

STAY POSITIVE----- TEST NEGATIVE

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HAM RADIO UNIVERSITY



2021

Our 22nd Year!



Consider Joining AMSAT
Keeping Amateur Radio In Space

- Technical achievement awards!
- Educational support!
- Beginner materials!
- Future satellites!



www.amsat.org

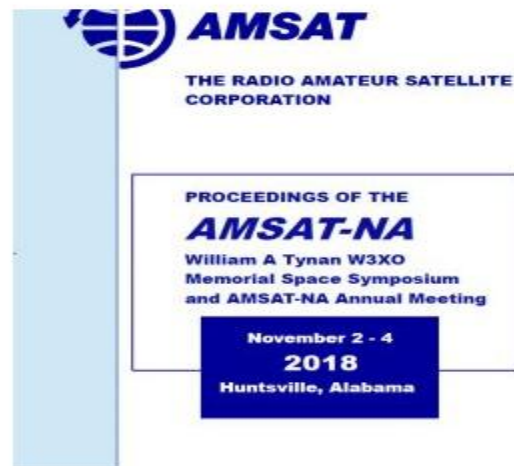
Books for Specific Satellite Types



2020 Edition of Getting Started with
Amateur Satellites – Digital
Download



\$15.00



2018 AMSAT Symposium Proceedings -
Digital Download



\$15.00





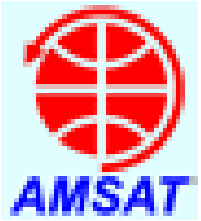
Kenwood TH-D72 Full duplex \$\$\$\$



Yaesu FT-60R



BAOFENG/two pack



PROGRESSION



ICOM-92AD

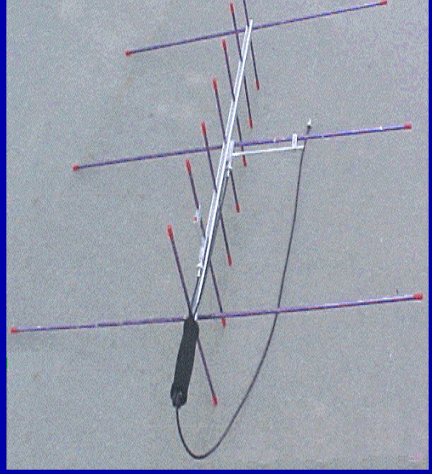
ONE DUAL BAND HT/ FM SIMPLEX- SO-50 ETC.

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

Model 146/437-10WBP



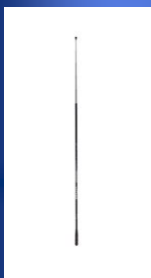
“GAIN IS KING”



