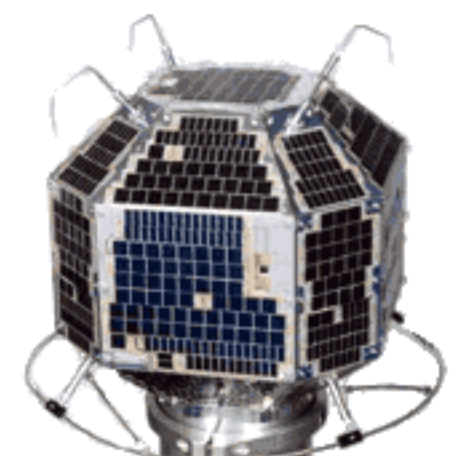
Amateur Radio Satellites

AMSAT-UK

Fred Dawson G1HCM

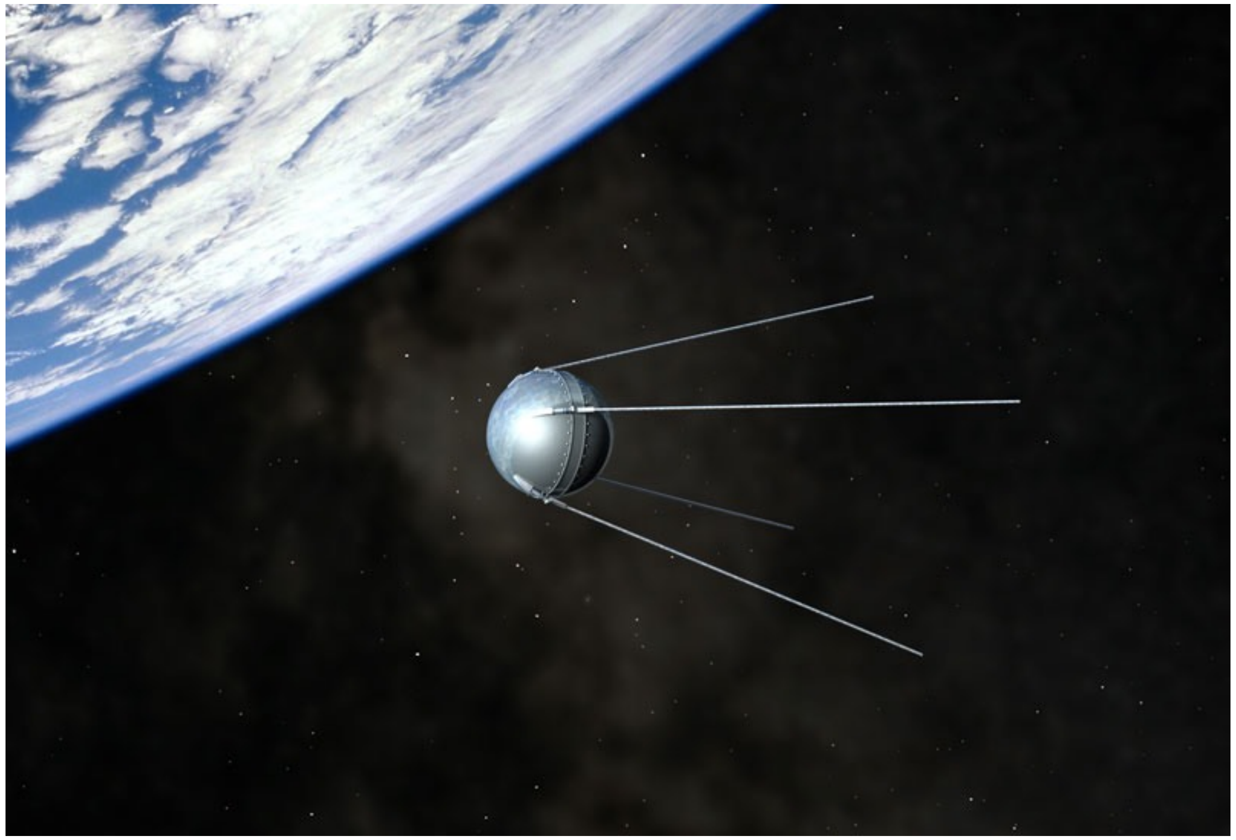
ARISS

Amateur Radio on the International Space Station



Satellites

History changed on October 4, 1957, when the Soviet Union successfully launched Sputnik I. The world's first artificial satellite was about the size of a beach ball (58 cm.or 22.8 inches in diameter), weighed only 83.6 kg. or 183.9 pounds, and took about 98 minutes to orbit the Earth on its elliptical path.



Only 4 years later

OSCAR 1 was the first amateur radio satellite launched by Project OSCAR into Low Earth Orbit. OSCAR I was launched December 12, 1961 by a Thor-DM21 Agena B launcher from Vandenberg Air Force Base, Lompoc, California.

The start for me

- First interested in the 1980s, Russian RS satellites UoSAT space shuttle etc.
- Prediction using BBC Micro
- FT726R 2 metres and 70 centimetres
- Roddy Clews G3CDK of S&CRS was my mentor.
- Joined AMSAT UK Magazine and nets
- Break from 1992 for family and work until 2014

Phase 3D
ill fated Oscar 40

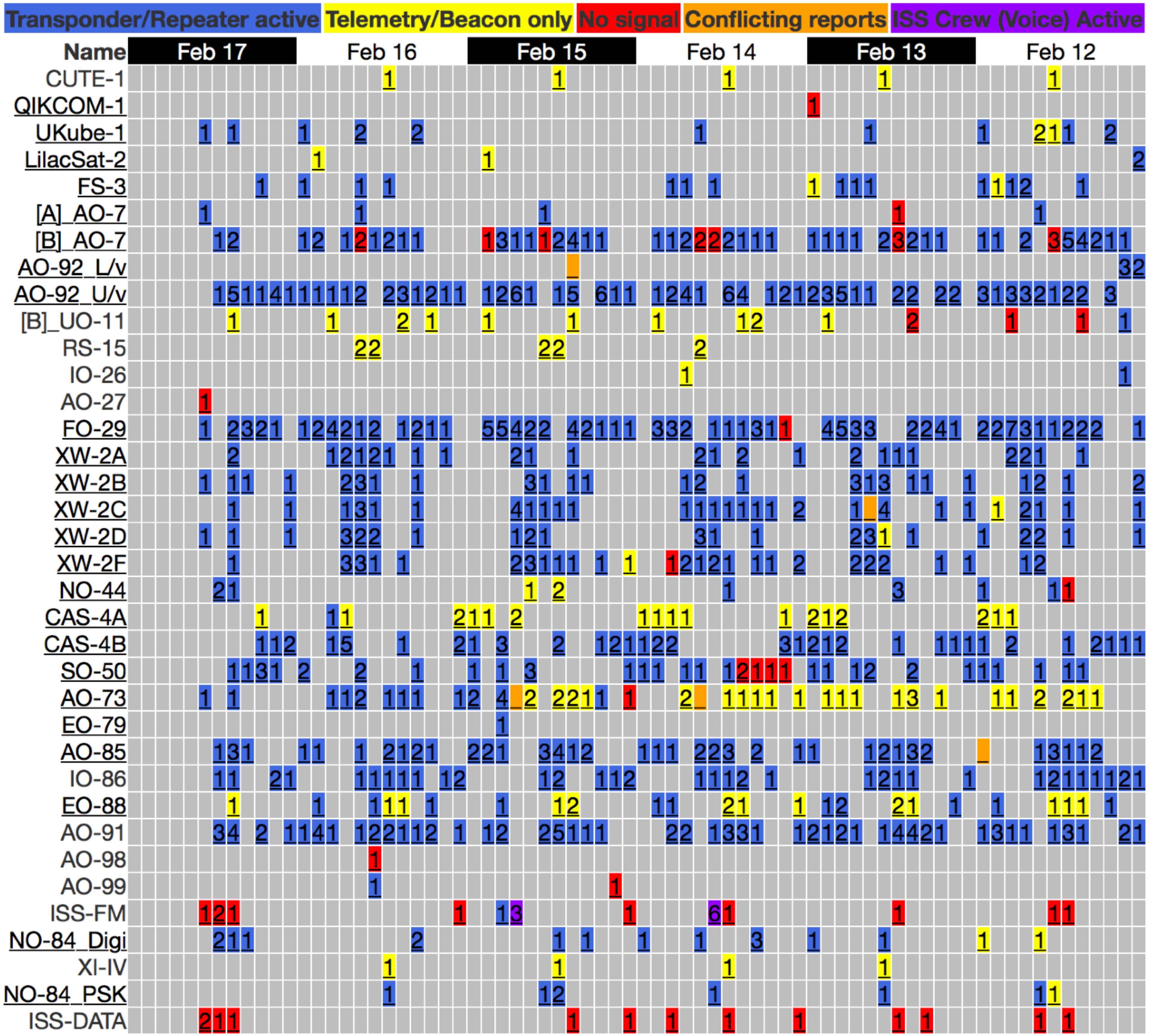
On 13 December 2000 at 11:23 UTC, transmissions from AO-40 ceased during the exercising of its 400 newton motor.

The Command Team were able to infer that there had been an explosion caused by pressure in the propellant pipes caused by malfunction of the control valves.

A protective cap that was supposed to be removed from the motor before launch, was inadvertently left in place.

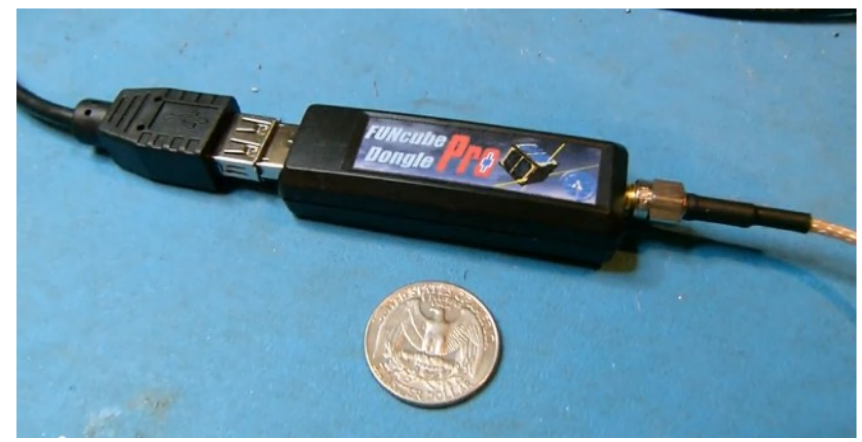
When the motor was fired, pressure built up where it shouldn't, and destructive failure occurred. The loss of the motor caused AO-40 to be left in an equatorial orbit that the satellite was not designed for.

Satellites - Current Status as of 17 Feb 18



Hardware

- TS 2000 HF, VHF, UHF, microwave (23cm) full duplex
- Funcube dongle + turnstile antenna



- Windows Laptop
- Wimo Quad 70 and 2
- Yaesu rotator (elev and az) + ERC interface
- Wimo phase control for both 70 and 2 (V, H, RHCP LHCP)
- Low loss coax MESSI & PAOLONI ULTRAFLEX 10
- All connectors N Type

Software

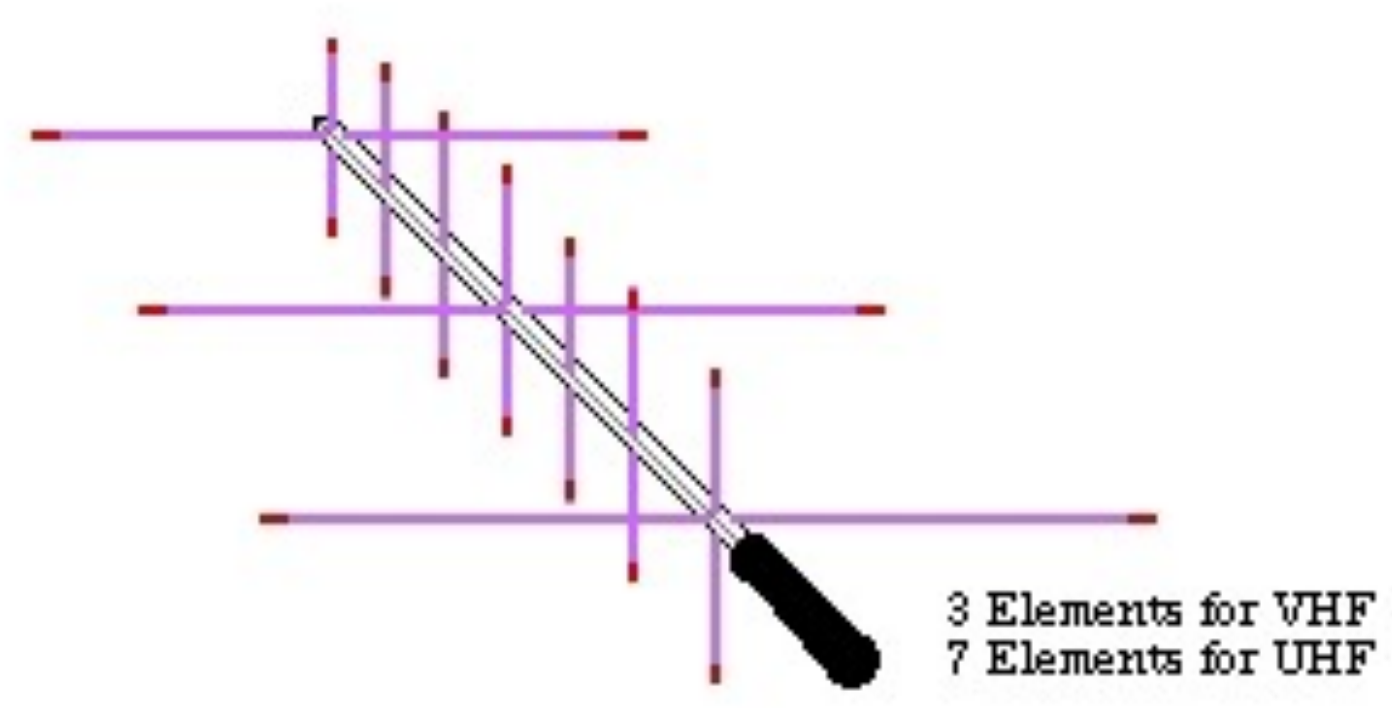
- SDR Sharp
- FOX telemetry software
- Funcube telemetry software
- SSTV ap on iPhone
- HRD Free version
- Rotator software for setup and calibration

Basic Setup

- For FM satellites hand-held with 2m and 70cm
- Arrow antenna with duplexer IOWRS can loan you this
- Satellites AO92, AO91, SO50, AO85

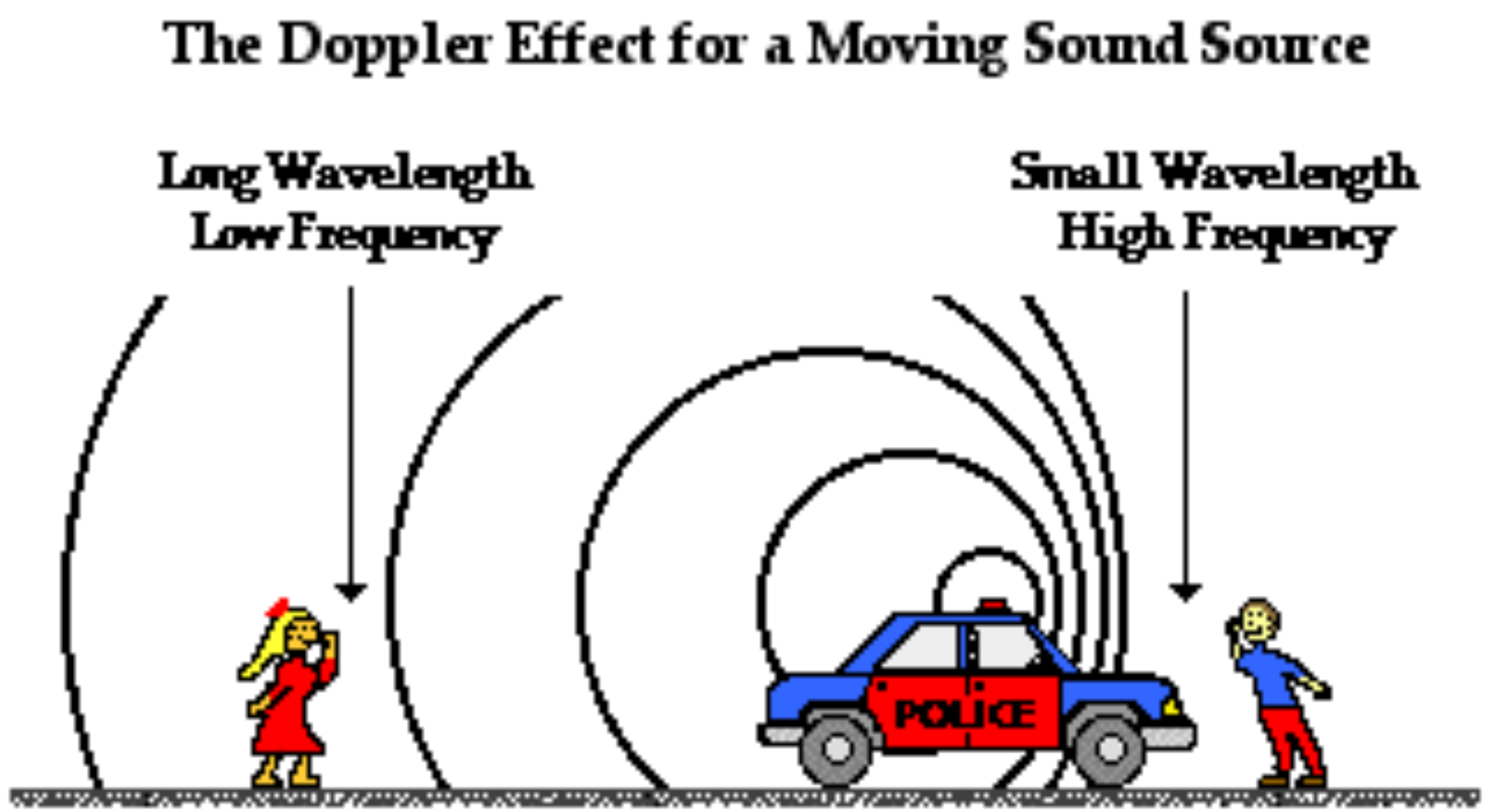
ARROW ANTENNA 146/437-10WBP

3 Element VHF 7 element UHF Portable Hand Held Yagi Satellite Antenna with Split Boom w/ Duplexer




Bob
PJ4/K0HR

Dopler shift



The International Space Station orbits at an altitude of 400 km above the surface of the Earth. What is the space station's orbital velocity? The orbital velocity of the International Space Station is **7672 m/s or 17161.78 MPH**

Set up for SO50

The order of operation is: (allow for Doppler as necessary):

1) Transmit on 145.850 MHz with a tone of 74.4 Hz to arm the 10 minute timer on board the spacecraft.

