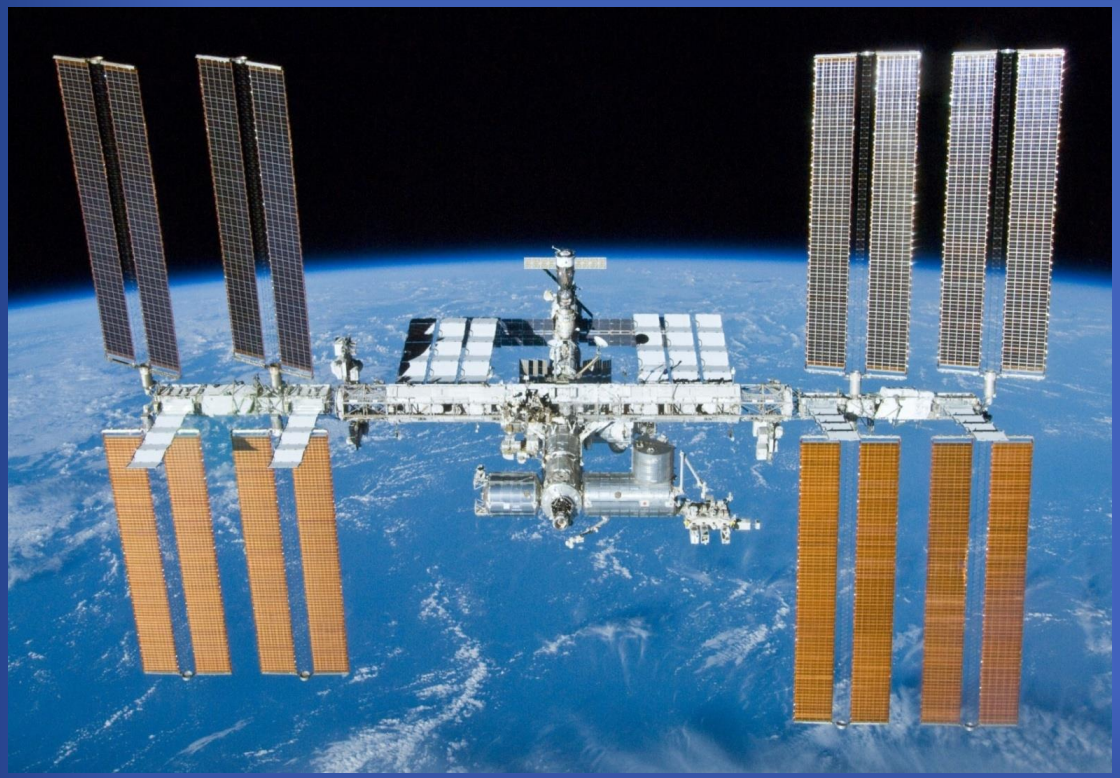
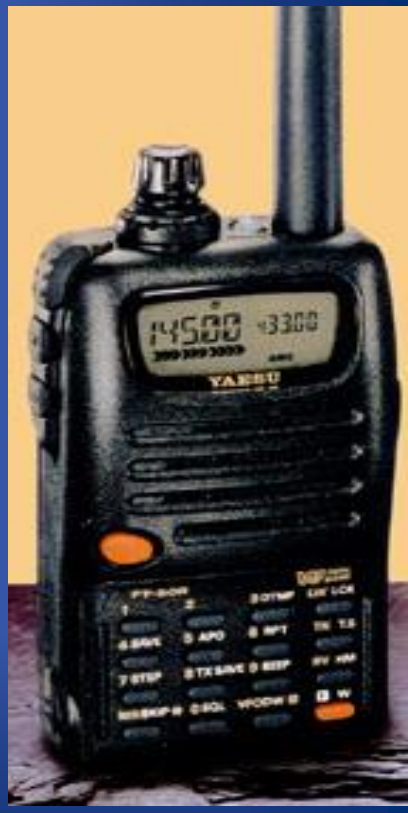
Welcome to the ISS

Talk, maybe, with an astronaut & other amateur radio operators





Peter Portanova- W2JV- Amsat Ambassador

W2JV@ARRL.NET

Astronauts Don Pettit and Suni Williams

My Start

WN2OQQ-1963

Field Day 2008 RCARC & Owls

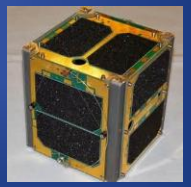
I would like to know

Owns an HT?

Field Day

Has an Amateur Radio License

Made a Contact Thru a Satellite

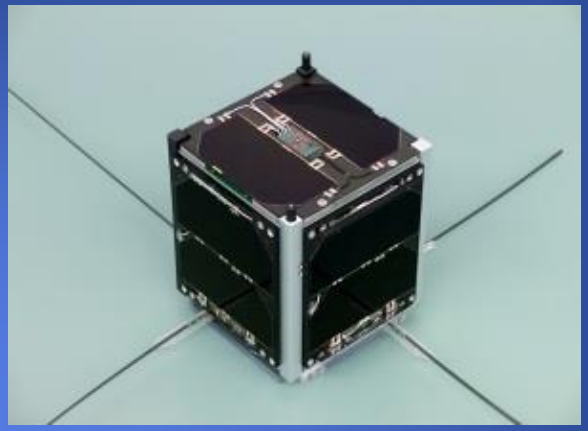


FIELD DAY GSBARC 2023

NSPIRE SOMEONE- WE NEED MORE STEM STUDENTS

ELLIE RECEIVED HER LICENCE- 9-2024!!

AO-73- STEM



Spread The Word- About our Hobby

Amateur Radio Satellites in the Classroom

Amateur radio satellites are school experiments

STEM Outreach- Amateur Radio Satellites and the ARISS program

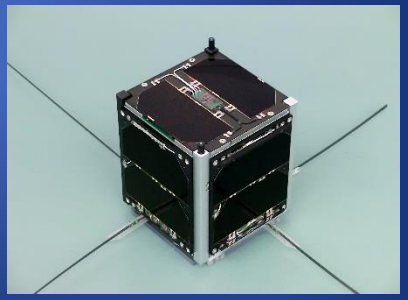
AMSAT develops partnerships with academic institutions

FUNcube Satellite –launched in 2013

Satellite contains a materials science experiment

Students receive telemetry data

Compare to classroom results



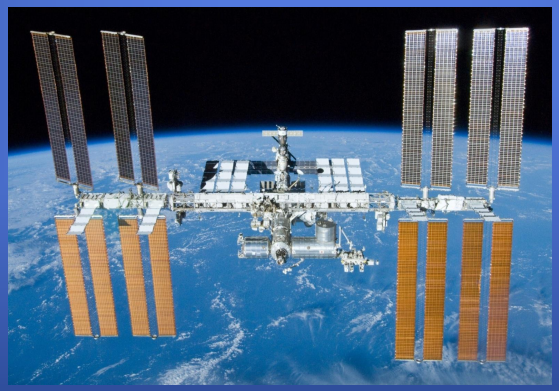
CAPTAIN VIDEO- Are You Ready to Blast Off

Satellite History

11 lbs

Oscar-1 1961

ISS-1998



925,000 lbs

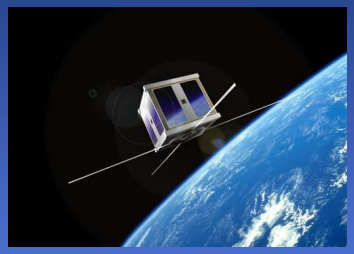
AO-73- 2013

2.93lbs

Oscar -7- 1974

62lbs

What Are we Going to Learn?