Arrow Dual Band Yagi

Elk Dual Band Log Periodic

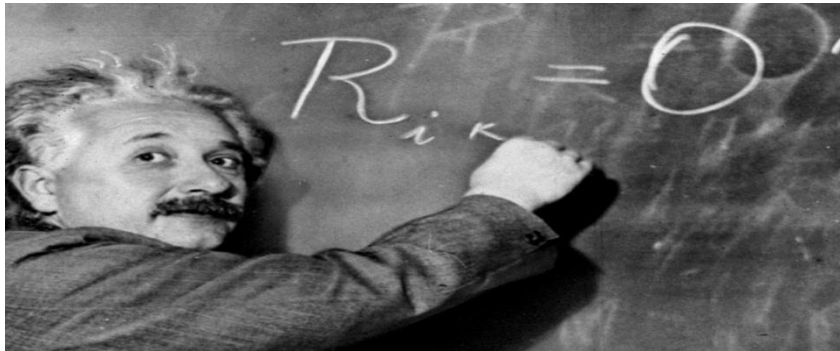
KM4LGM.COM TAPE MEASURE



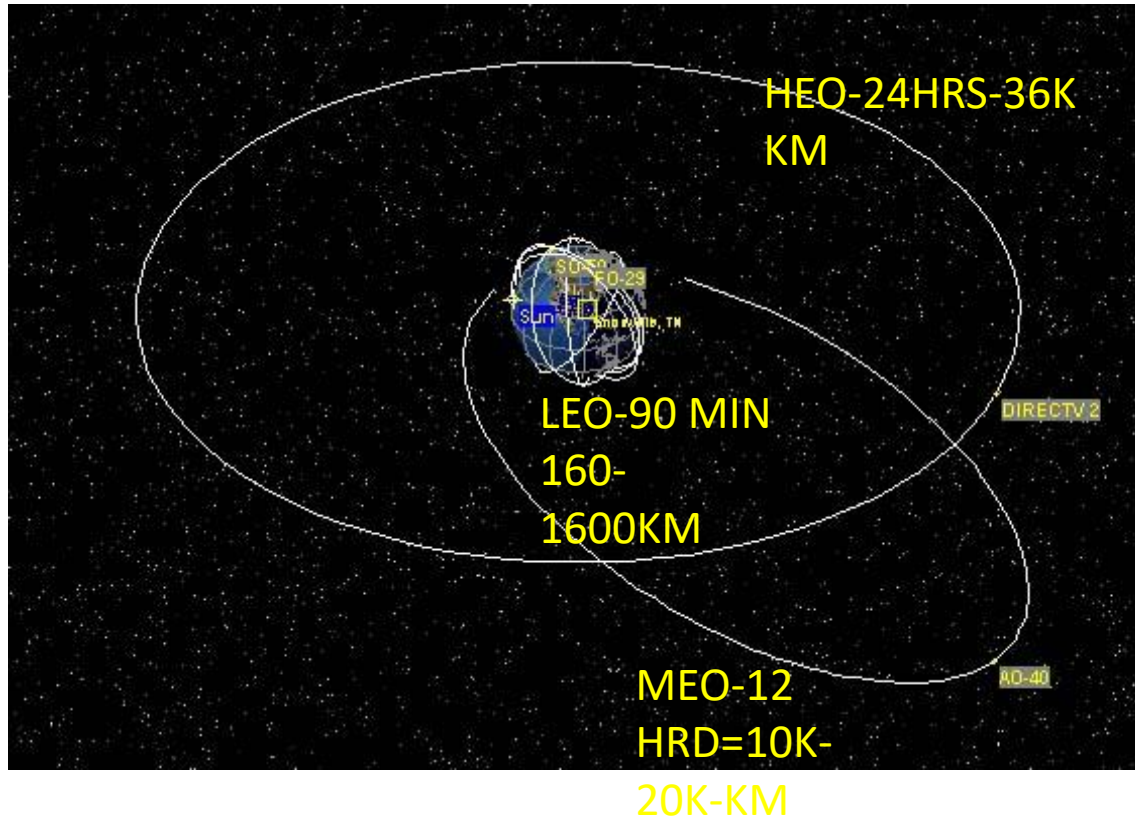
**Diamond
SRH 789**



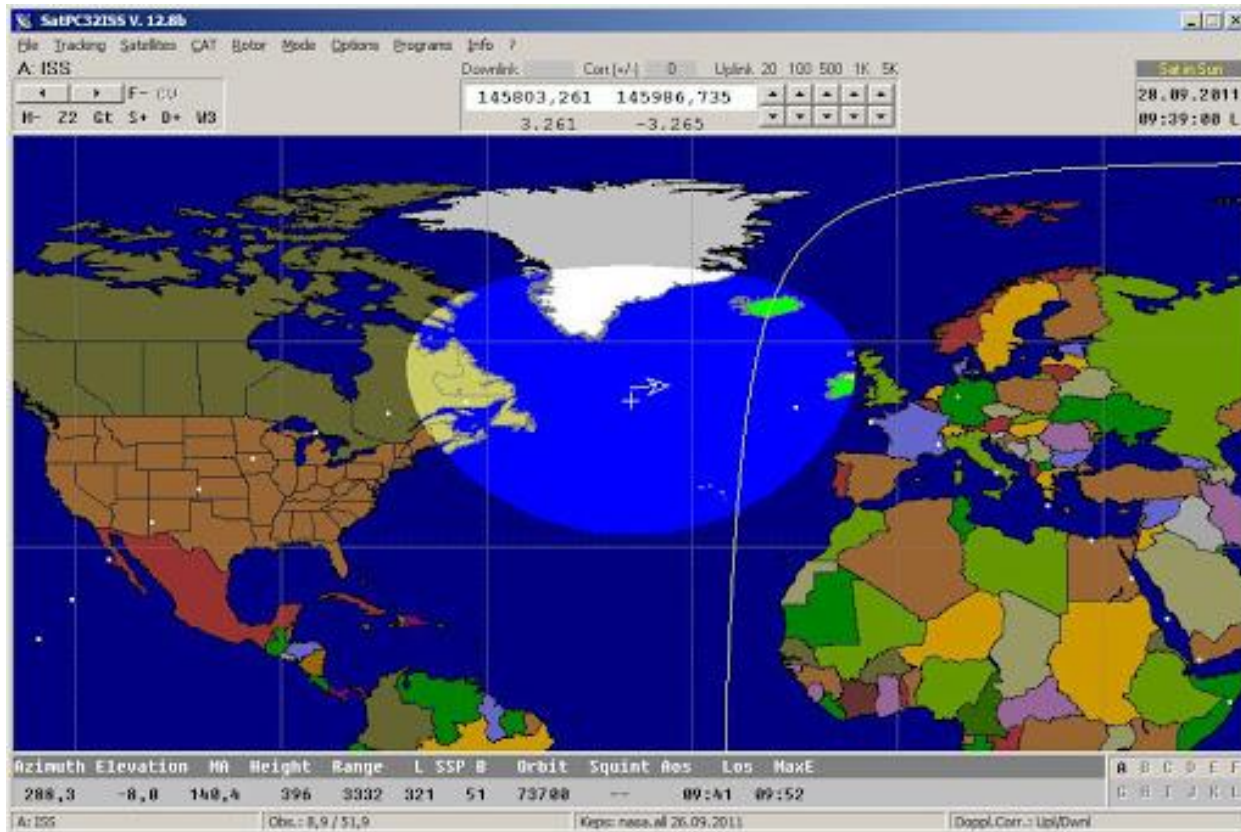
A few terms to understand



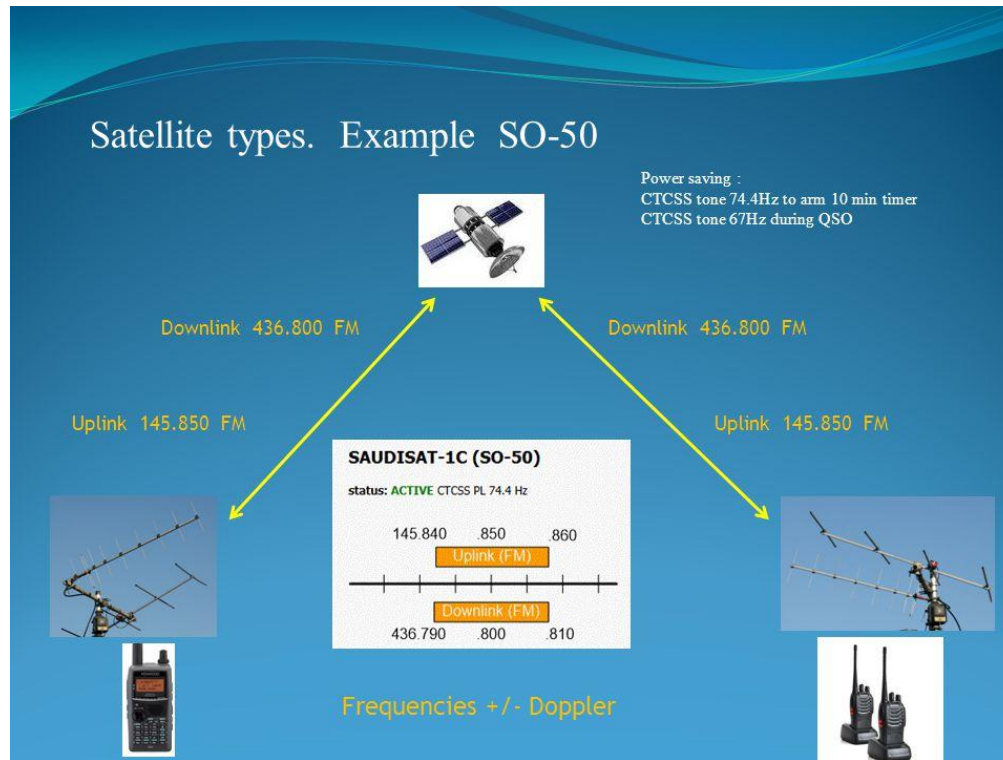
ORBIT



FOOTPRINT



UPLINK & DOWNLINK



SO-50 (SaudiSat-1C)

	Uplink FM (67 Hz CTCSS)	Downlink FM	Comments
SO-50 (SaudiSat-1C)	145.850 MHz	436.795 MHz	Operational

SO-50 also has a 10 minute timer that must be armed before use. Transmit a 2 second carrier with a CTCSS tone of 74.4 Hz to arm the timer.



AOS-LOS-UTC

That wasn't so bad



AMSAT

AMSAT Online Satellite Pass Predictions



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

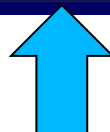
AMSAT Online Satellite Pass Predictions - SO-50							
View the current location of SO-50							
Date (UTC)	AOS (UTC)	Duration	AOS Azimuth	Maximum Elevation	Max El Azimuth	LOS Azimuth	LOS (UTC)
26 Nov 20	21:26:25	00:05:49	323	2	349	14	21:32:14
26 Nov 20	23:09:53	00:05:47	349	2	2	41	23:15:40

HOW DOES IT EFFECT HOW WE SET UP UPLINK & DOWNLINK FREQUENCIES?