2) Now transmit on 145.850 MHz (FM Voice) using 67.0 Hz within the 10 minute window.

3) Sending the 74.4 Hz tone again within the 10 minute window will reset the 10 minute timer

You can set the memory channels in your handheld as follows:

Ch	TX	RX	CTCSS
1	145.850	Timer Reset	74.4 Hz
2	145.850	436.805	67 Hz
3	145.850	436.800	67 Hz
4	145.850	436.795	67 Hz
5	145.850	436.790	67 Hz
6	145.850	436.785	67 Hz

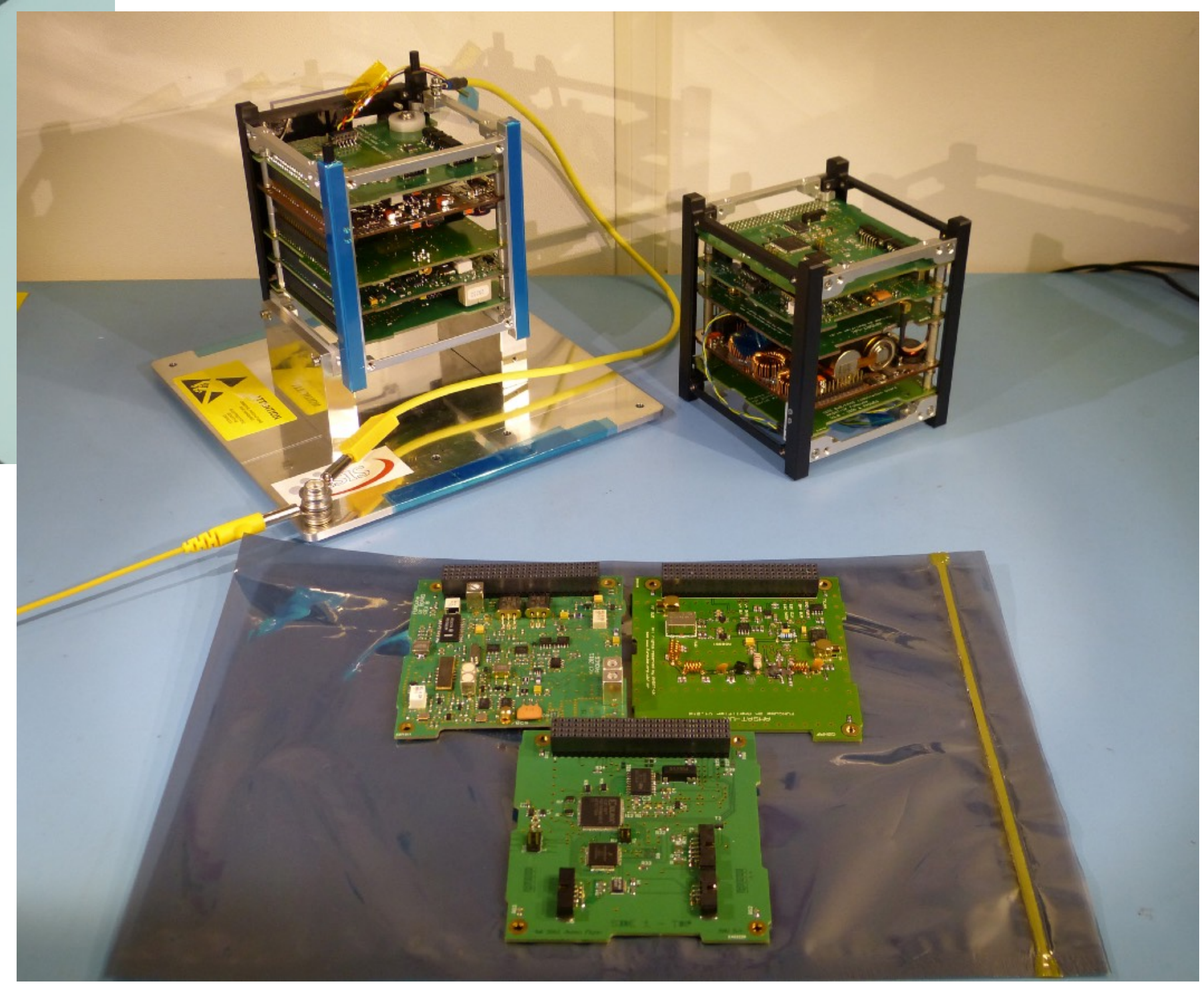
At the start of the pass tune to 436.805 and then decrease the frequency during the 10+ minute pass.

Dopler shift in practice

Telemetry signal recorded on SDR

Amateur satellites

AO73 / Fun Cube 1
10cm Cube



Welcome to the FUNcube Web Site

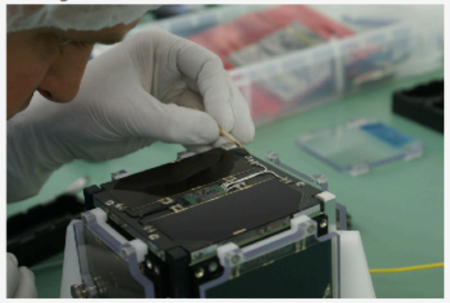
AMSAT-UK FUNcube
Fun in Space with Amateur Radio

FUNcube
UK Amateur Radio Educational Satellite

Introduction

In 2009, a team of volunteer experts from **AMSAT-UK**, in collaboration with their colleagues in the Netherlands at AMSAT-NL started work on a new amateur satellite concept –***The FUNcube Project***

The initial plan was to design, build and launch a single spacecraft but further flight opportunities became available and the project now comprises of the following missions:



FUNcube-1 (AO73) is a complete educational 1U CubeSat with the goal of enthusing and educating young people about radio, space, physics and electronics. FUNcube-1, now registered as a Dutch spacecraft, was successfully launched from Russia on a DNEPR rocket on Nov 21st 2013 and, after more than three years in orbit, continues to perform well. More than 1000 stations, including many at schools and colleges around the world, have received and decoded the telemetry. Details of current operations and the telemetry available from FUNcube-1 can be seen at **http://warehouse.funcube.org.uk/** We also have a dedicated educational outreach page here **https://funcube.org.uk/education-outreach/**

FUNcube-1 is in a Sun-Synchronous Low Earth Orbit approx 630km above the earth. In such an orbit a satellite passes over most locations approximately 3 times in the morning, and 3 in the evening, every day. This schedule allows the morning passes to be used for educational purposes and the evening passes for Amateur Radio communications.

The satellite also carries a Materials Science Experiment, from which the school students can receive telemetry data and which they can compare to the results they obtained from similar reference experiments in the classroom.

FUNcube-1 also carries a UHF to VHF linear transponder with approx 300mW PEP output and which can be used by Radio Amateurs worldwide for SSB and CW communications.

Measuring just 10cm x 10cm x 10cm, and with a mass of less than 1kg, FUNcube-1 is the first spacecraft to have a primary mission of educational outreach to schools and the smallest ever satellite to carry a linear transponder for radio amateurs.

FUNcube-2 on UKube-1 is a follow-on project and comprises of a set of FUNcube boards that is flying as part of the separate UKube-1 triple cubesat and it has identical goals. This spacecraft was successfully launched on a Soyuz rocket from Baikonur on July 8th 2014. It has also now been in space for more than three years and both the telemetry downlink and transponder continue to be operational on a 24/7 basis.

FUNcube-5 (EO88) on Nayif-1 – Nayif-1 is a 1U Cubesat project that has been developed by the Emirates Institution for Advanced Science and Technology (EIAST) in partnership with students at the American University of Sharjah (AUS) This mission is intended to provide Emirati students with a tool to design and test systems in space. It carries a complete, and enhanced, FUNcube communications package to provide educational outreach telemetry and an amateur transponder. Nayif-1 was successfully launched from India

FUNcube-1 / AO-73 details

TLM down link freq 145.935 MHz BPSK - Please check the news section for the current operating schedule during high illumination periods.

Transponder:
Nominal Uplink 435.150 - 435.130 MHz LSB (Inverting)
The passband may be up to 15kHz higher depending on on-board temps. Low temperature gives higher freqs!
Downlink 145.950 - 145.970 MHz USB
Please use a maximium uplink power of 5 watts to a 7 dBi gain antenna. More power is not needed to use the transponder!

Links:
Forum for Help and advice.
Latest Dash Board Software
Latest Keplerian Elements (TLEs)
Handbook ver 1.3
Data Warehouse

Search

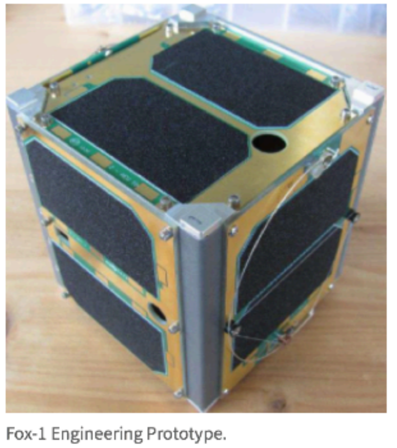
Recent Posts

AO73/FUNcube-1 Illumination – update 1
AO73/FUNcube-1 spin period and illumination
FUNcube-1 celebrates its 4th birthday

Meet The Fox Project

What is the *Fox Project?*

CubeSats were once just a cheap way for university students to build and launch a satellite. But they have become the hottest new technology in the space industry. NASA, the National Reconnaissance Office ("spy satellites,") Aerospace Corporation and even Boeing have all launched and operated CubeSats. And now, the NASA Educational Launch of Nano satellite (ELaNa) program, which offers free launches to education and encourage science missions, is open to US non-profit corporations like AMSAT. *Project Fox* is AMSAT's answer to this new, emerging technology. AMSAT is developing a family of CubeSats with amateur radio transponders that can support advanced science experiments. We are working with universities on science and education missions that qualify for the NASA ELaNa program. This provides us with a way to put ham radio transponders into orbit and provides our university partners with a reliable platform for space-based research projects.



Fox-1 Engineering Prototype.

Our Phase 1 *Fox* satellites are 1-Unit CubeSats. They each include an analog FM repeater that will allow simple ground stations using an HT and an "arrow" type antenna to make contacts using the satellite. This was the mode made so popular by AO-51. The Phase 1 CubeSats also have the capability of operating in a high-speed digital mode for data communications. Two of our phase 1 *Fox* satellite projects (*Fox-1* and *Fox-1B* "RadFXSat") have already been accepted into the NASA ELaNa program for free launches. AMSAT has purchased a launch for a third (*Fox-1C*) on a Spaceflight SHERPA with a 3Q 2015 launch to SSO.

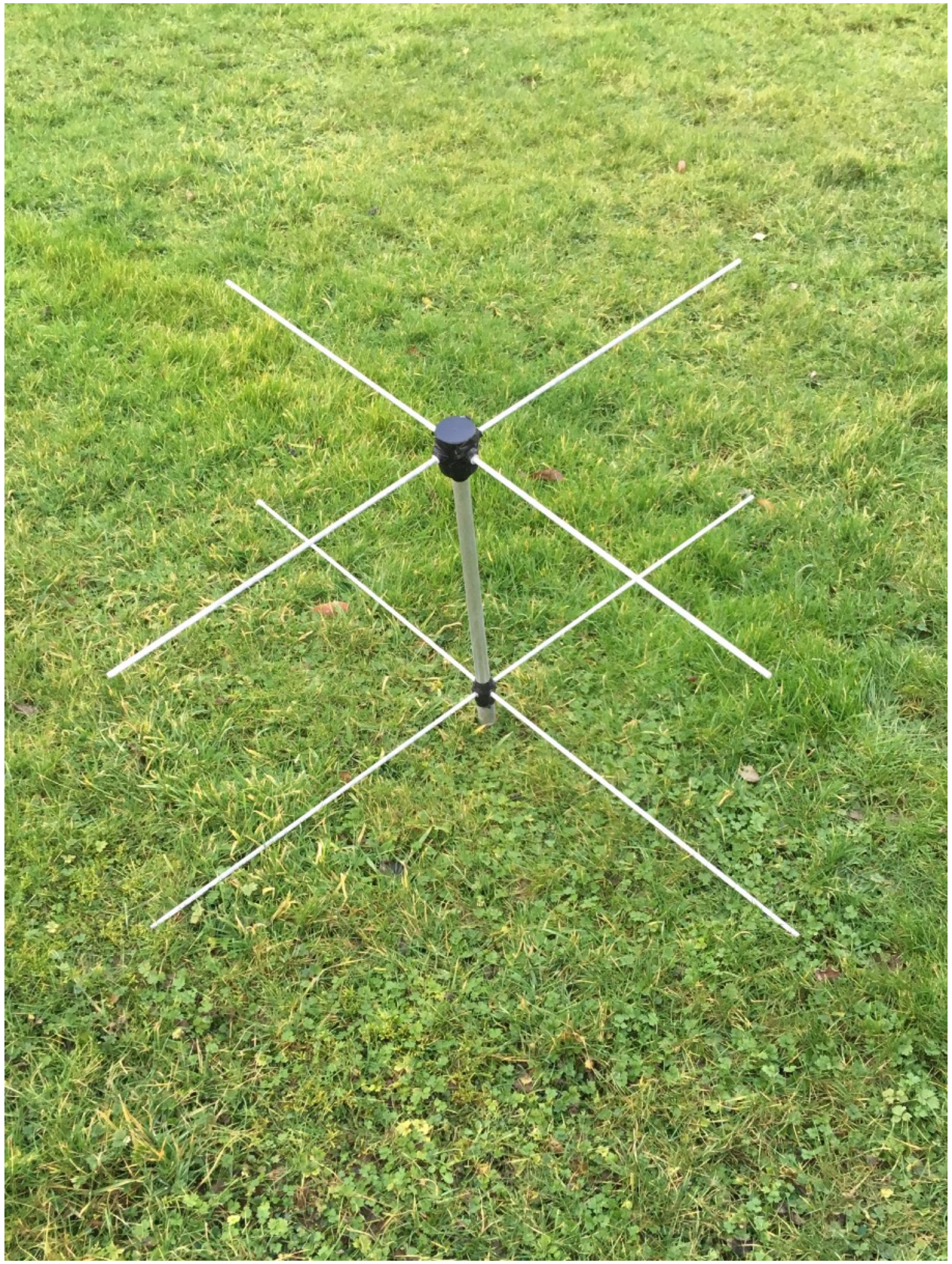
Why Are The Fox Satellites "Only" In Low Earth Orbit (LEO)?

Cost, launch opportunities, and user needs. High Earth Orbit (HEO) satellites are simply not affordable today. An excellent replacement for AO-13 is in storage in Germany. So far, the cheapest available launch is $10 million. While efforts continue to find an affordable launch, this underlines why the type of satellites we are used to are no longer affordable. By comparison, launch costs into LEO for CubeSats is in the $100k range, and is often free if paired with a suitable education-oriented mission. However, the technology developed and tested is planned to be usable, or upgradable, to HEO missions when they arise. CubeSat technology can essentially be "snapped together" to form larger, more capable spacecraft. Likewise, the engineering management procedures developed will provide us with the needed experience and contacts for other missions.