How to Program our Radios to Hear/transmit to the ISS

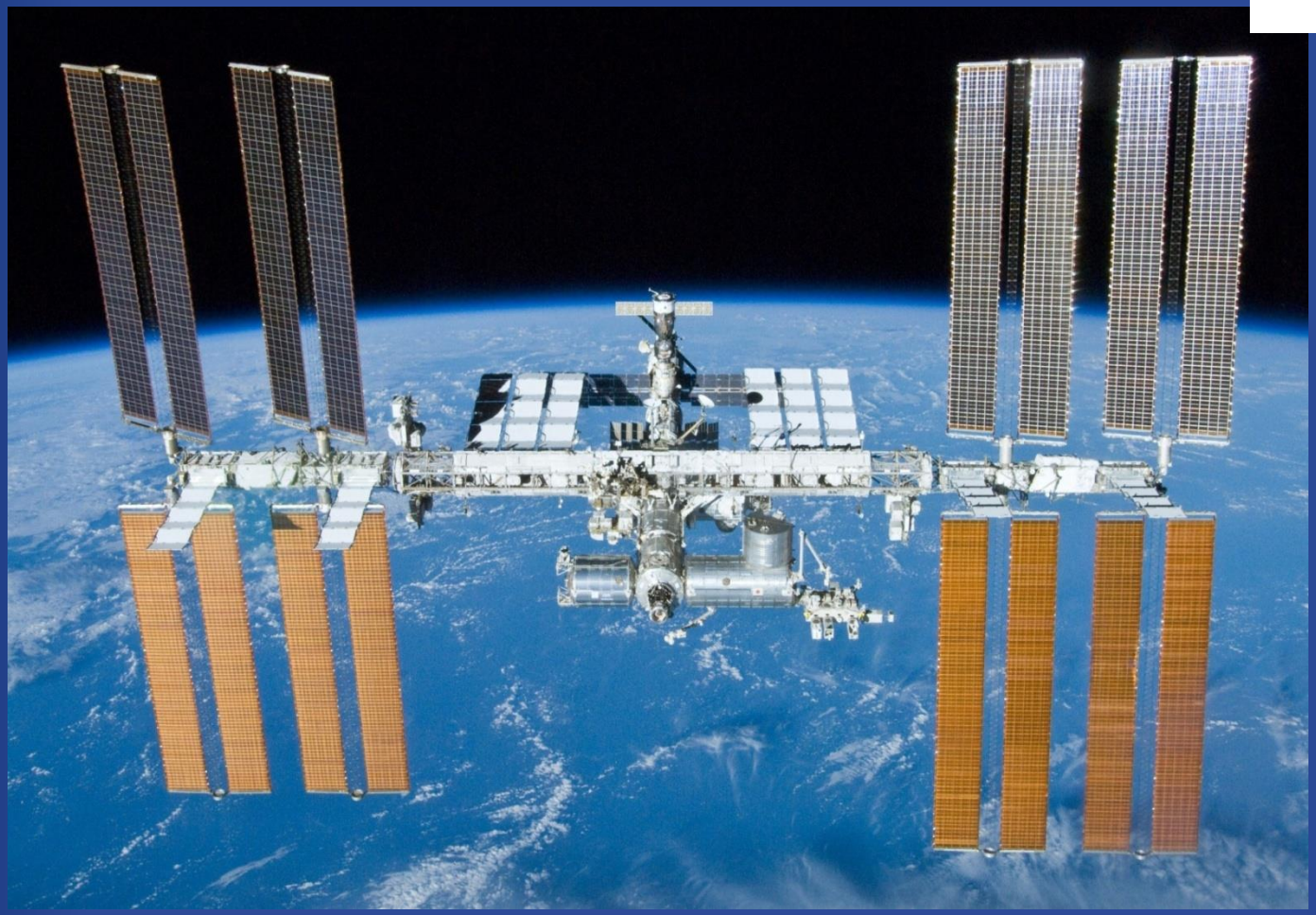
How to know When a Satellite is in our Footprint

How to Track a Satellite thru its Orbit

Using Software to do all the Math

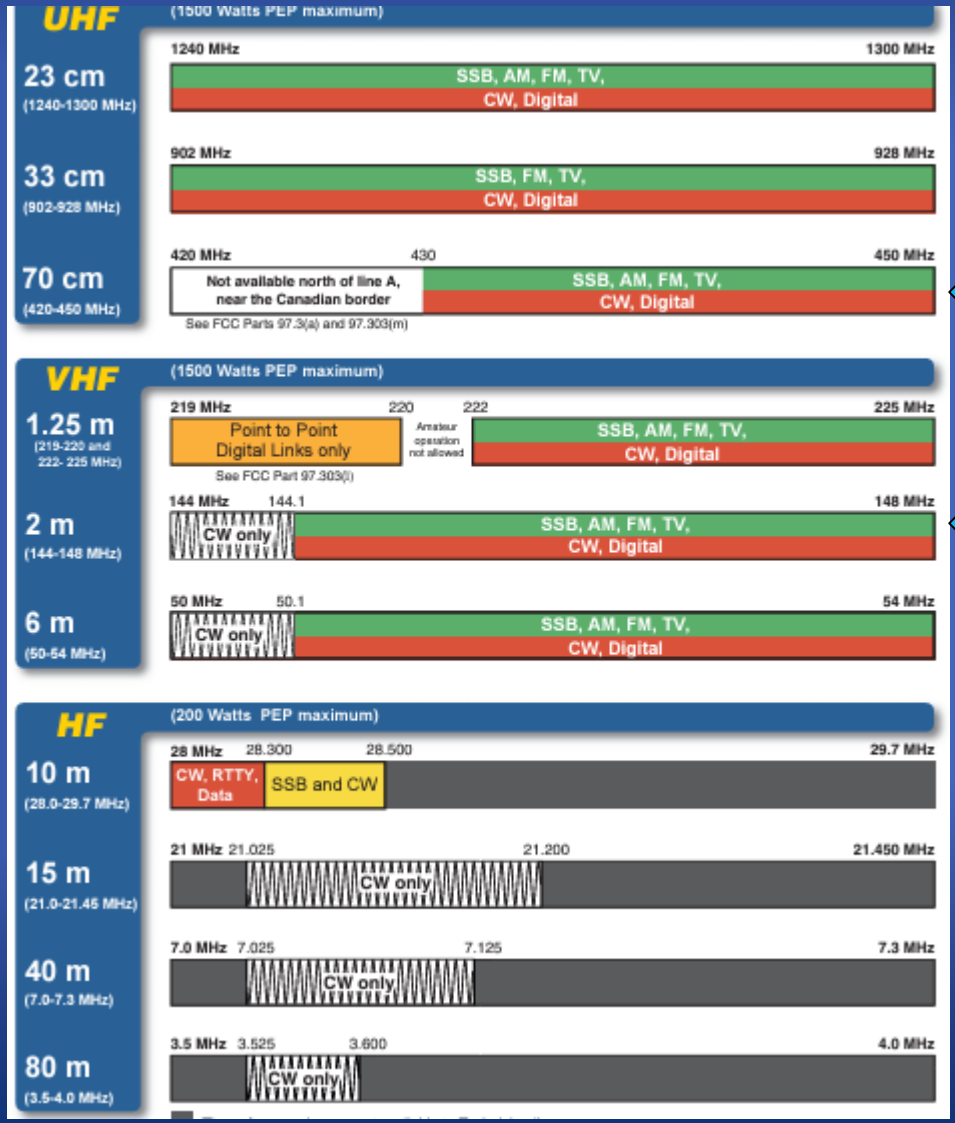
Satellite Terms

ISS Largest Satellite in Space



https://www.ariss.org/current-status-of-iss-stations.html

Technician Privileges



What Is An Amateur Satellite?

Orbiting Satellite Carrying Amateur Radio

Project OSCAR formed 1959

Oscar 1 launched 1961- 4 years after Sputnik

AMSAT formed -1969

Lance Ginner-K6GSJ
Bringing Oscar 1 to Vandenberg AFB

What is An Amateur Radio Satellite

Flying Repeater

FM Repeater Satellite

Single-channel; only one person can talk at a time-
145.990 uplink- 436.800 down- ISS- w/Doppler correction
Acts like a local repeater- difference it has an uplink/downlink
Operate using a dual band FM Radio- Two preferred- hear yourself

Linear Satellite Transponder

100 KHz Wide Passband- with a mixer stage
Capable of SSB/CW/Digital Operations
Operate using an all mode radio

What's up there?

