / Lighthouses**
Amateur Radio Lighthouse Society (ARLHS)
Commissioners for Irish Lights_ Loran
International Lighthouse Lightship Weekend
Leuchtturmseiten von Anke und Jens
Lighthouse Directory
Lighthouses in the World List of Lights beginning with A
Northern Lighthouse Board
Nederlandse Vuurtoren Vereniging – Baken voor nautisch erfgoed
Nederlandse vuurtorens

**Tracking**
AISLive.com - Live Ship Info
Live Ships Map - AIS - Vessel Traffic and Positions
Scannernet.nl - Live AIS
Ship tracking and ship photos - vesseltracker.com
Shipspotting.com - Shipsphotos
Tall Ship Tracker
Vesseltracker

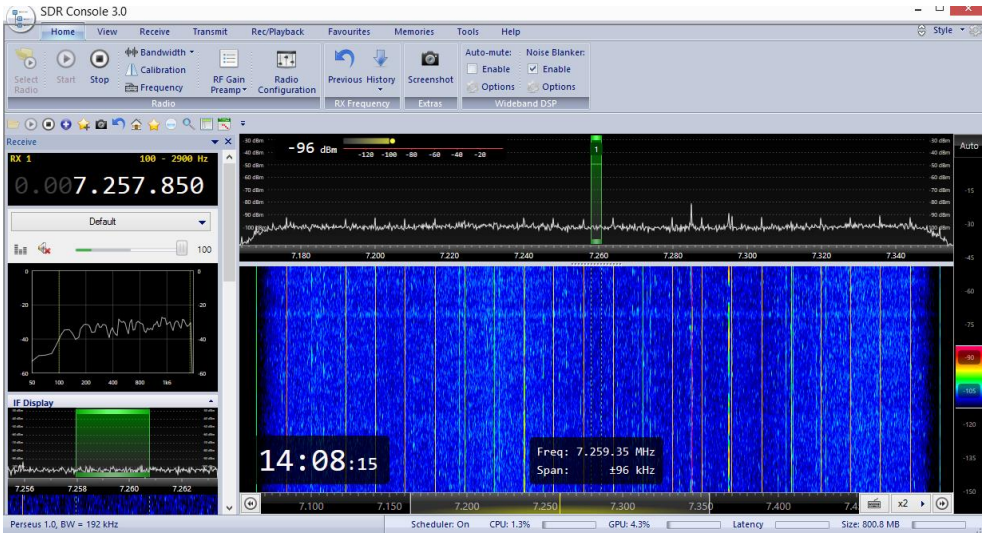
**Andere websites / Other websites**

Arendnet Scheepvaart Site
ATIS hoe en waarom Alles over de ATIS-code
Booreilanden
Dienst Der Hydrografie
Haven van Antwerpen
Hydrographic Institute of the Republic of Croatia
Hydrographic Society
IHO - Intl Hydrographic Org
IMO - International Maritime Organization
ITU MARS
Kielradio
Madrid Radio Servicio Manual - Frecuencias
Maritiemewereld.nl MTW
Maritime Radio Historical Society
Noble Drilling
Ocean weather ships
PCH Scheveningenradio
Penta Marine Radio Communications
Port of Rotterdam.com
Radio maritime day
Rigzone
Seefunk.de_ Das Tor fuer Seefunker
The G4PYR MF Coastal Radio Website
USQUE AD MARE - The Weather Ships - Canadian Coast Guard

**Aero related links**

Aeronautical Charts 1500,000 Series Charts
Airframes-Aircraft Database
AirNav Airport Information
Airport Data.com
AIS Netherlands
ARINC Rockwell Collins
Aviaworld
British Airports
Dutch VACC
EuroCenter vACC
Eurocontrol
FAA Federal Aviation Agency
Planning Charts
ICAO
International Ice Patrol Home Page
Lookup Airport SkyVector
Plane Spotting Zone
Russian Airfield Database
RussianPlanes.net - фотографии самолетов и вертолетов
Selcal Logs
Shannon Airport
skyvector Flight Planning - Aeronautical Charts
Stockholm Radio
World Aeronautical Database

SDR console 3.0 connected to an ELAD FDM-S2



Simon's World Map