What is a CubeSat?

A CubeSat is a small and standardized satellite that packs a lot of "bang for the buck." As shown in the CubeSat (1 Unit)

Ground Station




ERC-M
AZ 45 > 45
EL 34 > 45 UP
Easy-Rotor-Control by DF9GR
ELEVATION - AZIMUTH DUAL CONTROLLER
G-5500
ELEVATION
O,ADJ.
AZIMUTH
O,ADJ.
DOWN
UP
LEFT
(CCW)
RIGHT
(CW)
POWER
YAESU


PHASE SHIFTER
VERT
RCP
LCP
HORZ
2 MTRS
VERT
RCP
LCP
HORZ
70 CMS
PWR 12V


KENWOOD
7.166.99
LSB
M.CH
14
433.225.00
FM
GB3IW
MENU
TF-SET
CALL
MR
M.IN
MAIN
SUB
SPLIT
A/B
A=B
VFO/M
SCAN
M▶VFO
M.IN
CTRL
CLR
DISP
PHONES
MIC


MICROPHONE
MH-31
FUNcube
Dongle Pro+


WARNING
U.S. AIR FORCE INSTALLATION
FOUNDER MEMBER
OF THE
GRUMPY
OLD MENS
CLUB
CCTV
DC3AQ
acer
Microsoft
DELL

Prediction
WHERE AND WHEN

PCsat 32
HRD
GoSatWatch iPhone

Online
AMSAT NA

Keplarian Elements

Keplerian Elements

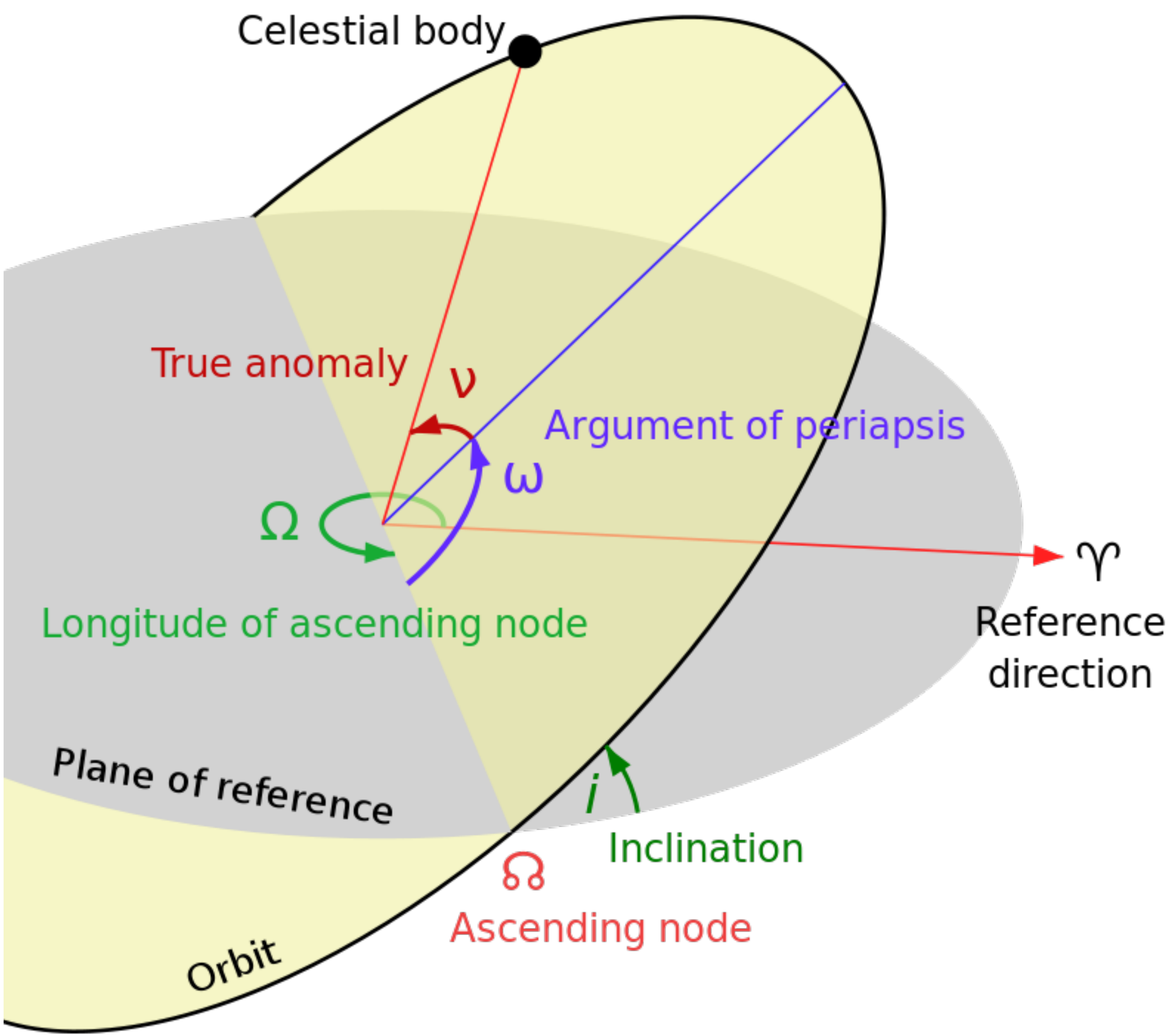
Seven numbers are required to define a satellite orbit. This set of seven numbers is called the satellite orbital elements, or sometimes “Keplerian” elements (after Johann Kepler [1571-1630]), or just elements. These numbers define an ellipse, orient it about the earth, and place the satellite on the ellipse at a particular time. In the Keplerian model, satellites orbit in an ellipse of constant shape and orientation. The Earth is at one focus of the ellipse, not the center (unless the orbit ellipse is actually a perfect circle)

The real world is slightly more complex than the Keplerian model, and tracking programs compensate for this by introducing minor corrections to the Keplerian model. These corrections are known as perturbations. The perturbations that amateur tracking programs know about are due to the lumpiness of the earth’s gravitational field (which luckily you don’t have to specify), and the “drag” on the satellite due to atmosphere. Drag becomes an optional eighth orbital element.

1 Epoch
2 Orbital Inclination
3 Right Ascension of Ascending Node (R.A.A.N.)
4 Argument of Perigee
5 Eccentricity
6 Mean Motion
7 Mean Anomaly
8 Drag (optional)

- No need to do the complex maths as there are software programs to do it for you.

- The Keplerain elements are available online and down loaded automatically by the software



Celestial body
True anomaly
ν
Argument of periapsis
ω
Ω
♈
Reference direction
Longitude of ascending node
Plane of reference
i
Inclination
☊
Ascending node
Orbit

AMSAT

10605 Concord St, #304
Kensington, MD 20895
1-888-322-6728

AMSAT Online Satellite Pass Predictions

AMSAT Online Satellite Pass Predictions - ISS

View the current location of ISS

Date (UTC)	AOS (UTC)	Duration	AOS Azimuth	Maximum Elevation	Max El Azimuth	LOS Azimuth	LOS (UTC)
15 Feb 18	10:06:34	00:08:06	185	9	145	85	10:14:40
15 Feb 18	11:41:13	00:10:27	230	39	136	74	11:51:40
15 Feb 18	13:17:27	00:10:43	262	80	350	81	13:28:10
15 Feb 18	14:54:02	00:10:42	281	87	352	102	15:04:44
15 Feb 18	16:30:32	00:10:16	285	30	193	137	16:40:48
15 Feb 18	18:07:45	00:06:57	271	6	230	187	18:14:42
16 Feb 18	09:15:40	00:06:17	166	4	140	93	09:21:57
16 Feb 18	10:49:18	00:10:08	219	26	163	75	10:59:26
16 Feb 18	12:25:14	00:10:43	254	86	176	78	12:35:57
16 Feb 18	14:01:48	00:10:42	277	76	6	95	14:12:30