AO-7- SSB/CW

AO-73-SSB/Telemetry

AO-123- FM

ISS-FM/SSTV/1/5-DIGI

JO-97-SSB/CW

RS-44-SSB/CW

SO-50-FM- 22nd anniversary

AO-91-FM

MO-122-SSB/CW

PO-101-FM

Sonate-2-APRS Digi

ARISS

Amateur Radio on the International Space Station

AMSAT® AMATEUR RADIO IN SPACE

- ARISS was created to:

- Design, build, and operate amateur radio equipment in space for educational purposes
- Provide a contingency communications network for the ISS
- Allow astronauts to educate students
- Inspire interest in STEM subjects and careers
- Provide educational opportunities for students, teachers, and the public

ARISS

Amateur Radio on the International Space Station

School Contacts

SSTV

Current Status of ISS Stations

•*as of December 29, 2021*

Columbus Module radio's: IORS (Kenwood D710GA) – STATUS - Configured. Current mode set to packet operation (145.825 MHz up & down). Next mode change to support cross band repeater (145.990 MHz up {PL 67} & 437.800 MHz down) targeting Jan 4

ISS CBR

145.990-UP W/67.0TONE-
437.800 DOWN

ISS Digipeater

https://www.ariss.org/current-status-of-iss-stations.html

Amateur Radio on the ISS

Cross-band FM repeater (145.990 MHz- uplink w/67.0 tone- 437.800-downlink
-Packet normally active on 145.825MHz
-School contacts & SSTV on 145.800MHz FM

-Crews have active as NA1SS in the last couple of years
-Kjell Lindgren (KO5MOS) summer of 2022
-Warren "Woody" Hoburg (KB3HTZ) summer of 2023
-Loral O'Hara (KI5TOM) fall of 2023

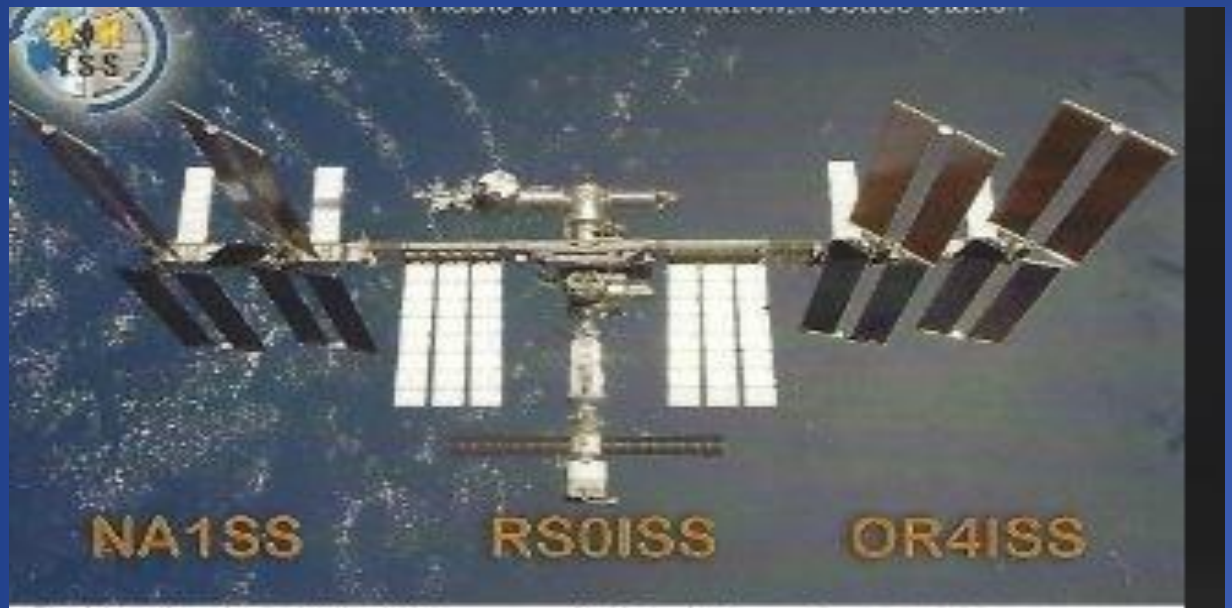
Current amateur radio operators on the ISS

-Nick Hague: Call sign KG5TMV
-Zena Cardman: Call sign KJ5CMN
-Stephanie Wilson: Call sign KD5DZE

-

The ISS crew's work schedules determine when they can use the radios. They usually wake up between 0730 and 1930 UTC, and are most likely to make casual contacts about an hour after waking and before sleeping.
Since 2022 the crews are using the cross band repeater for random QSO's

ISS QSL Card



The International Space Station (ISS) is sponsored by Canada, Japan, Russia, the USA and many nations in Europe. ISS crews hail from these and other nations. Major hardware elements are:

- Zarya , Zvezda, Pirs, research modules Poisk and MRM-1 Rassvet built by Russia
- Science lab Destiny, Unity, Quest, Harmony and Tranquility modules provided by the US
- Canadian Mobile Servicing System, a 55-foot mobile robotic arm used for assembly and maintenance
- Columbus module, a science laboratory provided by ESA
- Kibo module, a science laboratory provided by Japan.
- CREW - LINDGREN - COSMOS

ISS crews and visitors often use their Amateur Radio station, first set up in Zarya and then Zvezda, to talk with school students to aid in their education, plus chat with fellow radio amateurs around the world. The ARISS Team continually works to extend ISS Amateur Radio station capability with new operation modes and, more recently, equipment placement in the Columbus module.

To: W2JV

From	Day	Month	Year	UTC	MHz
☑ NA1SS ☐ RS0ISS ☐ OR4ISS	5	8	2022	2330	24/Low

Mode: ☑ Voice ☐ Packet ☐ SSTV ☐ APRS ☑ Repeater ☐ SWL

Mode: - THANKS FOR PARTICIPATING. -73-

What is needed to get started with the FM satellites?

Technician license
Transmit to


UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
AMATEUR RADIO LICENSE

KB3IFH

DORMAN, RANDY J
4522 FOXTAIL RD
HAMPSTEAD, MD 21074

FCC Registration Number (FRN): 0007081581

Special Conditions / Endorsements
NONE

Grant Date	Effective Date	Print Date	Expiration Date
06-12-2002	04-17-2003	04-18-2003	06-12-2012

File Number	Operator Privileges	Station Privileges
001279265	Amateur Extra	PRIMARY

THIS LICENSE IS NOT TRANSFERABLE

Randy Dorman
(Licensee's Signature)

FCC 660 - May 2007

Amsat.org

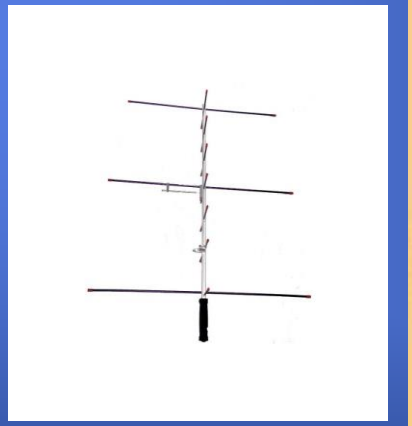
AMSAT Online Satellite Pass Predictions - SO-50

View the current location of SO-50

Date (UTC)	AOS (UTC)	Duration	AOS Azimuth	Maximum Elevation	Max El Azimuth	LOS Azimuth	LOS (UTC)
05 Jan 18	14:40:31	00:13:31	216	72	284	32	14:54:02
05 Jan 18	16:23:01	00:11:01	269	12	328	19	16:34:02
05 Jan 18	18:08:34	00:05:50	324	2	350	15	18:14:24
05 Jan 18	19:51:39	00:06:26	347	3	13	44	19:58:05
05 Jan 18	21:31:34	00:11:57	340	15	38	98	21:43:31
05 Jan 18	23:11:37	00:13:59	327	88	212	149	23:25:36
06 Jan 18	00:53:11	00:10:22	302	9	262	205	01:03:33
06 Jan 18	13:25:55	00:12:42	185	28	131	43	13:38:37
06 Jan 18	15:06:09	00:13:01	238	31	324	26	15:19:10
06 Jan 18	16:50:07	00:08:41	292	6	333	13	16:58:48
06 Jan 18	18:35:46	00:04:24	342	1	354	20	18:40:10
06 Jan 18	20:16:45	00:08:51	345	6	26	66	20:25:36
06 Jan 18	21:56:34	00:13:21	335	28	59	120	22:09:55
06 Jan 18	23:36:58	00:13:32	319	36	235	171	23:50:30
07 Jan 18	01:21:23	00:02:59	273	1	260	248	01:24:22
07 Jan 18	12:13:17	00:08:50	147	7	106	63	12:22:07
07 Jan 18	13:50:35	00:13:29	207	75	146	35	14:04:04
07 Jan 18	15:32:26	00:11:46	259	16	318	21	15:44:12
07 Jan 18	17:17:37	00:06:29	315	3	341	13	17:24:06
07 Jan 18	19:01:42	00:05:23	347	2	13	34	19:07:05

SMILEY 2/220/440-
high gain whip

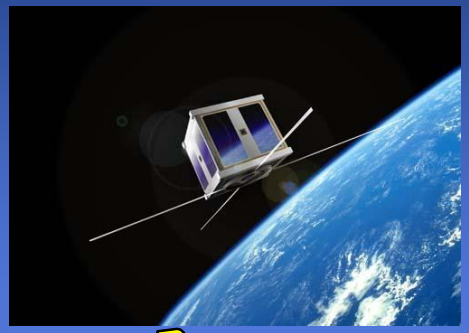
ARROW or
ELK or HH ant.