Your results are shown above

Use the form below to request more pass predictions

Show Predictions for: ISS **for Next** 10 **Passes**

Calculate Latitude and Longitude from Gridsquare: io90jr Calculate Position

Or

Enter Decimal Latitude:* 50.7292 North

Enter Decimal Longitude:* 1.2083 West

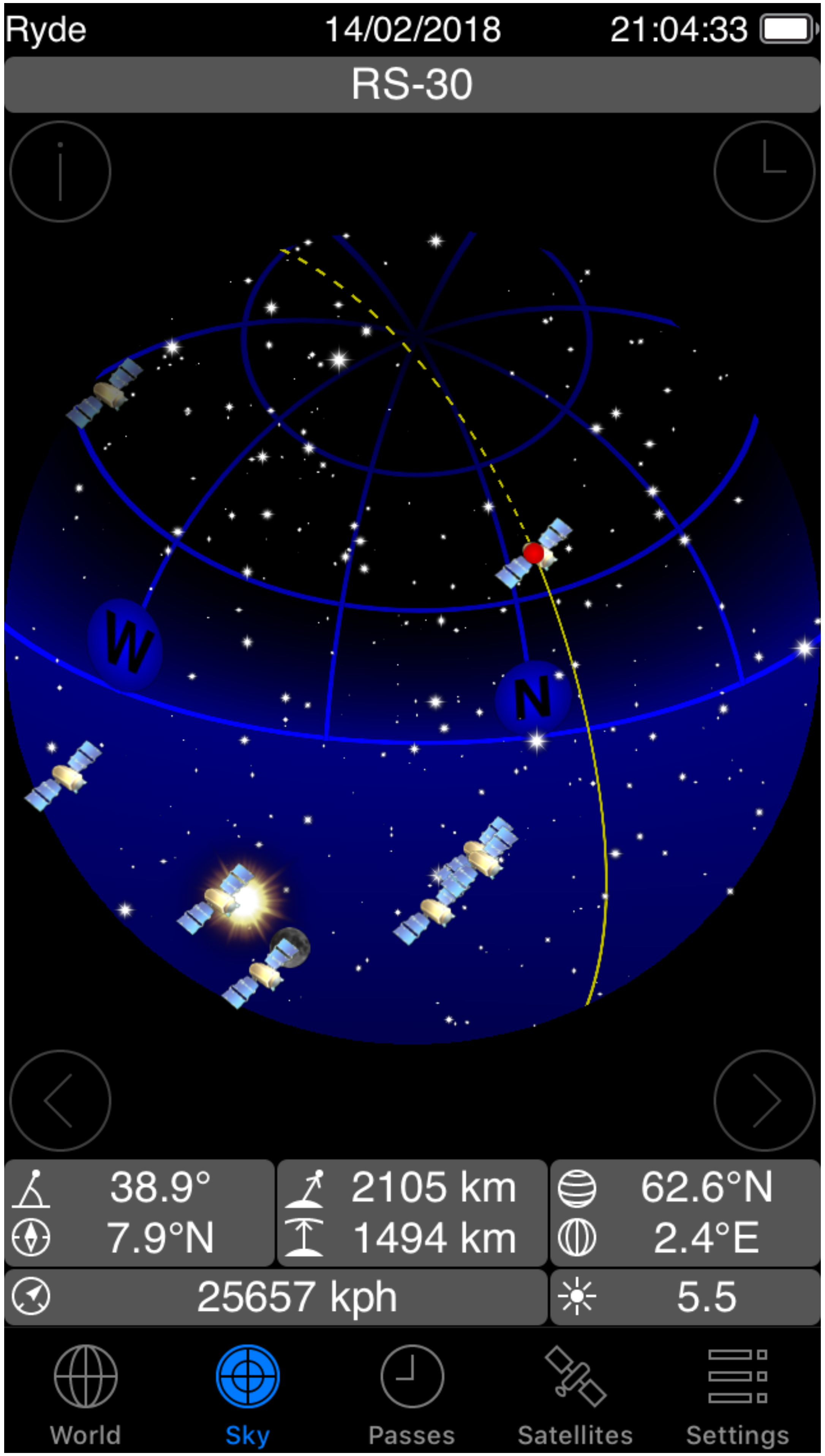
Elevation in meters AMSL: 20

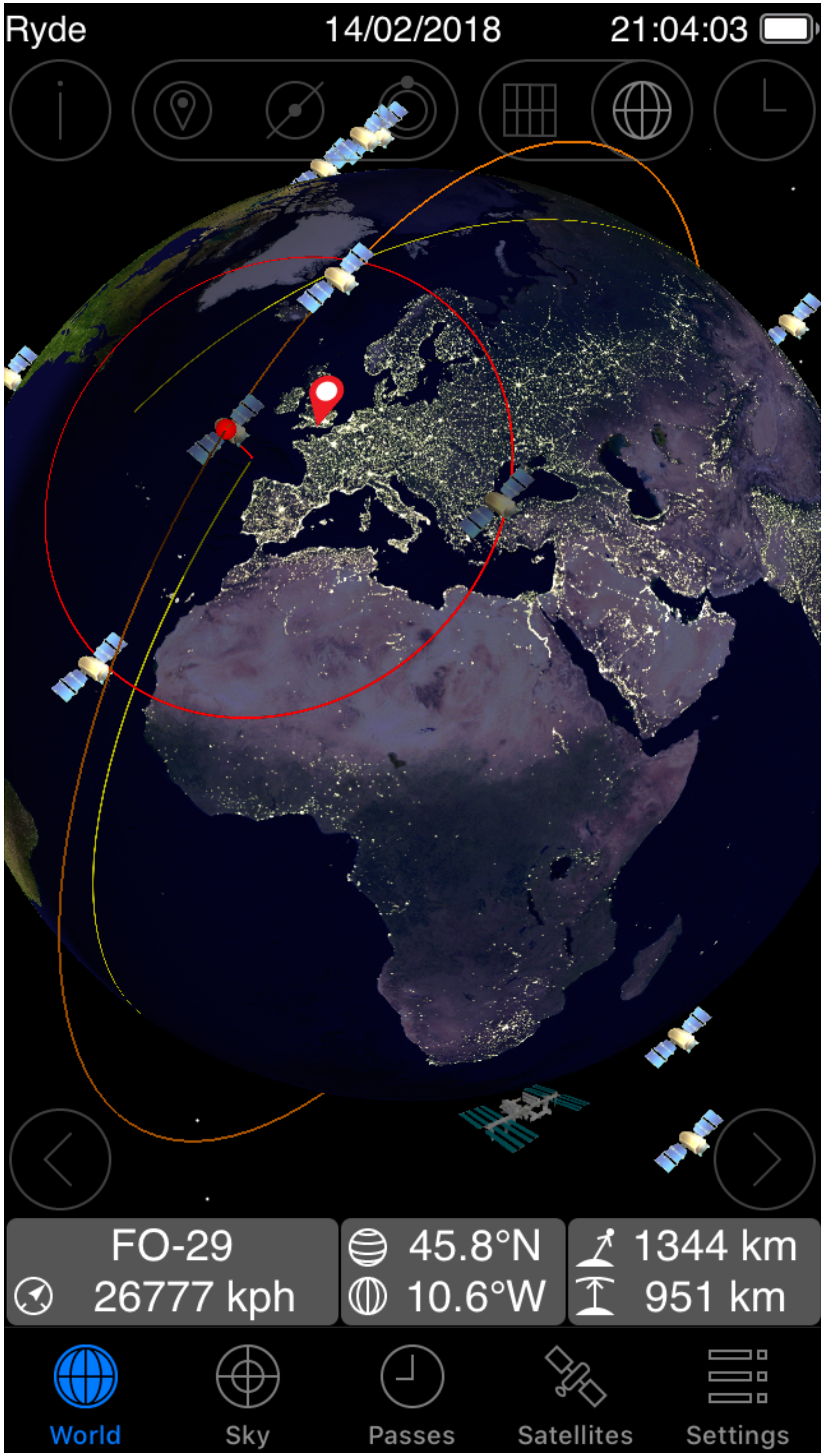
Predict

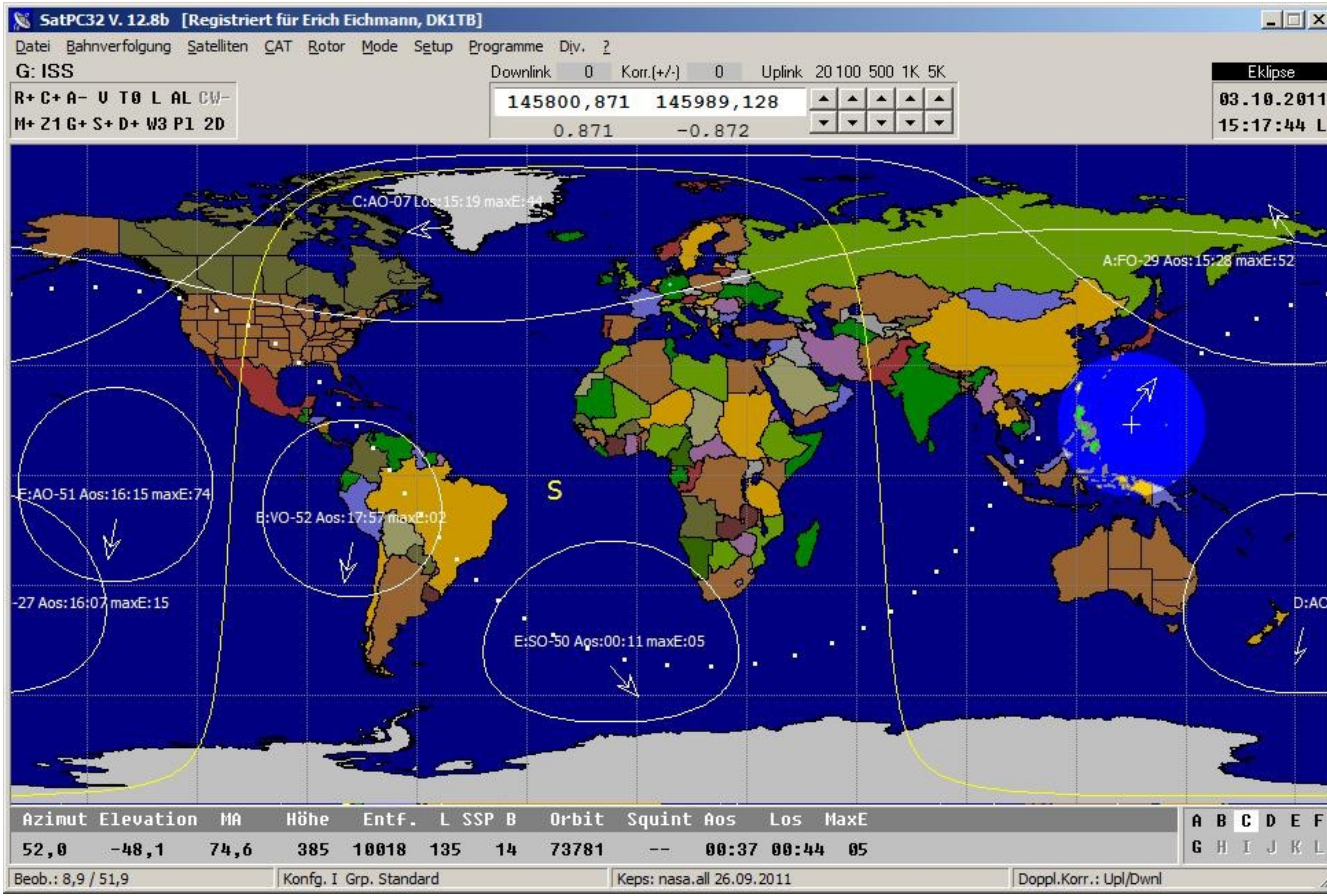
Save my location for later use

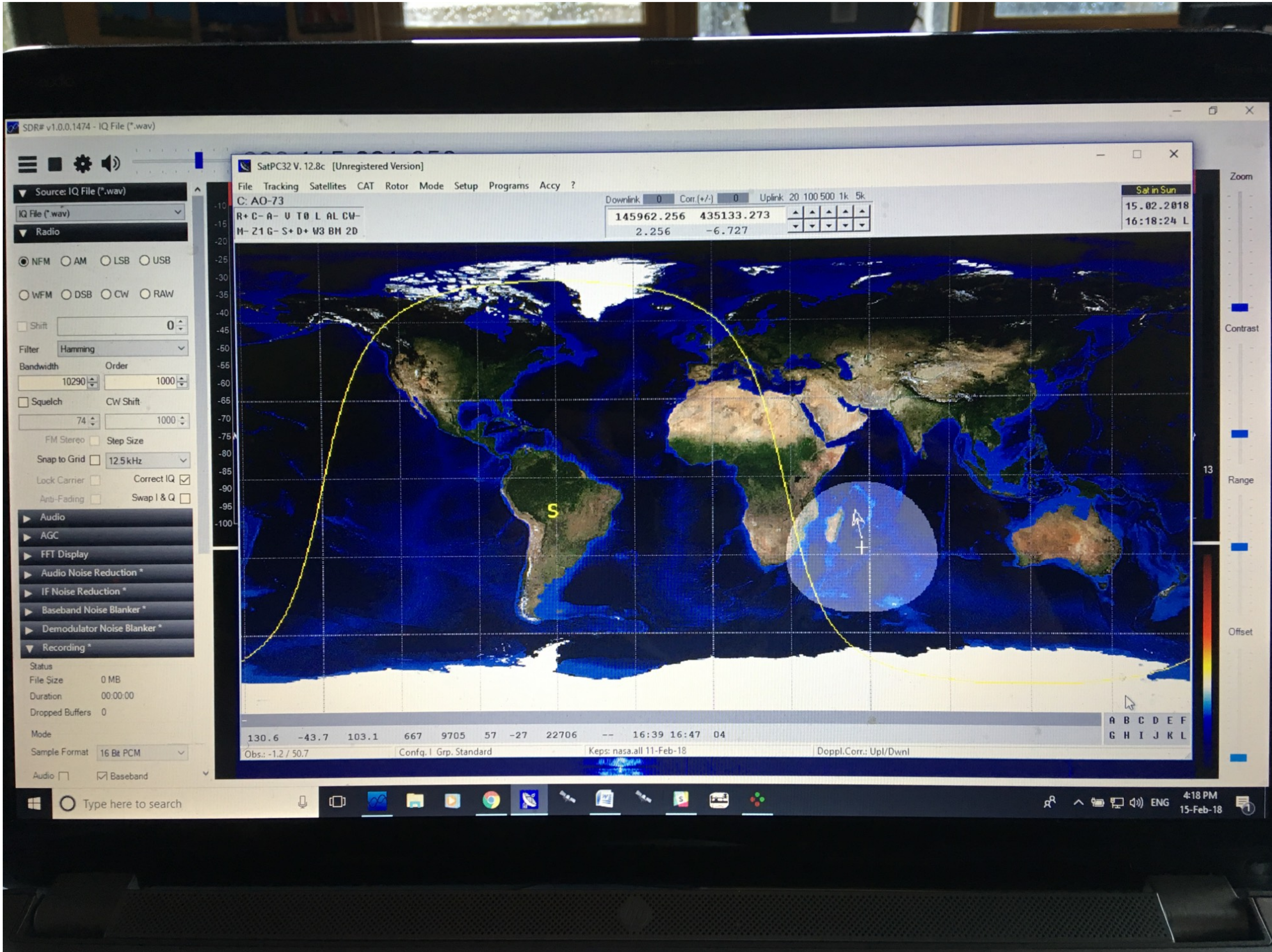
Based on the Predict engine, courtesy of John Magliacane, KD2BD
2018 Feb 14 22:31:33 UTC

GoSatWatch iPhone



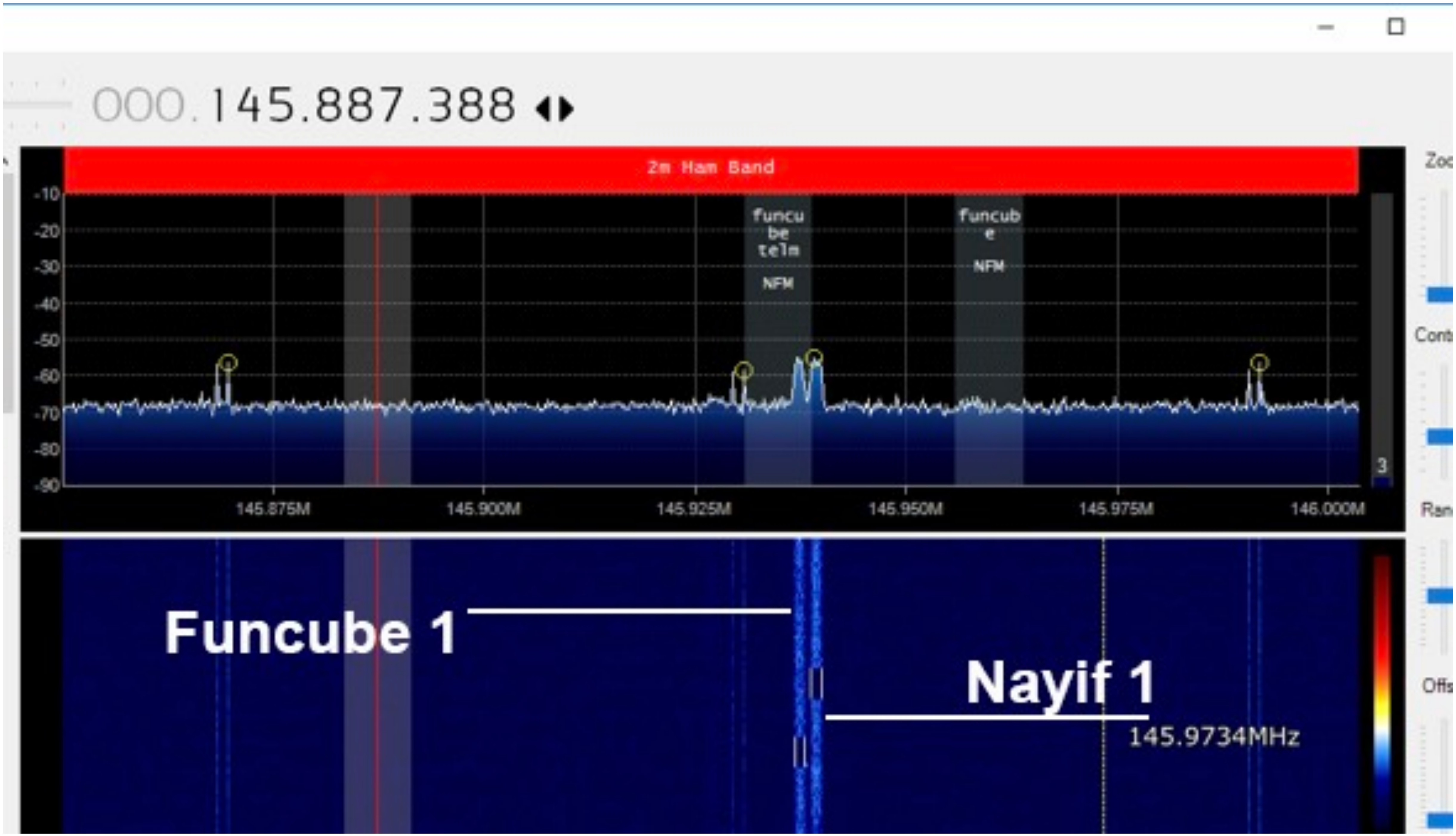


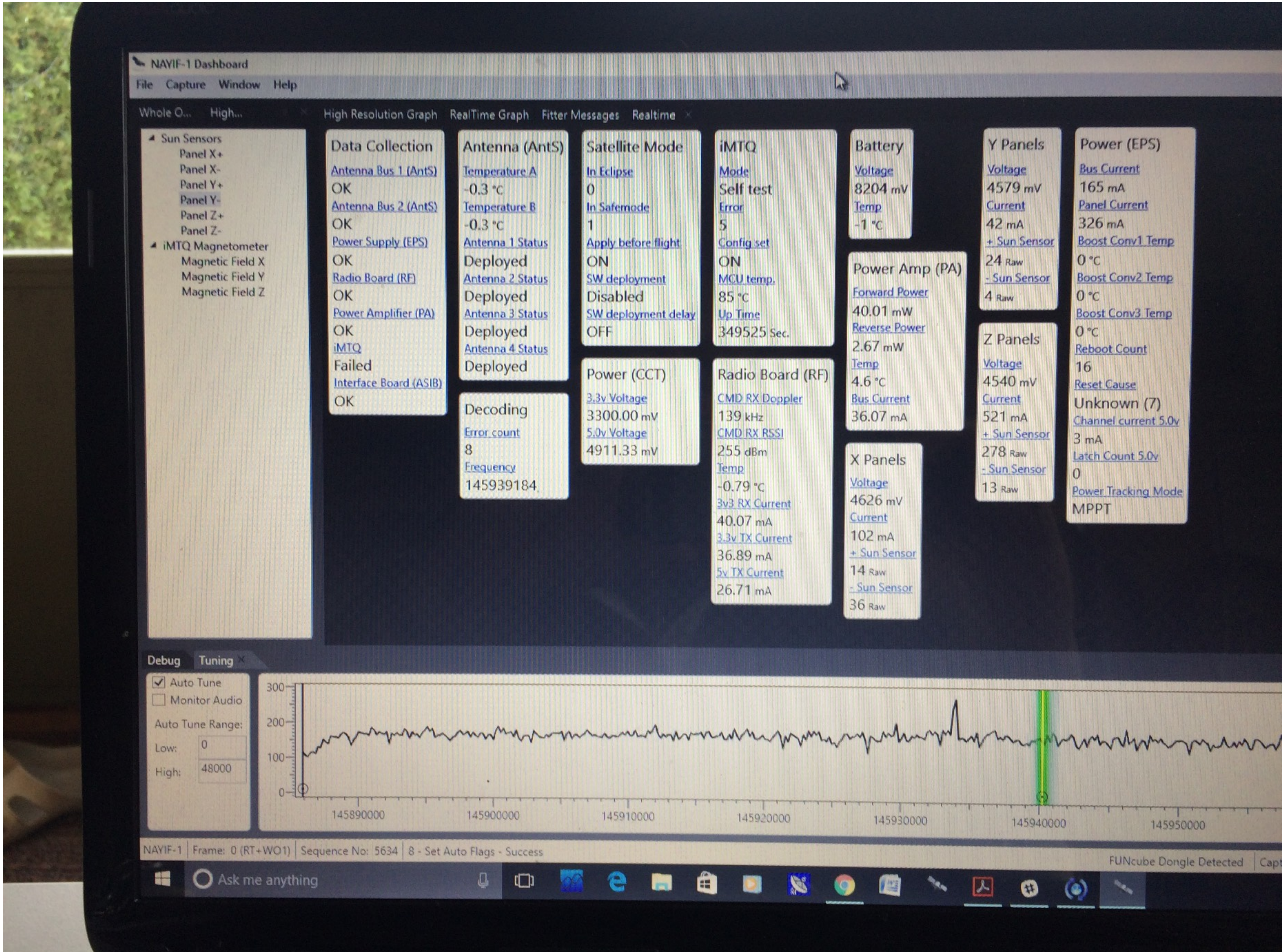

SatPC32 V. 12.8b [Registriert für Erich Eichmann, DK1TB]
Datei Bahnverfolgung Satelliten CAT Rotor Mode Setup Programme Div. ?
G: ISS
R+ C+ A- V T0 L AL CW-
M+ Z1 G+ S+ D+ W3 P1 2D
Downlink 0 Korr.(+/-) 0 Uplink 20 100 500 1K 5K
145800,871 145989,128
0.871 -0.872
Eklipse
03.10.2011
15:17:44 L
C:AO-07 Los:15:19 maxE:44
A:FO-29 Aos:15:28 maxE:52
E:AO-51 Aos:16:15 maxE:74
E:VO-52 Aos:17:57 maxE:02
-27 Aos:16:07 maxE:15
E:SO-50 Aos:00:11 maxE:05
D:AO
S
Azimut Elevation MA Höhe Entf. L SSP B Orbit Squint Aos Los MaxE
52,0 -48,1 74,6 385 10018 135 14 73781 -- 00:37 00:44 05
A B C D E F
G H I J K L
Beob.: 8,9 / 51,9
Konfg. I Grp. Standard
Keps: nasa.all 26.09.2011
Doppl.Korr.: Upl/Dwnl