Dual-VFO, HT

Satellite Lingo

OSCMIL



Low Noise Block Downconverter

BentPipeTransponder

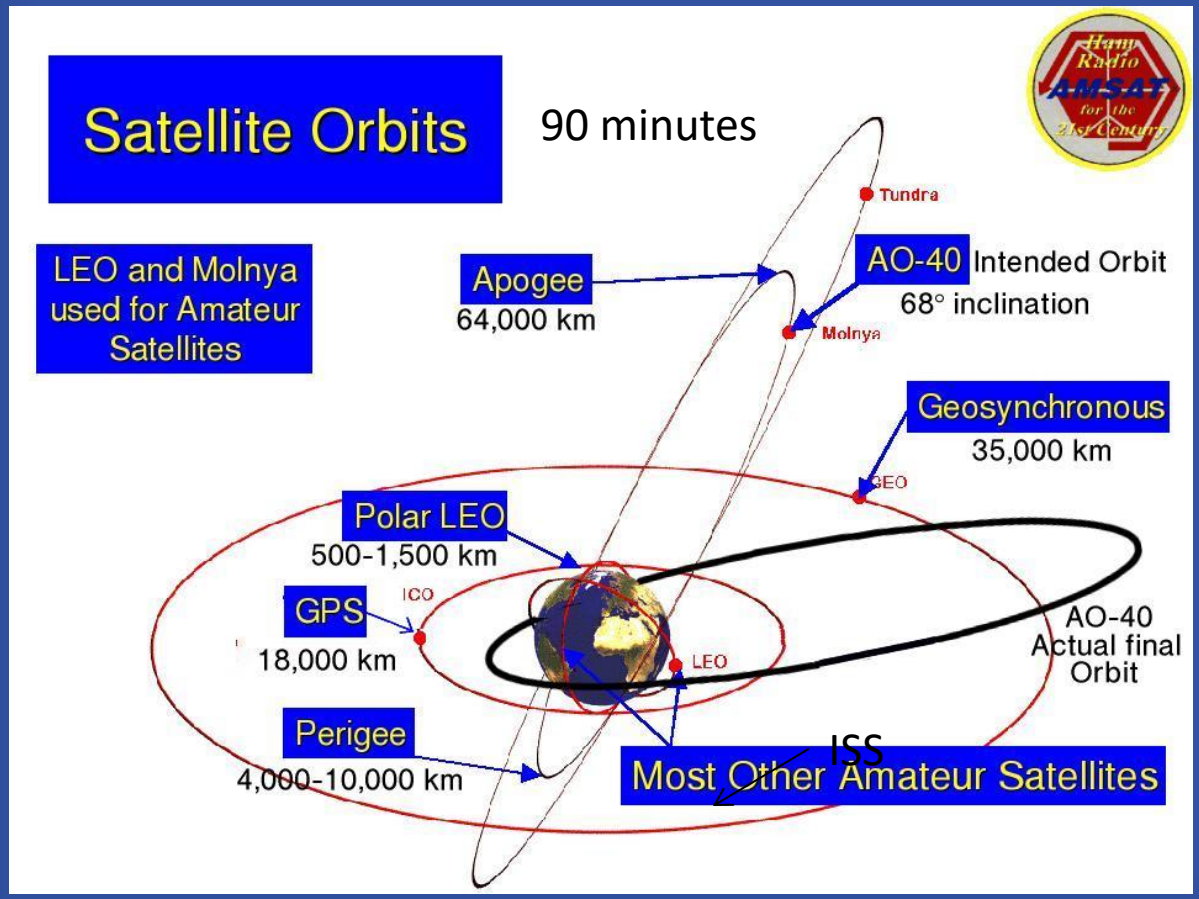
OSCAR

Clarke Belt

ORBIT-The Path of a Satellite
Doppler-Shift in Frequency caused by satellite motion
LEO- Low Earth Orbit- 500-2000km
Uplink– Frequency to transmit
Downlink-Frequency to receive
Footprint-When Satellite can be received

How high can you fly

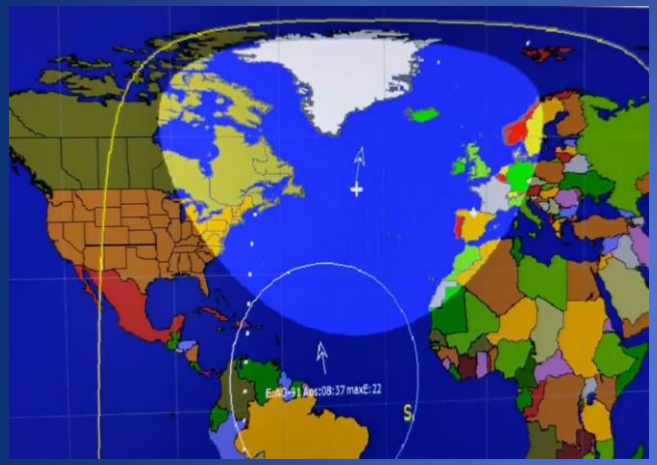
LEO- 400-2000km MEO- 2000-36000km HEO >36000km