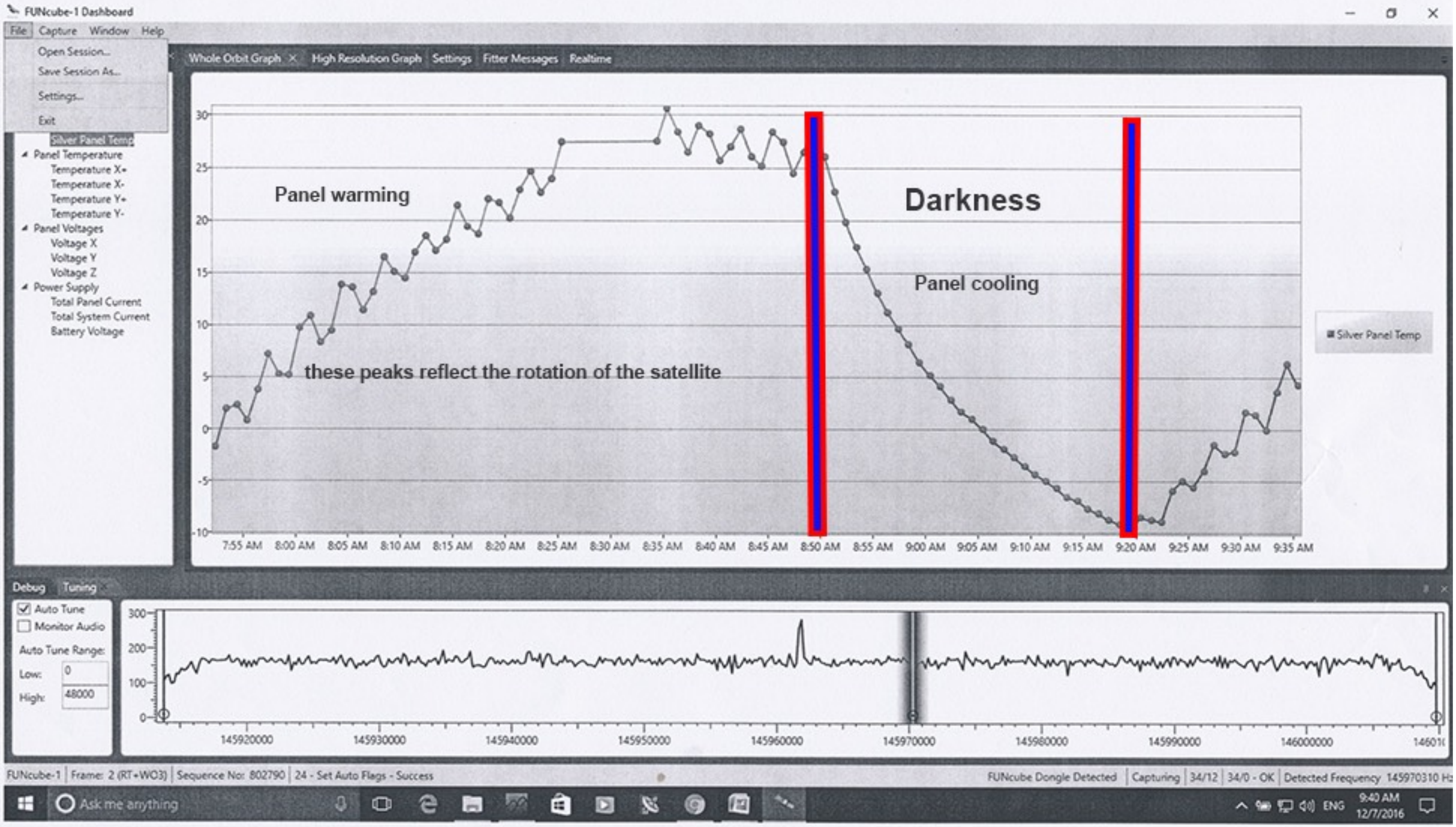

SDR# v1.0.0.1474 - IQ File (*.wav)
Source: IQ File (*.wav)
IQ File (*.wav)
Radio
NFM
AM
LSB
USB
WFM
DSB
CW
RAW
Shift
Filter
Hamming
Bandwidth
Order
10290
1000
Squelch
CW Shift
74
1000
FM Stereo
Step Size
Snap to Grid
12.5 kHz
Lock Carrier
Correct IQ
Anti-Fading
Swap I & Q
Audio
AGC
FFT Display
Audio Noise Reduction *
IF Noise Reduction *
Baseband Noise Blanker *
Demodulator Noise Blanker *
Recording *
Status
File Size
0 MB
Duration
00:00:00
Dropped Buffers
0
Mode
Sample Format
16 Bit PCM
Audio
Baseband
SatPC32 V. 12.8c [Unregistered Version]
File
Tracking
Satellites
CAT
Rotor
Mode
Setup
Programs
Accy
?
C: AO-73
R+ C- A- V T0 L AL CW-
M- Z1 G- S+ D+ W3 BM 2D
Downlink
0
Corr.(+/-)
0
Uplink
20
100
500
1k
5k
145962.256
435133.273
2.256
-6.727
Sat in Sun
15.02.2018
16:18:24 L
S
130.6
-43.7
103.1
667
9705
57
-27
22706
--
16:39
16:47
04
A B C D E F
G H I J K L
Obs.: -1.2 / 50.7
Confg. I Grp. Standard
Keps: nasa.all 11-Feb-18
Doppl.Corr.: Upl/Dwnl
Zoom
Contrast
Range
Offset
13
Type here to search
ENG
4:18 PM
15-Feb-18

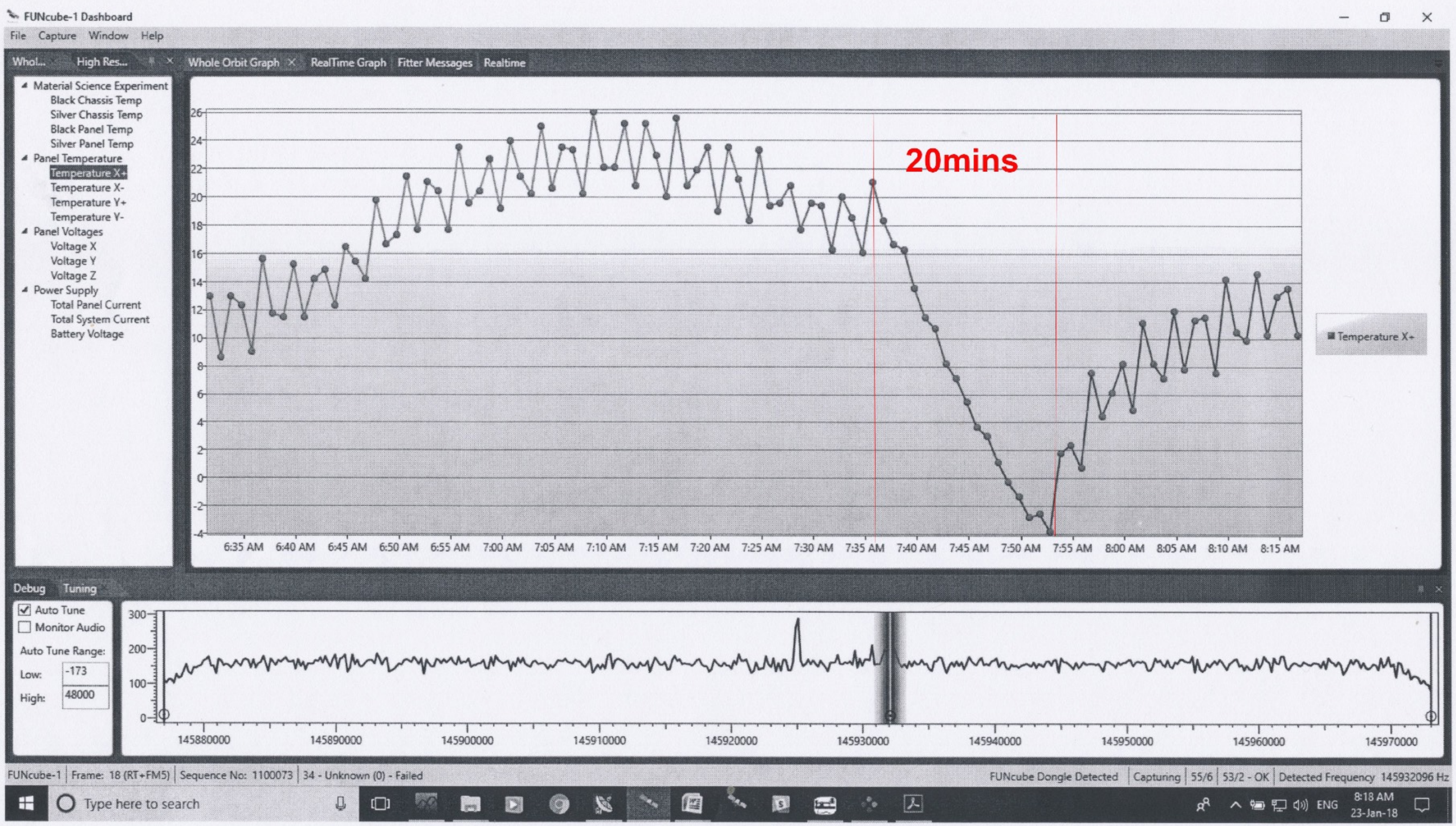
TELEMETRY

Satellite system status
Experiments
Data some cases can be uploaded to a data warehouse for all to use.
Great way of learning about space physics and satellite systems

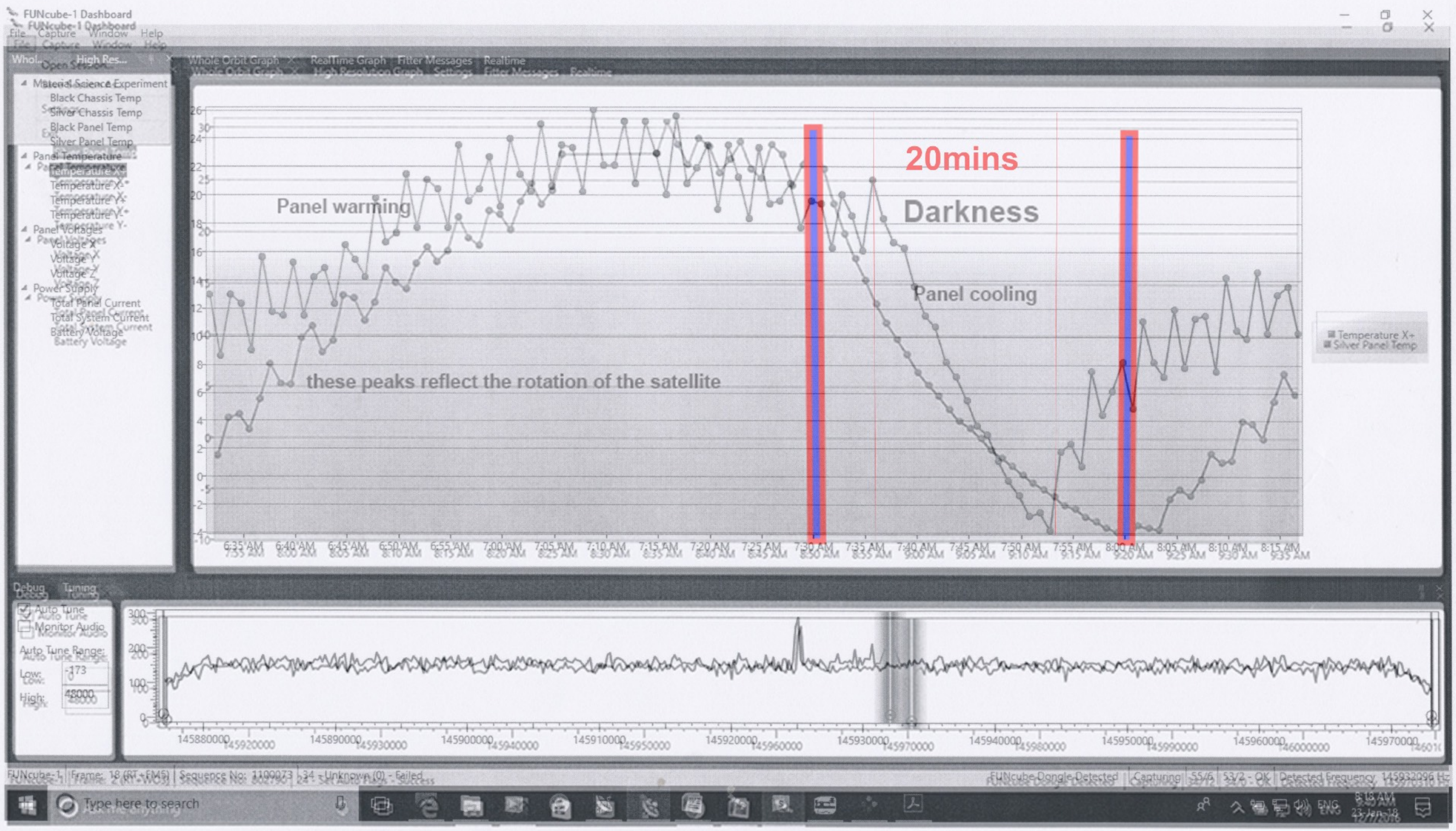

000.145.887.388
2m Ham Band
-10
-20
-30
-40
-50
-60
-70
-80
-90
funcu
be
telm
NFM
funcub
e
NFM
145.875M
145.900M
145.925M
145.950M
145.975M
146.000M
Funcube 1
Nayif 1
145.9734MHz

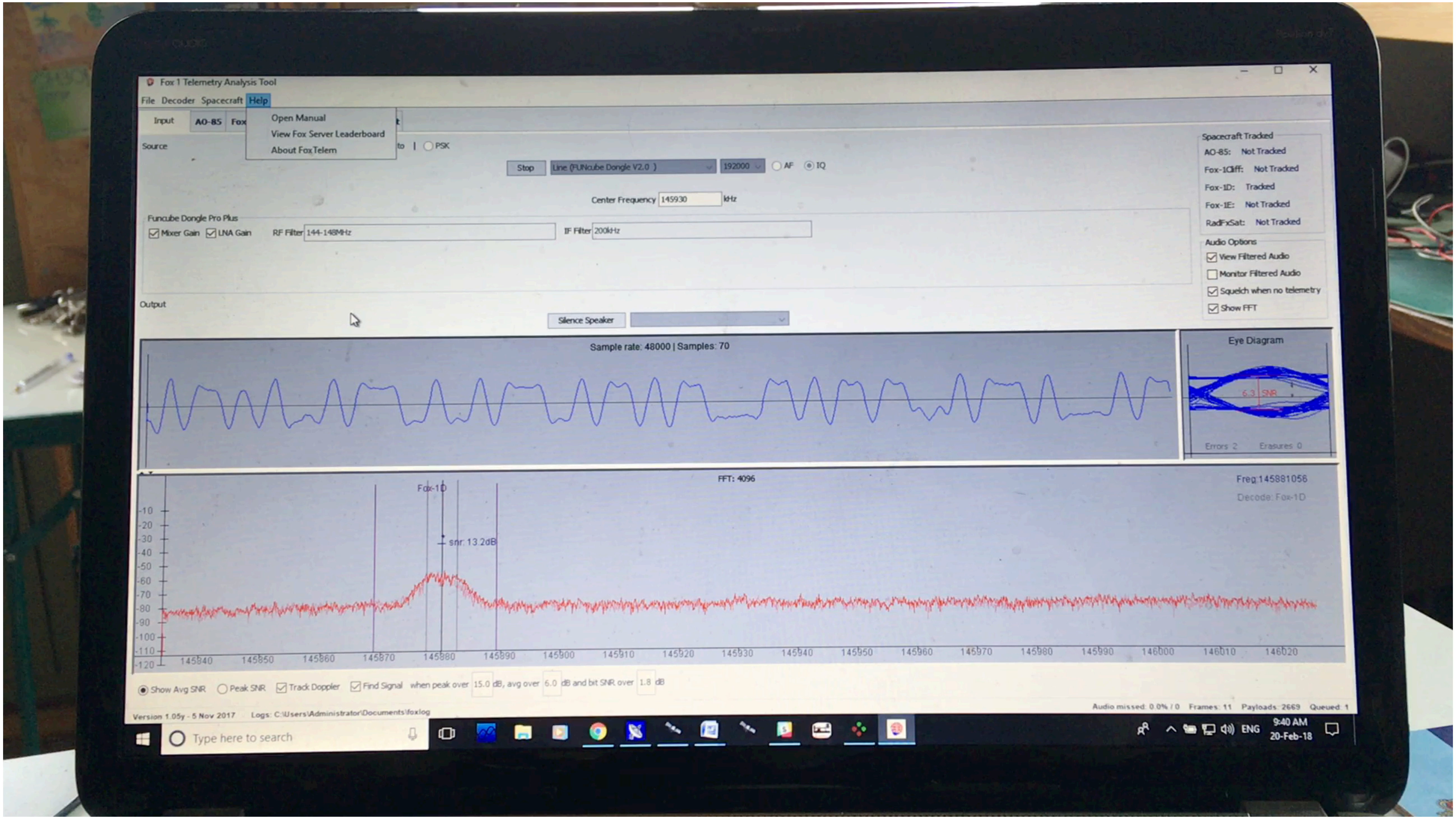

NAYIF-1 Dashboard
File Capture Window Help
Whole O... High...
High Resolution Graph RealTime Graph Fitter Messages Realtime
Sun Sensors
Panel X+
Panel X-
Panel Y+
Panel Y-
Panel Z+
Panel Z-
iMTQ Magnetometer
Magnetic Field X
Magnetic Field Y
Magnetic Field Z
Data Collection
Antenna Bus 1 (AntS)
OK
Antenna Bus 2 (AntS)
OK
Power Supply (EPS)
OK
Radio Board (RF)
OK
Power Amplifier (PA)
OK
iMTQ
Failed
Interface Board (ASIB)
OK
Antenna (AntS)
Temperature A
-0.3 °C
Temperature B
-0.3 °C
Antenna 1 Status
Deployed
Antenna 2 Status
Deployed
Antenna 3 Status
Deployed
Antenna 4 Status
Deployed
Decoding
Error count
8
Frequency
145939184
Satellite Mode
In Eclipse
0
In Safemode
1
Apply before flight
ON
SW deployment
Disabled
SW deployment delay
OFF
Power (CCT)
3.3v Voltage
3300.00 mV
5.0v Voltage
4911.33 mV
iMTQ
Mode
Self test
Error
5
Config set
ON
MCU temp.
85 °C
Up Time
349525 Sec.
Radio Board (RF)
CMD RX Doppler
139 kHz
CMD RX RSSI
255 dBm
Temp
-0.79 °C
3v3 RX Current
40.07 mA
3.3v TX Current
36.89 mA
5v TX Current
26.71 mA
Battery
Voltage
8204 mV
Temp
-1 °C
Power Amp (PA)
Forward Power
40.01 mW
Reverse Power
2.67 mW
Temp
4.6 °C
Bus Current
36.07 mA
X Panels
Voltage
4626 mV
Current
102 mA
+ Sun Sensor
14 Raw
- Sun Sensor
36 Raw
Y Panels
Voltage
4579 mV
Current
42 mA
+ Sun Sensor
24 Raw
- Sun Sensor
4 Raw
Z Panels
Voltage
4540 mV
Current
521 mA
+ Sun Sensor
278 Raw
- Sun Sensor
13 Raw
Power (EPS)
Bus Current
165 mA
Panel Current
326 mA
Boost Conv1 Temp
0 °C
Boost Conv2 Temp
0 °C
Boost Conv3 Temp
0 °C
Reboot Count
16
Reset Cause
Unknown (7)
Channel current 5.0v
3 mA
Latch Count 5.0v
0
Power Tracking Mode
MPPT
Debug Tuning
Auto Tune
Monitor Audio
Auto Tune Range:
Low: 0
High: 48000
300
200
100
0
145890000
145900000
145910000
145920000
145930000
145940000
145950000
NAYIF-1 | Frame: 0 (RT+WO1) | Sequence No: 5634 | 8 - Set Auto Flags - Success
FUNcube Dongle Detected
Ask me anything