Pass Times- LEO-20 minutes MEO- 90 minutes HEO- 12-18 hrs

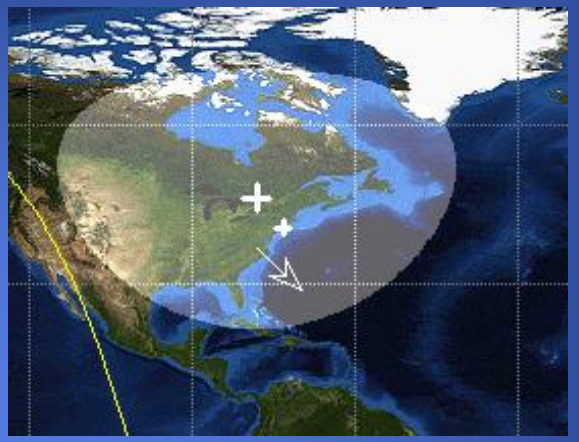
Satellites Footprint

RS-44



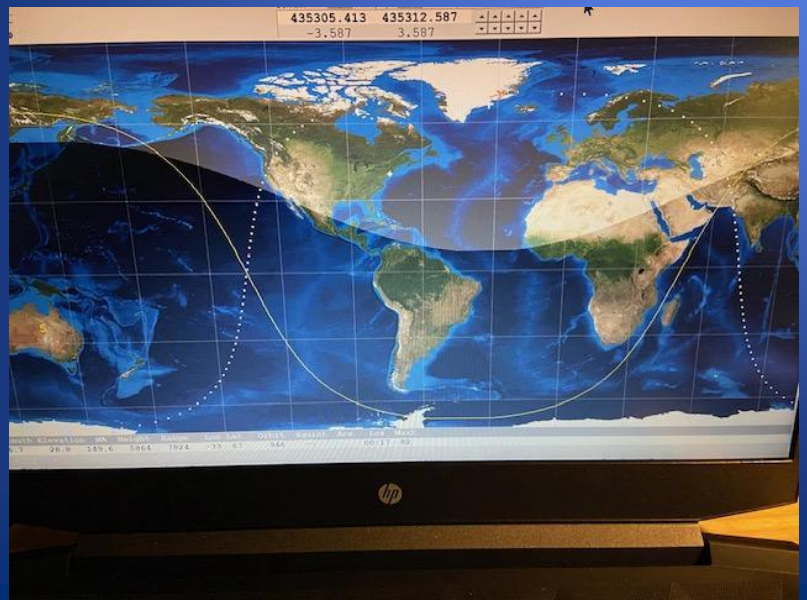
729 MILES

ISS



254 MILES

IO-117



PREPARING FOR A SATELLITE PASS

KISS Method

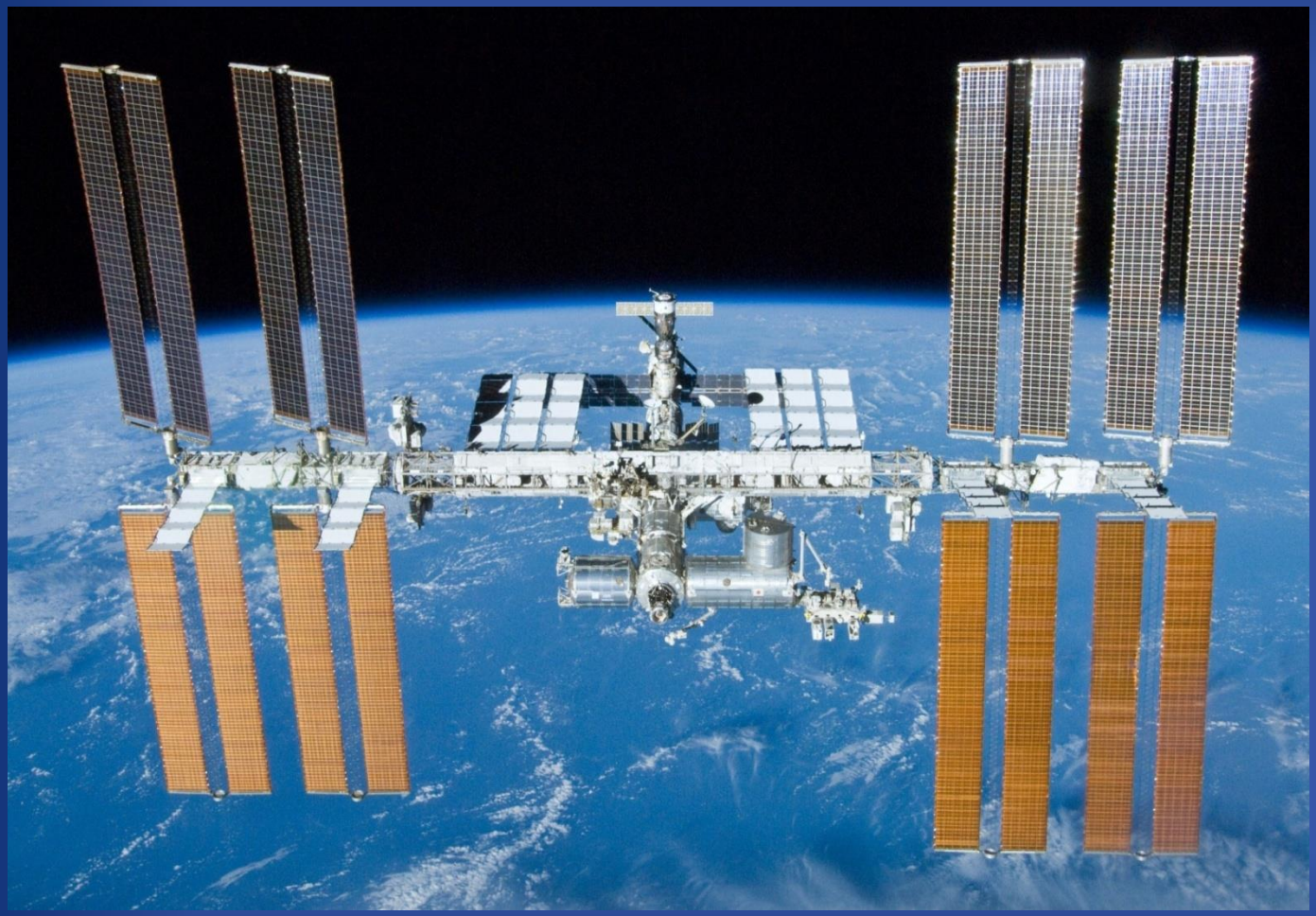
WHAT DO WE NEED?

Radios programmed for Doppler correction
Satellite Availability
Time the Satellite will be in our Footprint
Does the Elevation of pass match our surroundings
Trace the path the Satellite will follow

Tools Needed

Phone /Compass to follow from AOS to LOS
Satellite Software to visually follow pass- not required
Recorder- to remember call signs
Headset for hands free operation
Elk or Arrow Antenna
Two radios- one for uplink and one for downlink- not required initially

ISS Largest Satellite in Space



https://www.ariss.org/current-status-of-iss-stations.html

Getting Started

Radio Programming -ISS CBR

CH #	NAME	TX FREQ	CTCSS (TX)	RX FREQ
101	ISS- CBR	145.990	67.0	437.815
102	ISS-CBR	145.990	67.0	437.810
103	ISS-CBR	145.990	67.0	437.805
104	ISS-CBR	145.990	67.0	437.800
105	ISS-CBR	145.990	67.0	437.795
106	ISS-CBR	145.990	67.0	437.790
107	ISS-CBR	145.990	67.0	437.785

ADJUSTING FOR DOPPLER

https://ka7fvv.net/PDF/FM_Sat_Reference.pdf

Where to start

AMSAT SEARCH

www.amsat.org

Search …

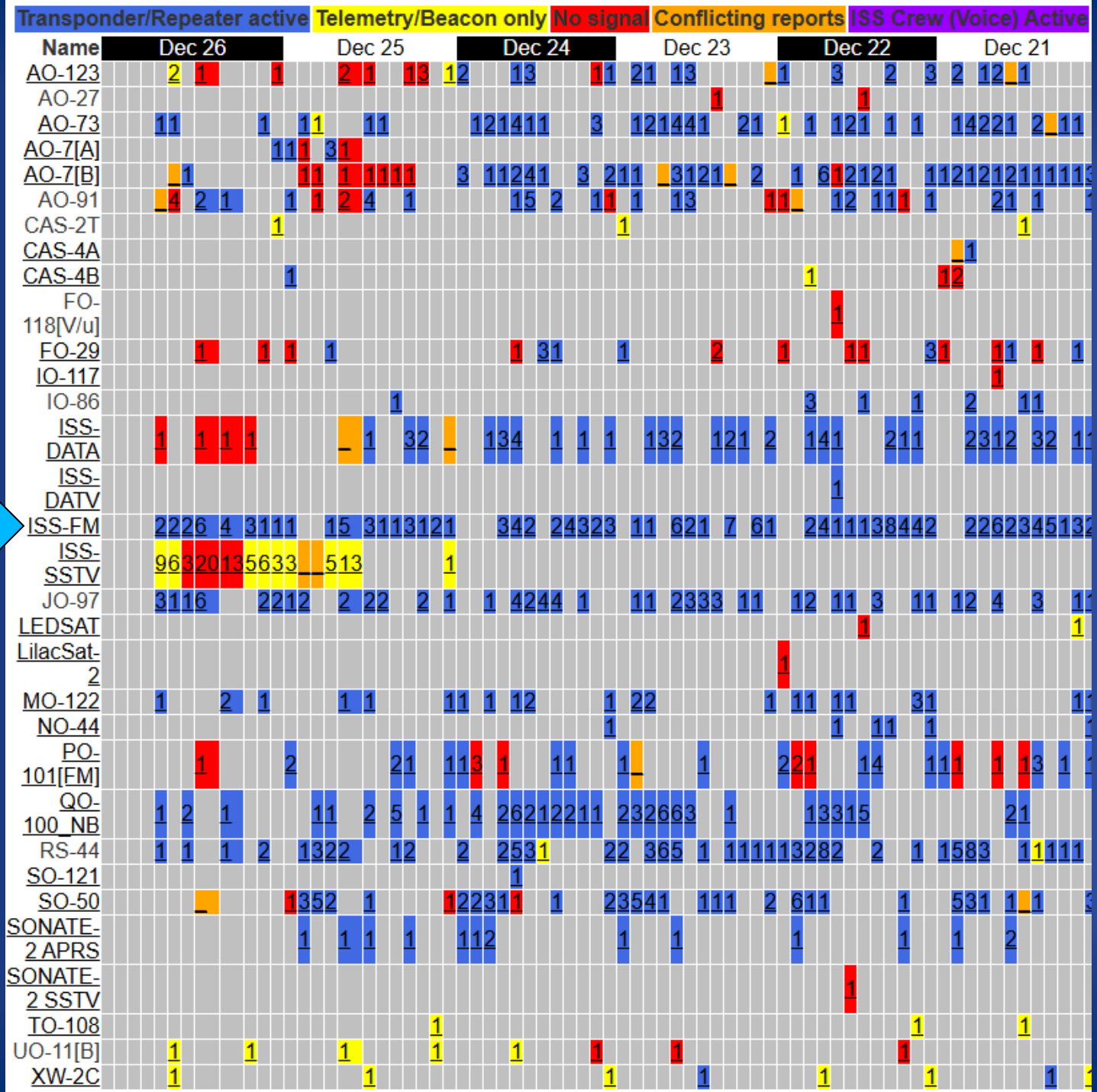
Home | About | Get Involved | Education | ARISS | Satellite Info | Services | Projects | Events | Donate | Store

Help Keep Amateur Radio in Space – Join the AMSAT President's Club today!

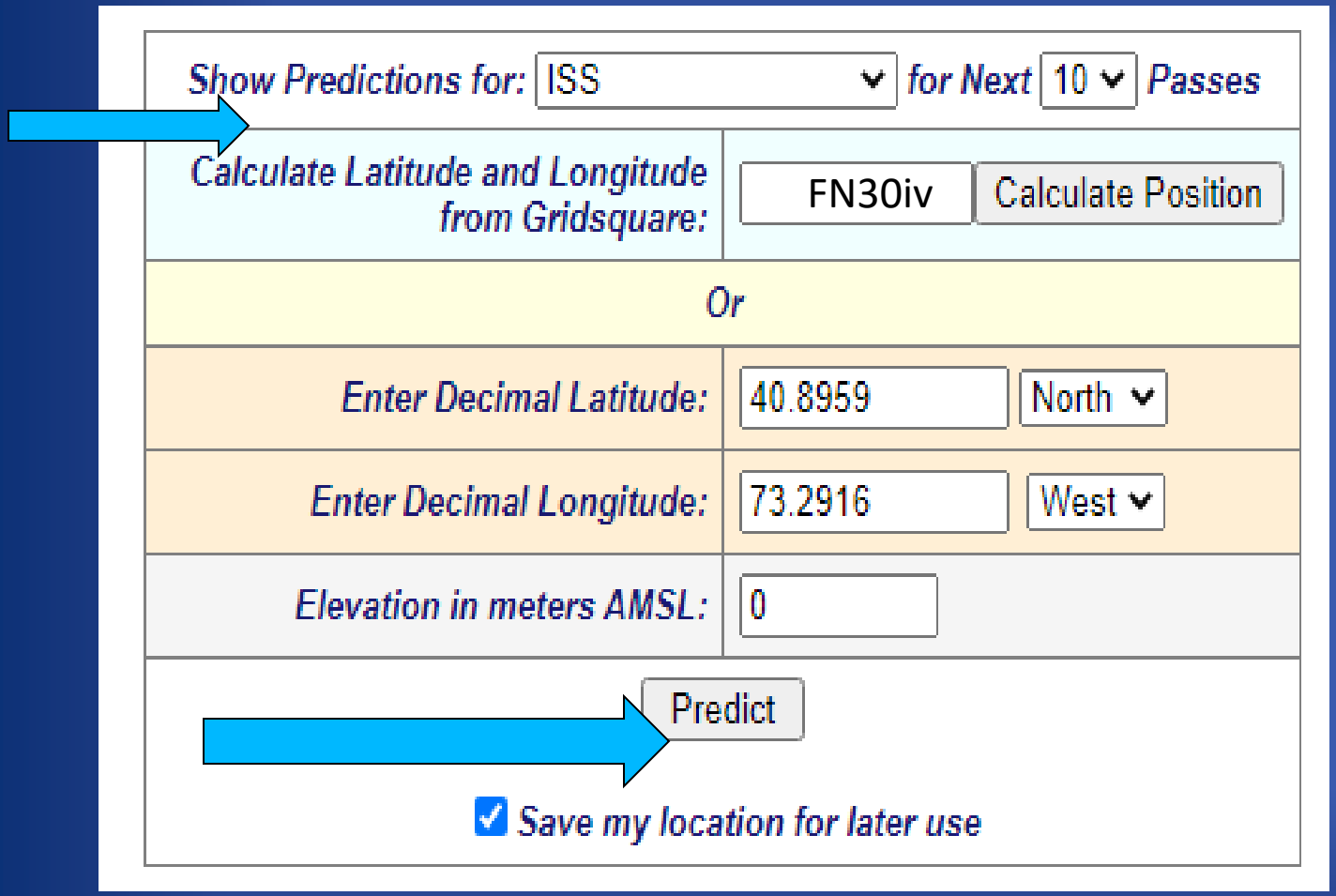
The AMSAT Journal

Join or Renew Today

AMSAT & You
Online Member Management Portal
Powered by Personify – Wild Apricot


Transponder/Repeater active
Telemetry/Beacon only
No signal
Conflicting reports
ISS Crew (Voice) Active
Name
Dec 26
Dec 25
Dec 24
Dec 23
Dec 22
Dec 21
AO-123
AO-27
AO-73
AO-7[A]
AO-7[B]
AO-91
CAS-2T
CAS-4A
CAS-4B
FO-118[V/u]
FO-29
IO-117
IO-86
ISS-DATA
ISS-DATV
ISS-FM
ISS-SSTV
JO-97
LEDSAT
LilacSat-2
MO-122
NO-44
PO-101[FM]
QO-100_NB
RS-44
SO-121
SO-50
SONATE-2 APRS
SONATE-2 SSTV
TO-108
UO-11[B]
XW-2C