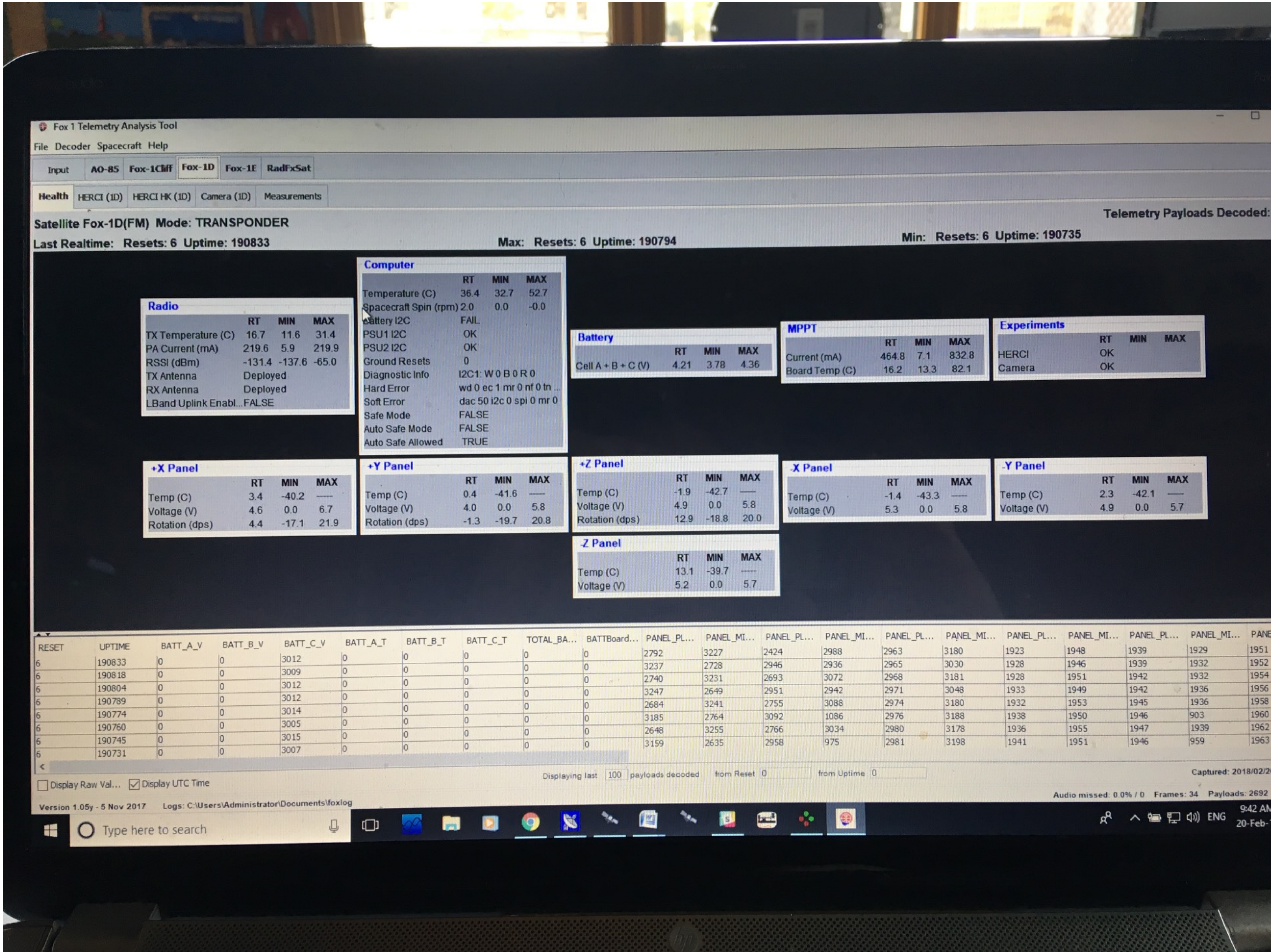

FUNcube-1 Dashboard
File Capture Window Help
Open Session...
Save Session As...
Settings...
Exit
Whole Orbit Graph
High Resolution Graph
Settings
Fitter Messages
Realtime
Silver Panel Temp
Panel Temperature
Temperature X+
Temperature X-
Temperature Y+
Temperature Y-
Panel Voltages
Voltage X
Voltage Y
Voltage Z
Power Supply
Total Panel Current
Total System Current
Battery Voltage
Panel warming
Darkness
Panel cooling
these peaks reflect the rotation of the satellite
Silver Panel Temp
Debug
Tuning
Auto Tune
Monitor Audio
Auto Tune Range:
Low: 0
High: 48000
FUNcube-1 | Frame: 2 (RT+WO3) | Sequence No: 802790 | 24 - Set Auto Flags - Success
FUNcube Dongle Detected | Capturing | 34/12 | 34/0 - OK | Detected Frequency 145970310 Hz
Ask me anything
9:40 AM
12/7/2016



FUNcube-1 Dashboard
File Capture Window Help
Whole Orbit Graph
RealTime Graph
Fitter Messages
Realtime
Material Science Experiment
Black Chassis Temp
Silver Chassis Temp
Black Panel Temp
Silver Panel Temp
Panel Temperature
Temperature X+
Temperature X-
Temperature Y+
Temperature Y-
Panel Voltages
Voltage X
Voltage Y
Voltage Z
Power Supply
Total Panel Current
Total System Current
Battery Voltage
20mins
Temperature X+
6:35 AM 6:40 AM 6:45 AM 6:50 AM 6:55 AM 7:00 AM 7:05 AM 7:10 AM 7:15 AM 7:20 AM 7:25 AM 7:30 AM 7:35 AM 7:40 AM 7:45 AM 7:50 AM 7:55 AM 8:00 AM 8:05 AM 8:10 AM 8:15 AM
Debug Tuning
Auto Tune
Monitor Audio
Auto Tune Range:
Low: -173
High: 48000
145880000 145890000 145900000 145910000 145920000 145930000 145940000 145950000 145960000 145970000
FUNcube-1 | Frame: 18 (RT+FM5) | Sequence No: 1100073 | 34 - Unknown (0) - Failed
FUNcube Dongle Detected | Capturing | 55/6 | 53/2 - OK | Detected Frequency 145932096 Hz
Type here to search
ENG
8:18 AM
23-Jan-18


FUNcube-1 Dashboard
File Capture Window Help
Whole Orbit Graph
RealTime Graph
Filter Messages
Realtime
Material Science Experiment
Black Chassis Temp
Silver Chassis Temp
Black Panel Temp
Silver Panel Temp
Panel Temperature
Temperature X+
Temperature X-
Temperature Y+
Temperature Y-
Panel Voltages
Voltage X
Voltage Y
Voltage Z
Power Supply
Total Panel Current
Total System Current
Battery Voltage
20mins
Darkness
Panel warming
Panel cooling
these peaks reflect the rotation of the satellite
Temperature X+
Silver Panel Temp
Auto Tune
Monitor Audio
Auto Tune Range:
Low:
High:
Type here to search


Fox 1 Telemetry Analysis Tool
File Decoder Spacecraft Help
Open Manual
View Fox Server Leaderboard
About FoxTelem
Input
AO-85
Source
PSK
Stop
Line (FUNcube Dongle V2.0)
192000
AF
IQ
Center Frequency 145930 kHz
Funcube Dongle Pro Plus
Mixer Gain
LNA Gain
RF Filter 144-148MHz
IF Filter 200kHz
Spacecraft Tracked
AO-85: Not Tracked
Fox-1Cliff: Not Tracked
Fox-1D: Tracked
Fox-1E: Not Tracked
RadFxSat: Not Tracked
Audio Options
View Filtered Audio
Monitor Filtered Audio
Squelch when no telemetry
Show FFT
Output
Silence Speaker
Sample rate: 48000 | Samples: 70
Eye Diagram
Errors 2
Erasures 0
FFT: 4096
Freq:145881056
Decode: Fox-1D
Fox-1D
snr: 13.2dB
Show Avg SNR
Peak SNR
Track Doppler
Find Signal
when peak over 15.0 dB, avg over 6.0 dB and bit SNR over 1.8 dB
Version 1.05y - 5 Nov 2017
Logs: C:\Users\Administrator\Documents\foxlog
Audio missed: 0.0% / 0
Frames: 11
Payloads: 2669
Queued: 1
Type here to search
ENG
9:40 AM
20-Feb-18

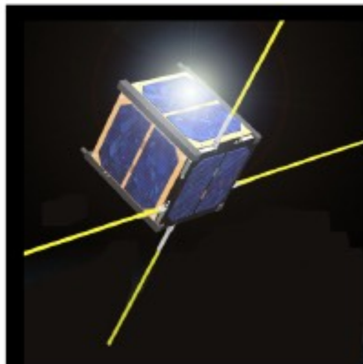

Fox 1 Telemetry Analysis Tool
File Decoder Spacecraft Help
Input AO-85 Fox-1Cliff Fox-1D Fox-1E RadFxSat
Health HERCI (1D) HERCI HK (1D) Camera (1D) Measurements
Satellite Fox-1D(FM) Mode: TRANSPONDER
Telemetry Payloads Decoded:
Last Realtime: Resets: 6 Uptime: 190833
Max: Resets: 6 Uptime: 190794
Min: Resets: 6 Uptime: 190735
Radio
RT MIN MAX
TX Temperature (C) 16.7 11.6 31.4
PA Current (mA) 219.6 5.9 219.9
RSSI (dBm) -131.4 -137.6 -65.0
TX Antenna Deployed
RX Antenna Deployed
LBand Uplink Enabl... FALSE
Computer
RT MIN MAX
Temperature (C) 36.4 32.7 52.7
Spacecraft Spin (rpm) 2.0 0.0 -0.0
Battery I2C FAIL
PSU1 I2C OK
PSU2 I2C OK
Ground Resets 0
Diagnostic Info I2C1: W 0 B 0 R 0
Hard Error wd 0 ec 1 mr 0 nf 0 tn ...
Soft Error dac 50 i2c 0 spi 0 mr 0
Safe Mode FALSE
Auto Safe Mode FALSE
Auto Safe Allowed TRUE
Battery
RT MIN MAX
Cell A + B + C (V) 4.21 3.78 4.36
MPPT
RT MIN MAX
Current (mA) 464.8 7.1 832.8
Board Temp (C) 16.2 13.3 82.1
Experiments
RT MIN MAX
HERCI OK
Camera OK
+X Panel
RT MIN MAX
Temp (C) 3.4 -40.2 -----
Voltage (V) 4.6 0.0 6.7
Rotation (dps) 4.4 -17.1 21.9
+Y Panel
RT MIN MAX
Temp (C) 0.4 -41.6 -----
Voltage (V) 4.0 0.0 5.8
Rotation (dps) -1.3 -19.7 20.8
+Z Panel
RT MIN MAX
Temp (C) -1.9 -42.7 -----
Voltage (V) 4.9 0.0 5.8
Rotation (dps) 12.9 -18.8 20.0
-X Panel
RT MIN MAX
Temp (C) -1.4 -43.3 -----
Voltage (V) 5.3 0.0 5.8
-Y Panel
RT MIN MAX
Temp (C) 2.3 -42.1 -----
Voltage (V) 4.9 0.0 5.7
-Z Panel
RT MIN MAX
Temp (C) 13.1 -39.7 -----
Voltage (V) 5.2 0.0 5.7
RESET UPTIME BATT_A_V BATT_B_V BATT_C_V BATT_A_T BATT_B_T BATT_C_T TOTAL_BA... BATTBoard... PANEL_PL... PANEL_MI... PANEL_PL... PANEL_MI... PANEL_PL... PANEL_MI... PANEL_PL... PANEL_MI... PANEL_PL... PANEL_MI... PANEL_
6 190833 0 0 3012 0 0 0 0 0 2792 3227 2424 2988 2963 3180 1923 1948 1939 1929 1951
6 190818 0 0 3009 0 0 0 0 0 3237 2728 2946 2936 2965 3030 1928 1946 1939 1932 1952
6 190804 0 0 3012 0 0 0 0 0 2740 3231 2693 3072 2968 3181 1928 1951 1942 1932 1954
6 190789 0 0 3012 0 0 0 0 0 3247 2649 2951 2942 2971 3048 1933 1949 1942 1936 1956
6 190774 0 0 3014 0 0 0 0 0 2684 3241 2755 3088 2974 3180 1932 1953 1945 1936 1958
6 190760 0 0 3005 0 0 0 0 0 3185 2764 3092 1086 2976 3188 1938 1950 1946 903 1960
6 190745 0 0 3015 0 0 0 0 0 2648 3255 2766 3034 2980 3178 1936 1955 1947 1939 1962
6 190731 0 0 3007 0 0 0 0 0 3159 2635 2958 975 2981 3198 1941 1951 1946 959 1963
Display Raw Val... Display UTC Time
Displaying last 100 payloads decoded from Reset 0 from Uptime 0
Captured: 2018/02/20 0
Audio missed: 0.0% / 0 Frames: 34 Payloads: 2692
Version 1.05y - 5 Nov 2017 Logs: C:\Users\Administrator\Documents\foxlog
Type here to search
ENG
9:42 AM
20-Feb-18

AMSAT-UK

AMSAT-NL
Radio Amateur Satellites

AMSAT-UK FUNcube Fun in space with Amateur Radio

Dnepr Cluster 2012 ISILAUNCH 03



Certificate of Achievement

It is certified that: **G1HCM**

Successfully received telemetry packets from the FUNcube-1 amateur radio satellite and first uploaded them to the warehouse on the date/time shown below.

Date : **26 Sep 2016**

Time : **20:17:10 UTC**

FUNcube-1 is a single unit educational amateur radio CubeSat satellite

Size: 10x10x10 cm Power: 350mW in sunlight, 35mW in eclipse

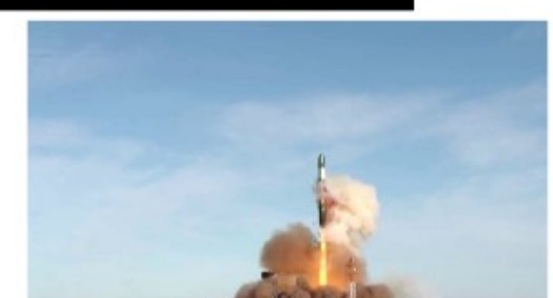
Antennas: dipole for 2m transmitter, dipole for 70cm receiver

QTH: orbiting earth at about 650km altitude

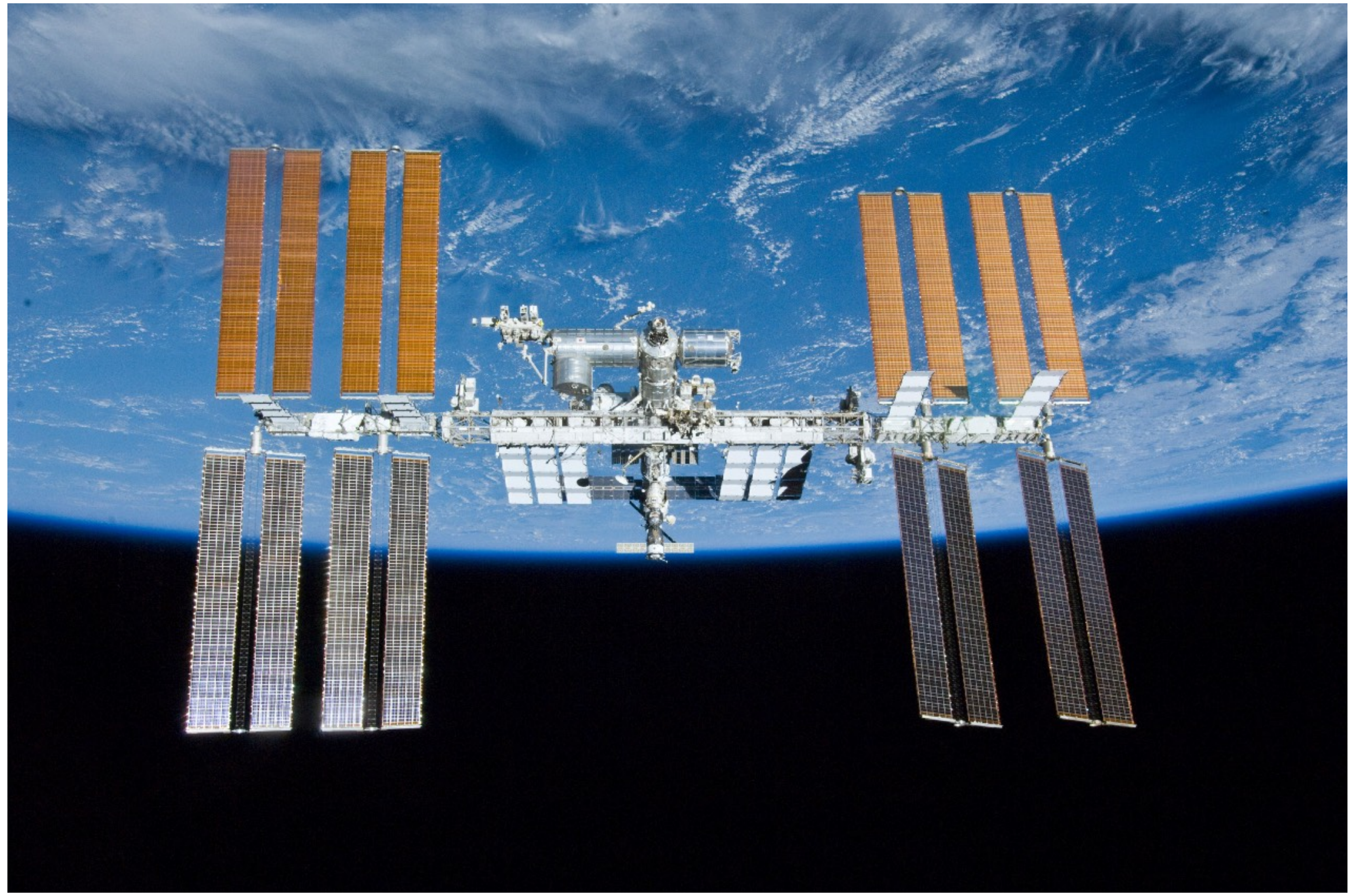
On behalf of the team, 73 de AMSAT

Thank you for supporting the FUNcube Project

funcube.org.uk

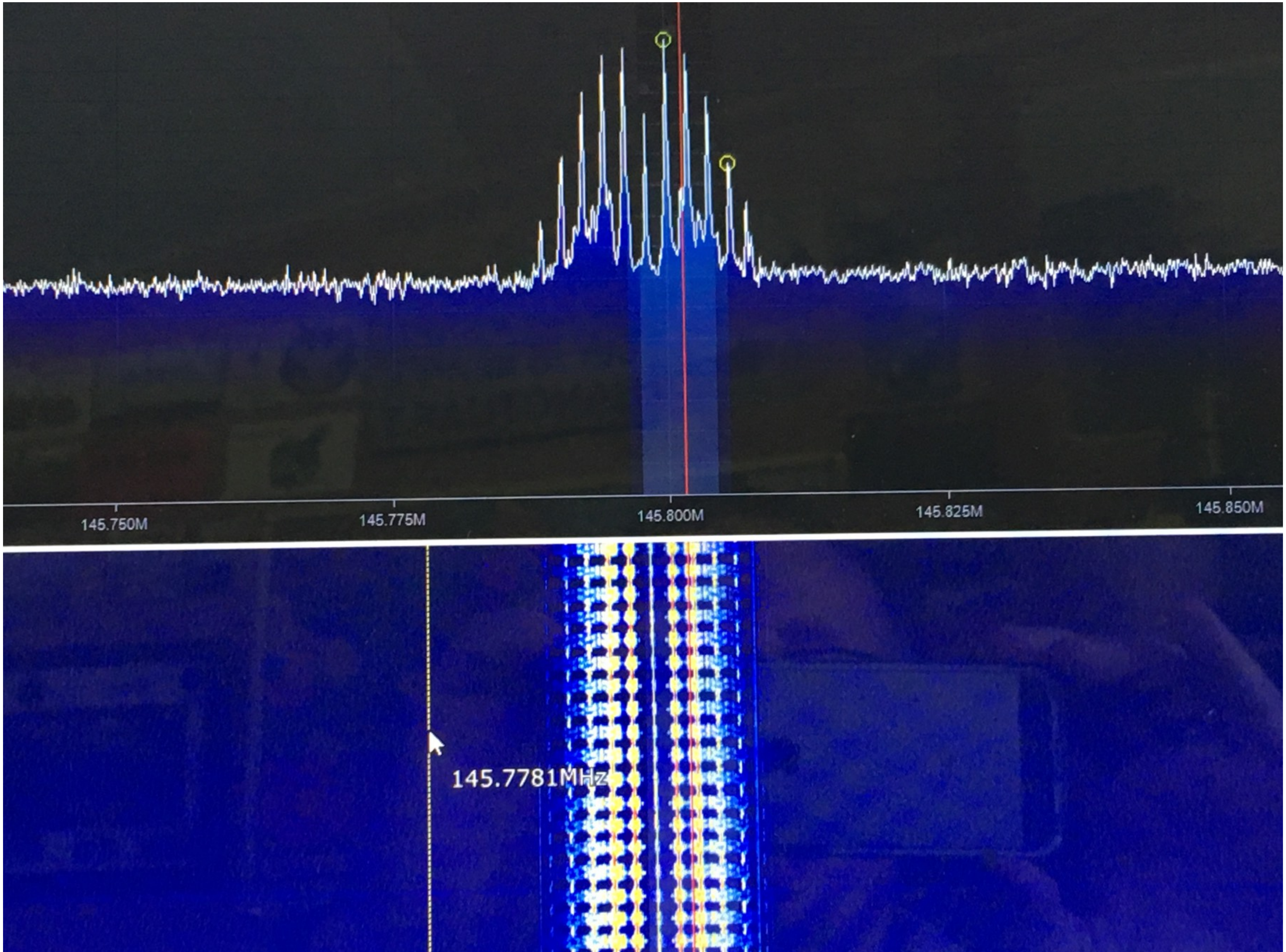


ARISS

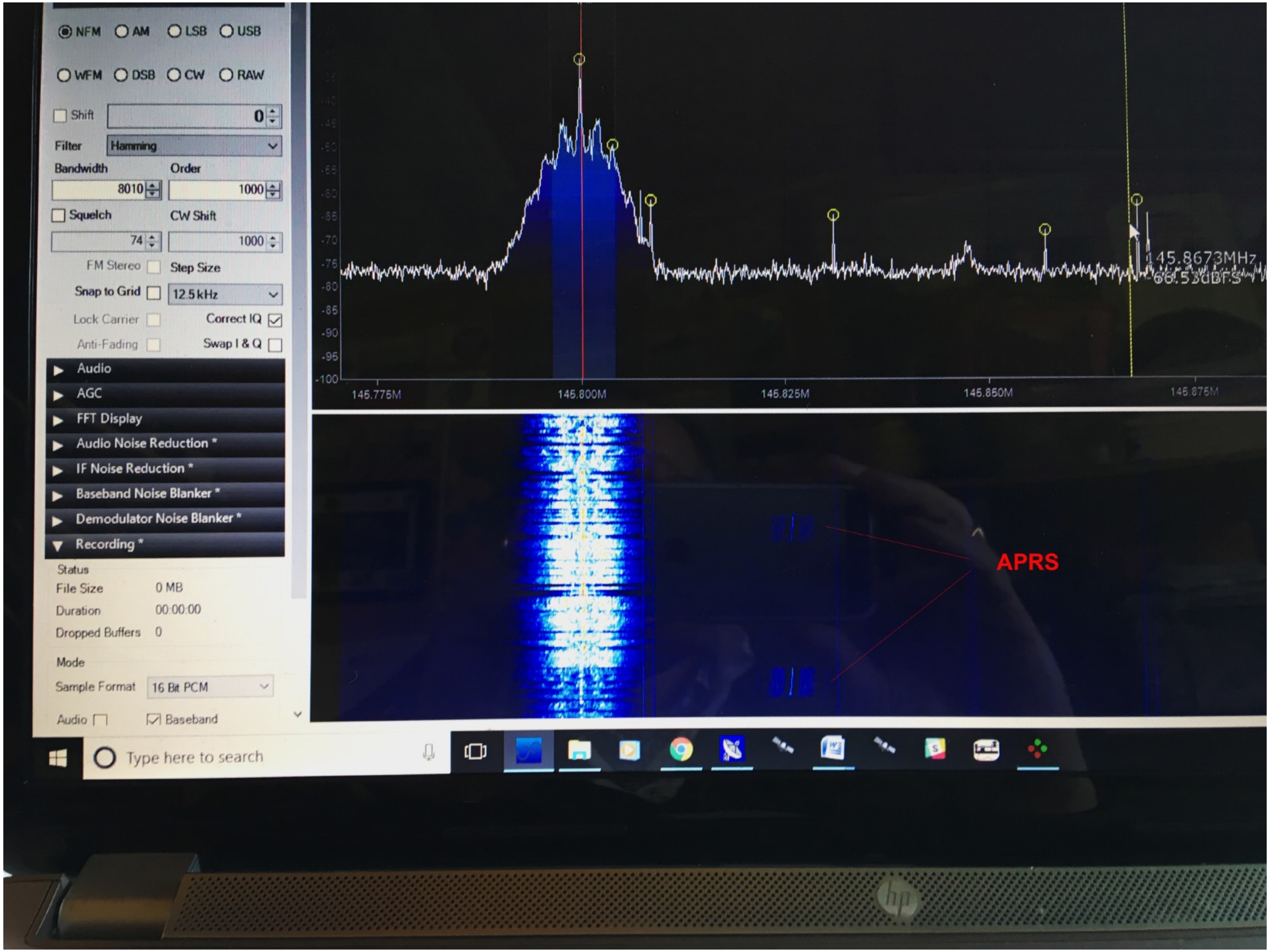


APRS SSTV and Voice Demo

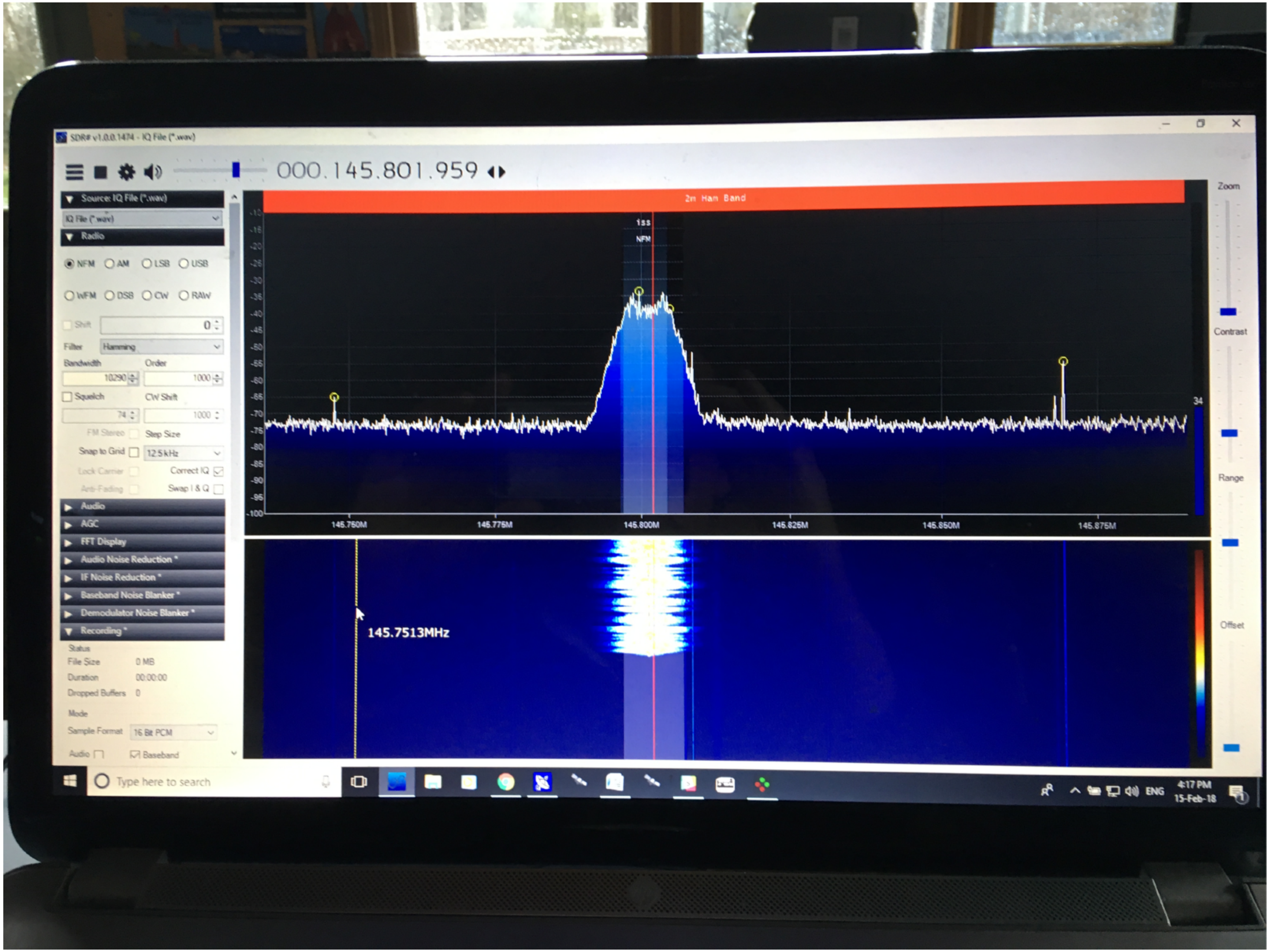
SSTV

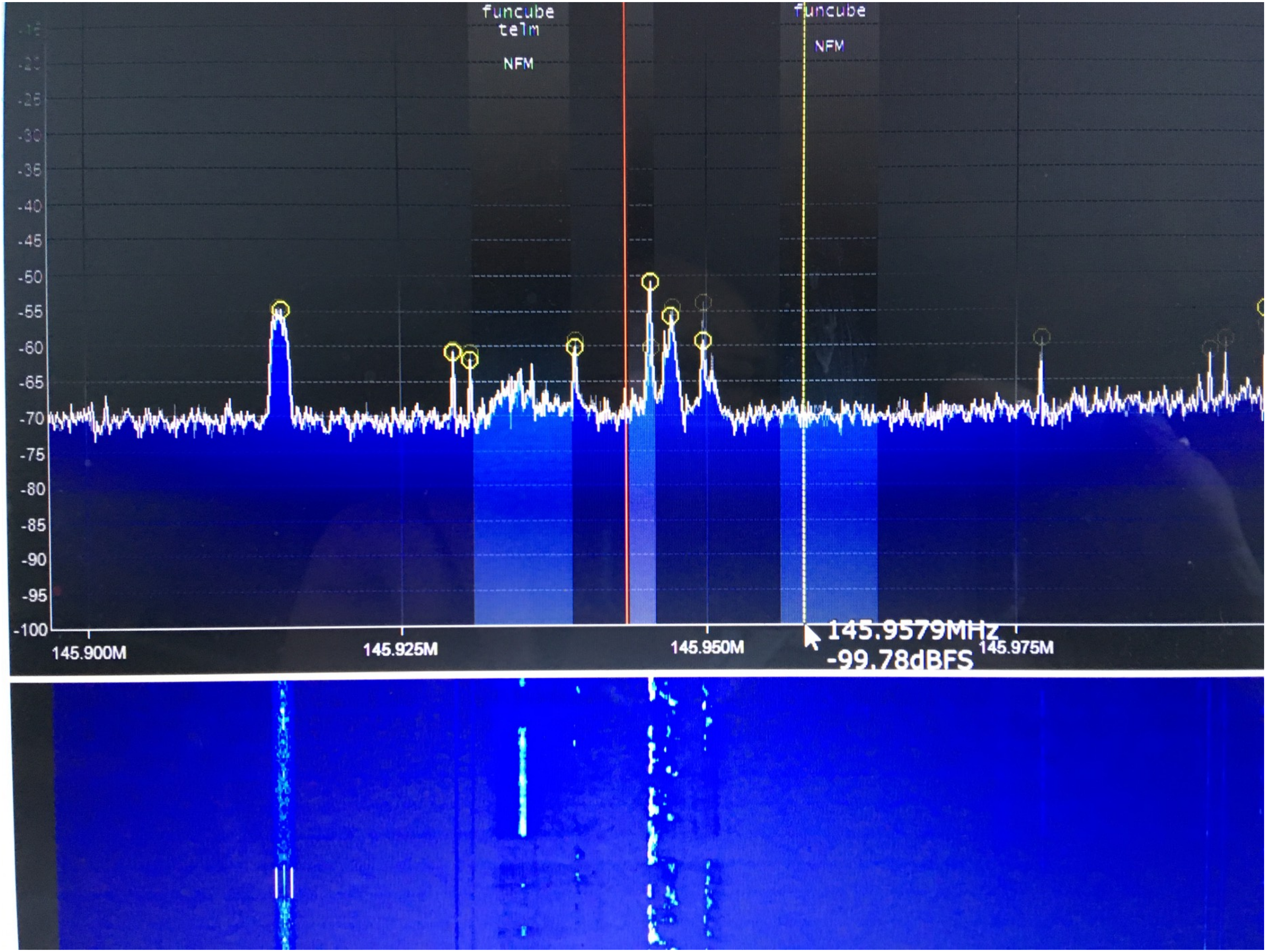


APRS


NFM
AM
LSB
USB
WFM
DSB
CW
RAW
Shift
Filter
Hamming
Bandwidth
Order
8010
1000
Squelch
CW Shift
74
1000
FM Stereo
Step Size
Snap to Grid
12.5 kHz
Lock Carrier
Correct IQ
Anti-Fading
Swap I & Q
Audio
AGC
FFT Display
Audio Noise Reduction *
IF Noise Reduction *
Baseband Noise Blanker *
Demodulator Noise Blanker *
Recording *
Status
File Size
0 MB
Duration
00:00:00
Dropped Buffers
0
Mode
Sample Format
16 Bit PCM
Audio
Baseband
Type here to search
145.775M
145.800M
145.825M
145.850M
145.875M
145.8673MHz
APRS