Pass Prediction- ISS-CBR



https://levinecentral.com/ham/grid_square.php

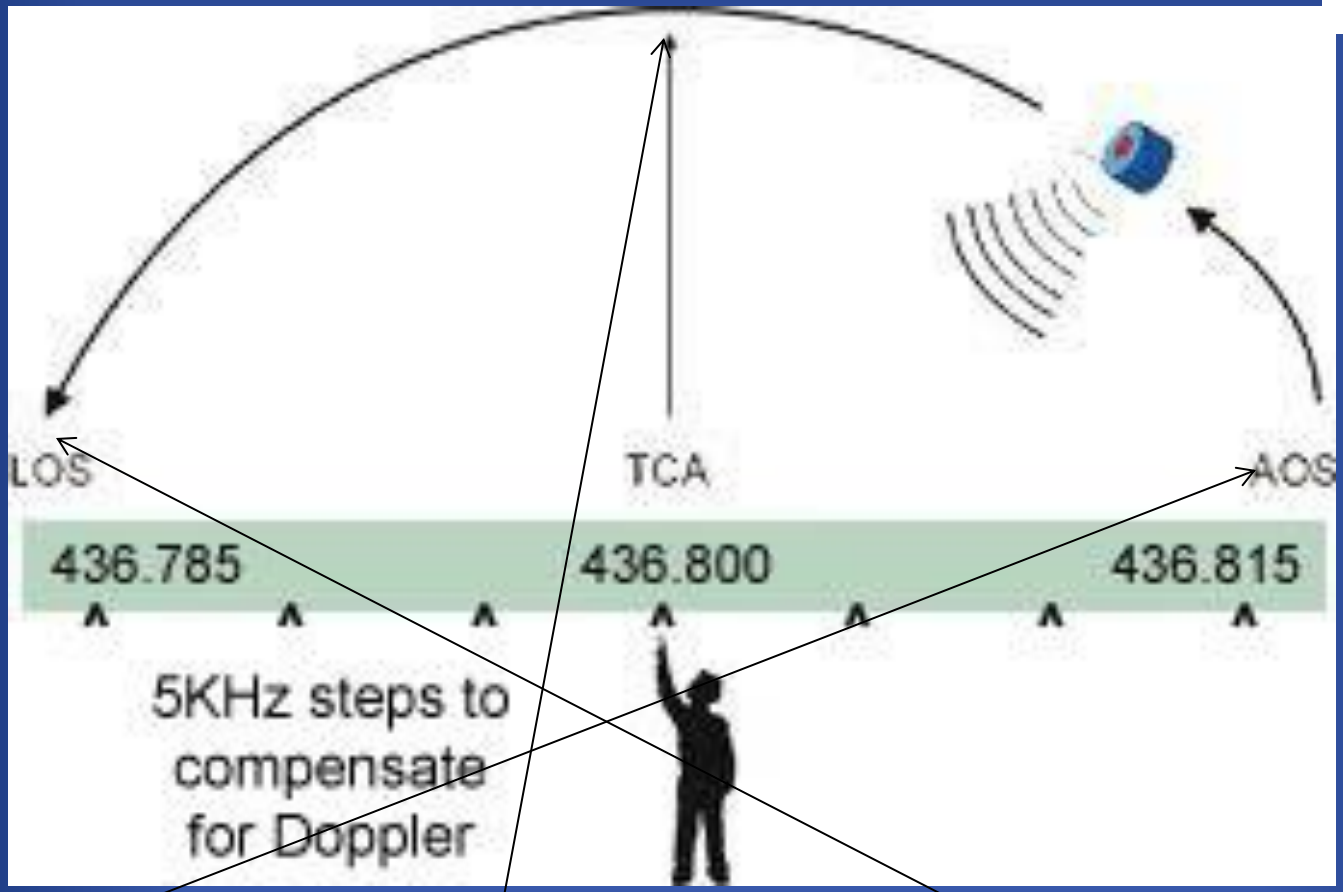
Tracking A Pass

AMSAT Online Satellite Pass Predictions - ISS

View the current location of ISS

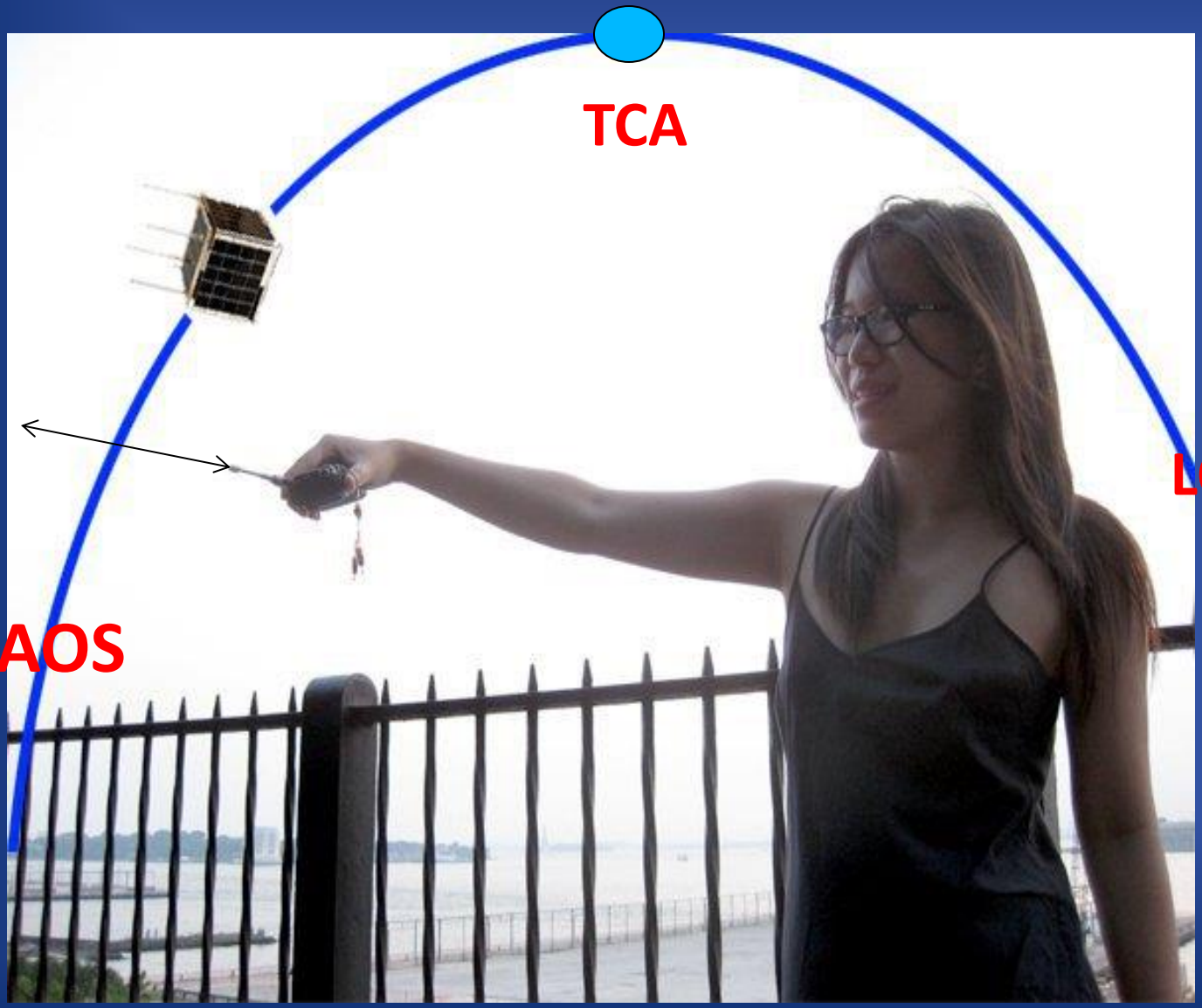
Date (UTC)	AOS (UTC)	Duration	AOS Azimuth	Maximum Elevation	Max El Azimuth	LOS Azimuth	LOS (UTC)
27 Dec 24	04:15:57	00:04:00	144	1	131	100	04:19:57
27 Dec 24	05:48:34	00:10:28	212	33	119	61	05:59:02
27 Dec 24	07:25:17	00:10:31	257	30	350	50	07:35:48
27 Dec 24	09:03:19	00:09:21	293	14	353	53	09:12:40
27 Dec 24	10:40:55	00:09:46	310	16	10	78	10:50:41
27 Dec 24	12:17:39	00:10:50	308	56	41	117	12:28:29
27 Dec 24	13:54:41	00:09:37	291	17	232	166	14:04:18
28 Dec 24	05:00:21	00:09:50	199	19	139	66	05:10:11
28 Dec 24	06:36:24	00:10:46	246	47	341	51	06:47:10
28 Dec 24	08:14:16	00:09:40	285	16	345	51	08:23:56

Hand Held Satellite Tracking



AOS-Acquisition of Signal- TCA-Time of closest approach- LOS-Loss of signal

PASS WITH AN EXTENDED WHIP



TWIST THE WRIST?

CHECKLIST for a Successful ISS-CBR Pass

- Go to WWW.AMSAT.ORG
- BE EARLY
- Show predictions for ISS
- "Passes" - 50 degrees minimum
- Doppler Shift Freq. Programmed
- Squelch Open
- WATCH- UTC Time
- COMPASS/phone- to trace pass-landmarks
- Grid Square- Yours- FN30?
- Voice Recorder

AMSAT Online Satellite Pass Predictions - ISS
View the current location of ISS

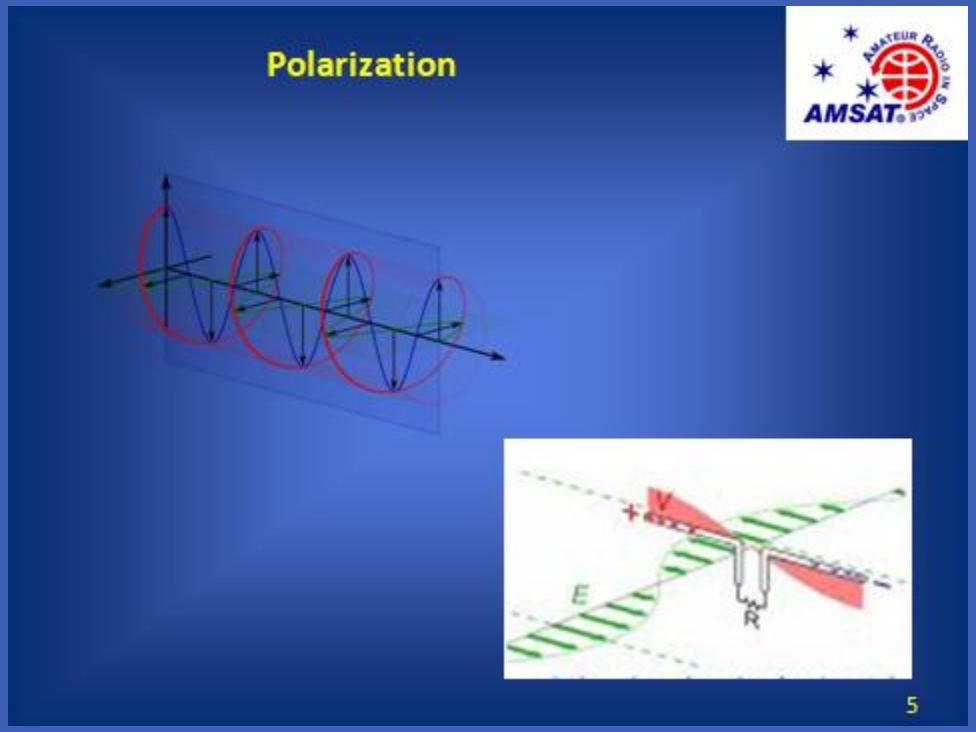
Date (UTC)	AOS (UTC)	Duration	AOS Azimuth	Maximum Elevation	Max El Azimuth	LOS Azimuth	LOS (UTC)
20 Dec 20	09:13:58	00:04:03	144	1	131	100	09:18:01
20 Dec 20	10:46:38	00:10:32	212	32	119	61	10:57:10
20 Dec 20	12:23:23	00:10:37	257	31	349	50	12:34:00
20 Dec 20	14:01:31	00:09:23	292	14	352	53	14:10:54
20 Dec 20	15:39:11	00:09:49	310	16	9	78	15:49:00
20 Dec 20	17:16:01	00:10:51	308	56	41	117	17:26:52

CH #	NAME	TX FREQ	CTCSS (TX)	RX FREQ
101	ISS- CBR	145.990	67.0	437.815

The Art Of Making Contacts

- Make sure you can hear other stations
- LISTEN-LISTEN-LISTEN
- Adjust antenna for best signal- YAGI WRIST
- Change frequency when signal is not clear
- Try not to call early in pass- elevation too low
- Wait for pause in the activity
- Give you call sign once- Listen
- Or Call a specific station, DO NOT CALL CQ!
- Know your Grid Square
- Repeat the process as the satellite moves
- You can schedule a contact with another

Circular vs Vertical



Twist the Wrist

Making Contacts

WHAT WENT WRONG?

- FORGOT OUR GLASSES
- WATCH NOT SYNCHRONIZED
- INCORRECT LATTITUDE, LONGITUDE
- NOT ON THE CORRECT PATH OF SAT.
- ANTENNA
- UPLINLK, DOWNLINK OFF
- SATELLITE PASS TO LOW
- Squelch is muted
- XYL IS YELLING- THE NEIGHBORS ARE LOOKING

When are Satellites Available

Websites:

www.amsat.org- AMSAT
www.heavens-above.com- Heavens Above
www.n2yo.com- N2YO
www.stoff.pi –Orbitron

APPS for Mobile Phones & Tablets:

ISS Detector
GoSatWatch
AMSAT droid

Software for Computers

SatPC32- Tracks & Controls
CSN Technologies- S.A.T.

PROGRESSION

Kenwood TH-D72
Full duplex

Yaesu FT-60R

BAOFENG/TWO PACK

ONE DUAL BAND HT/ FM SIMPLEX- yagi antenna

TWO HT'S/DUPLEX/ FM-SO-50- I HEAR MY DOWNLINK!

ALL MODE VHF/UHF/SSB 2 RADIOS- AO-7-FO-29-AO-73

ALL MODE VHF/UHF- BASE STATION- AZ-EL ANTENNAS

Satellite Resources

AMSAT.ORG

https://www.qrz.com/db/WD9EWK

http://www.k6lcs.com/Home.html

http://www.amsat.org/mailman/listinfo/amsat-bb

https://ke0pbr.wordpress.com/

https://www.pe0sat.vgnet.nl/satellite/amateur-radio-satellites/

https://levinecentral.com/ham/grid_square.php

How will you operate the Satellites?

ROVER

Backyard

BASE

KEEPING AMATEUR RADIO IN SPACE

PLEASE CONSIDER JOINING

Founded 1969-501 C-3 charity in DC- all Volunteer

Mission to develop and provide satellites and technology used for amateur radio use

Partners with schools and universities for launch opportunities thru NASA

WWW.AMSAT.ORG

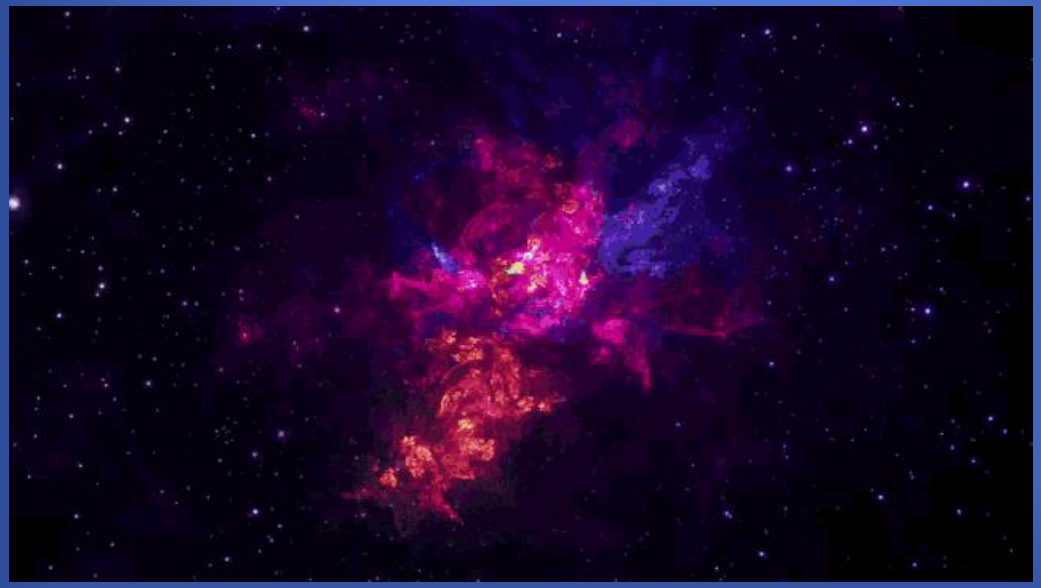
Future Satellite Launches

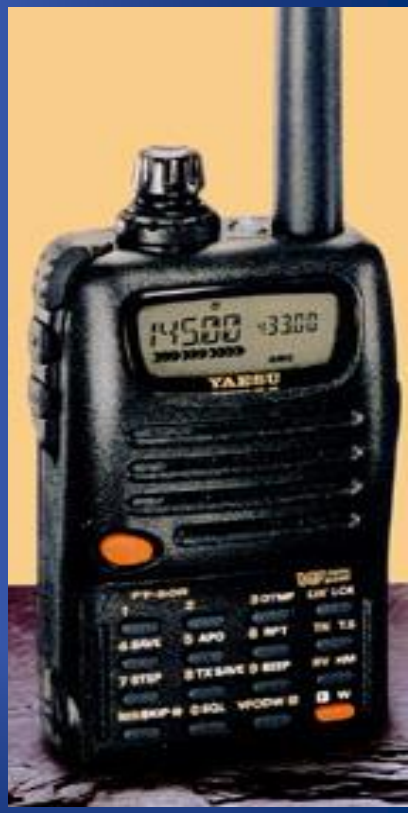
Greater Orbit Larger Footprint (GOLF)

- Successor to the Fox series of Cubesats
- Larger 3U (30x10x10 cm) footprint
- First two satellites in series
  - GOLF-Tee
    - Technology demonstrator
    - LEO
  - GOLF-1
    - Enhanced capabilities
    - LEO, but possibly MEO/HEO
      - Orbital debris regulations went into effect. It's crowded up there!

2025 launch

QUESTIONS?





THANK YOU @73'S

W2JV@AMSAT.ORG