ISS Voice Signal on SDR





funcube
telm
NFM
funcube
NFM
-50
-55
-60
-65
-70
-75
-80
-85
-90
-95
-100
145.900M
145.925M
145.950M
145.975M
145.9579MHz
-99.78dBFS

My First SSB Satellite QSO

The Future

Es Hail Geostationary Satellite

35,786 km away
Launch around 28 March 2018

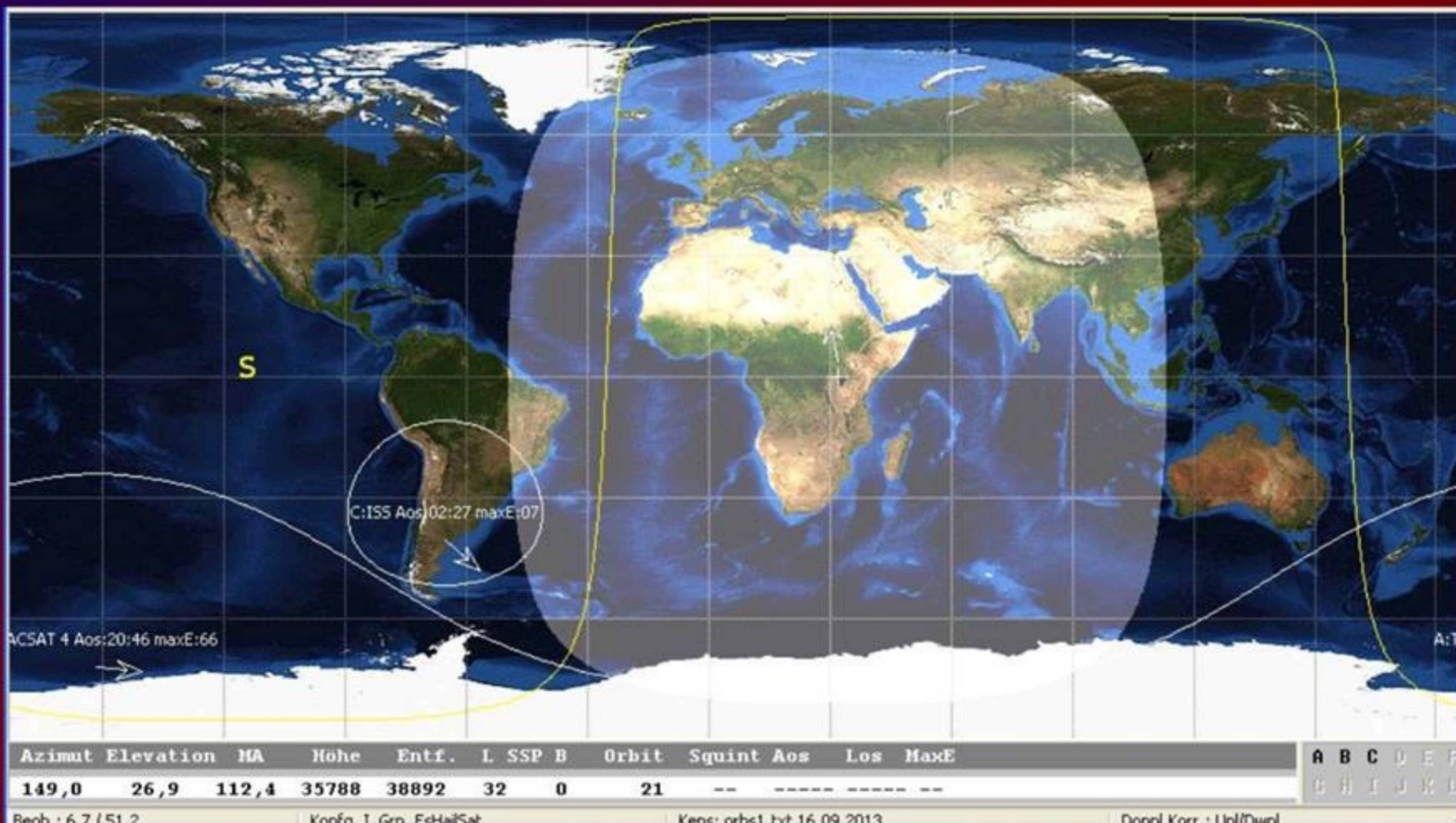
Qatar’s Es’hail 2 satellite will provide the first amateur radio geostationary communications that could link amateurs from Brazil to Thailand. The satellite is expected to launch in 2018 and will be positioned at 25.5 degrees East.

Es’hail 2 will carry two “Phase 4” amateur radio transponders operating in the 2400 MHz and 10450 MHz bands. A 250 kHz bandwidth linear transponder intended for conventional analogue operations and an 8 MHz bandwidth transponder for experimental digital modulation schemes and DVB amateur television

AMSAT-DL

Satellites for Communication and Science
Satelliten für Kommunikation und Wissenschaft

Earth Coverage Es'HailSat-2



Narrowband Linear transponder

2400.050 - 2400.300 MHz
Uplink
10489.550 - 10489.800 MHz
Downlink

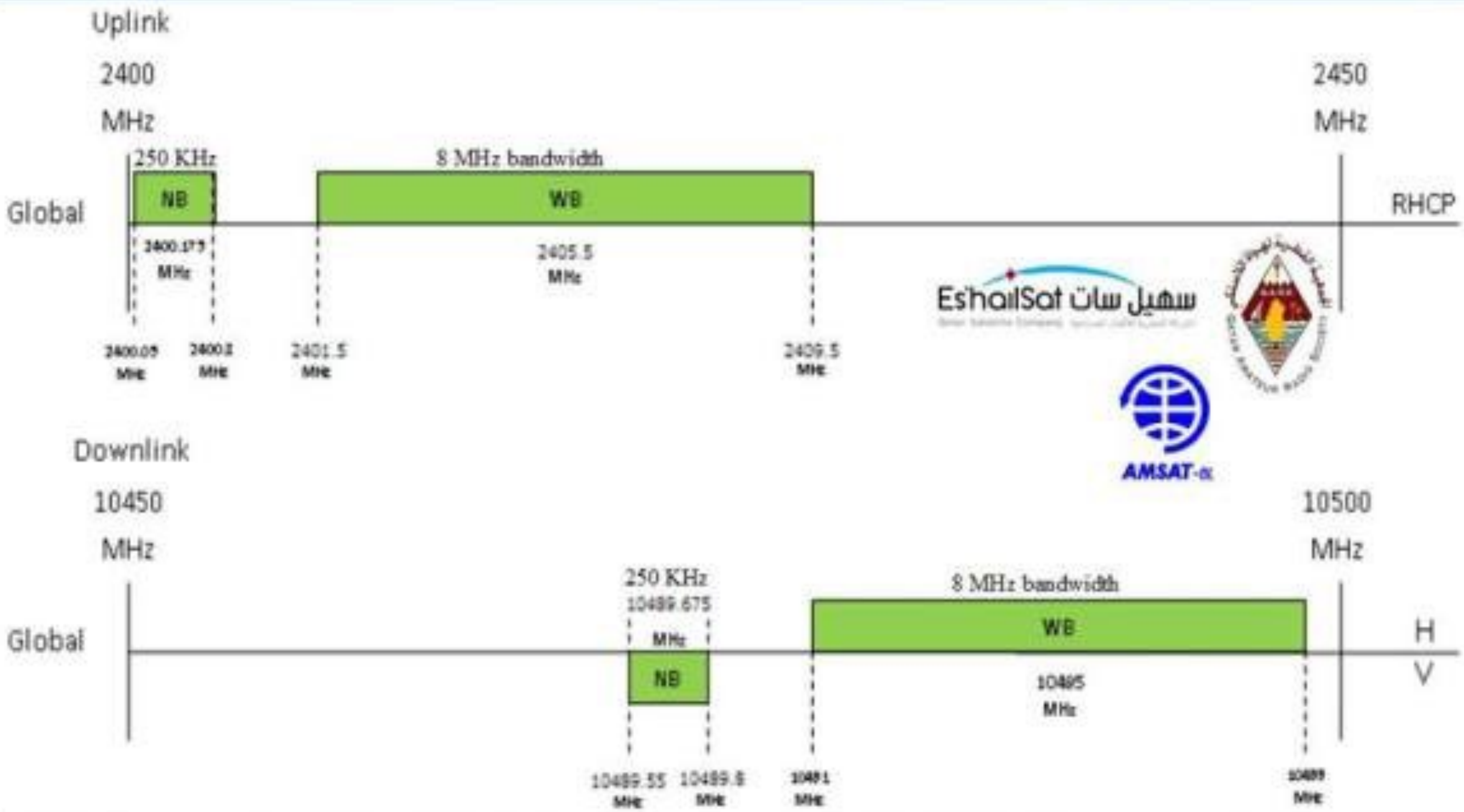
Wideband digital transponder

2401.500 - 2409.500 MHz
Uplink
10491.000 - 10499.000 MHz
Downlink

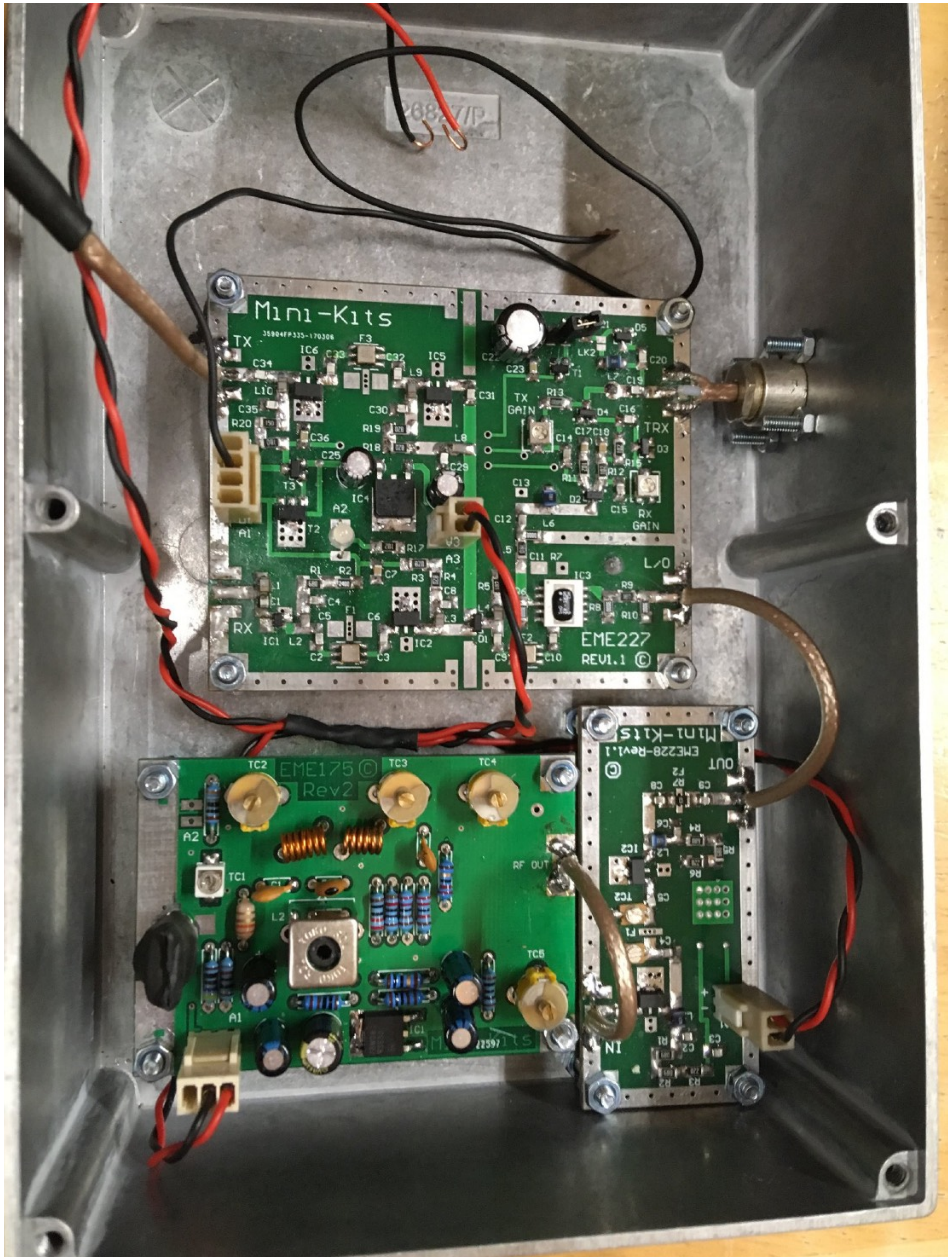
X-Band 10 GHz Downlink:
- 89 cm dishes in rainy areas at EOC like Brazil or Thailand
- 60 cm around coverage peak
- 75 cm dishes at peak -2dB
- NB: linear vertical polarisation
- WB: linear horizontal polarisation

S-Band 2.4 GHz NB-Uplink:
- narrow band modes like SSB, CW
- 5W nominal Uplink power (22.5 dBi antenna gain, 75cm dish)
- RHCP polarisation

S-Band 2.4 GHz WB-Uplink (DATV):
- wide band modes, DVB-S2
- peak EIRP of 53 dBW (2.4m dish and 100W) required
- RHCP polarisation



Xpdr	U/L FREQUENCY (MHz)				D/L FREQUENCY (MHz)				LO	BW
No	Pol	Begin	Center	End	Pol	Begin	Center	End	(MHz)	(MHz)
NB	RHCP	2400.05	2400.175	2400.3	V	10489.55	10489.675	10489.8	8089.5	0.25
WB	RHCP	2401.5	2405.5	2409.5	H	10491	10495	10499	8089.5	8



Paul G4IKI is building a 2.4 GHz Transverter

Uplink
750 Euro

Frequency range (IF)	144 ... 146 MHz
Input power (IF)	0.5 ... 5 W (adjustable)
Frequency range (RF)	2400 ... 2402 MHz
Output power (Psat)	min. 20 W

Downlink

80cm Dish around £30

LNB around £15

Funcube £150

Cables connectors bias tee £40

Further Information

- AMSAT UK Publish Oscar News
- AMSAT NA Predictions etc
- The ARRL satellite Handbook Steve Ford WB8IMY
- Satellite Experimenter's Handbook Martin Davidoff ARRL
- Hamsat Amateur Radio Satellites Explained Pierlugi Poggi IW4BLG

- This presentation will be made available online

ARE YOU UP FOR THE CHALLENGE?

Who will take this Arrow Antenna on loan and work a satellite.

IOWRS has satellite capability, but its needs some TLC from members keen to learn something new.