Doppler's Effect

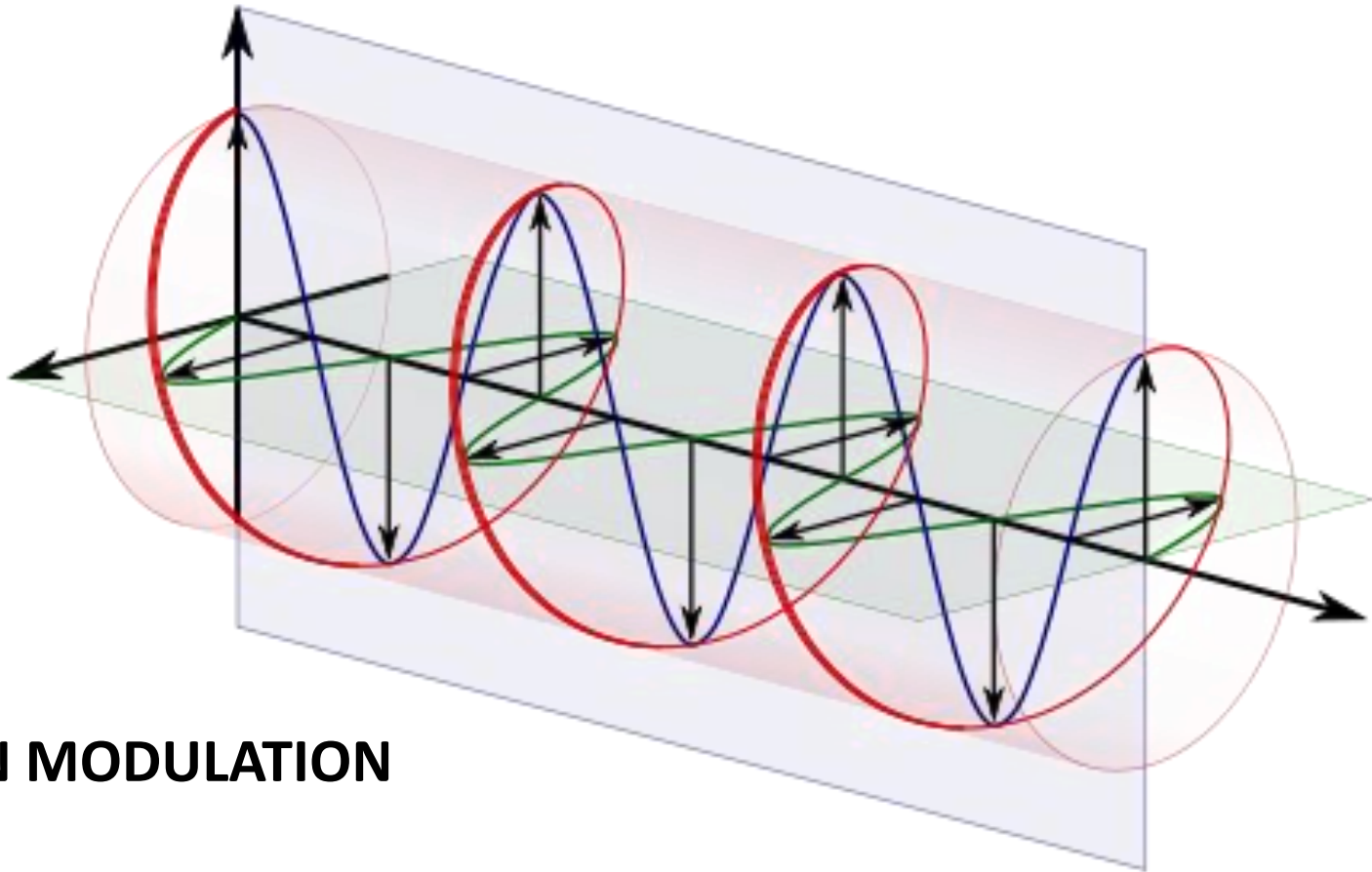


Band	15m	10m	2m	70cm	23cm	13cm	3cm
Freq. (MHz)	21.280	29.400	145.900	435.070	1269.000	2401.000	10250.000
Max Doppler	+/- 477 Hz	+/- 659 Hz	+/- 3.27 kHz	+/- 9.76 kHz	+/- 28.5 kHz	+/- 53.8 kHz	+/- 230 kHz



FARADAY EFFECT ON SATELLITES

That wasn't so bad



SPIN MODULATION

Older Satellites issue

PLAN AND PREPARE FOR A SUCCESSFUL SATELLITE PASS



FM Repeater Satellites



[SO-50 \(SaudiSat-1C\)](#)

[LilacSat-2 \(CAS-3H\)](#) - Transponder activations sporadic

A0-91- (Fox -1B)

[PO-101 \(Diwata-2\)](#) - Active by schedule

ISS Cross band Repeater- <https://www.ariss.org/current-status-of-iss-stations.html>

TRANSPONDER SATELLITES

[AO-7](#)

[FO-29 \(JAS-2\)](#) Due to low battery, check status

[AO-73 \(FUNcube-1\)](#) - Sat status

[XW-2A \(CAS-3A\)](#)

[XW-2B \(CAS-3B\)](#)

[XW-2C \(CAS-3C\)](#)

[XW-2F \(CAS-3F\)](#)

[EO-88 \(Nayif-1\)](#) active in eclipse only

[CAS-4A](#)

[CAS-4B](#)

[RS-44](#)

[QO-100 \(Es'hail-2 / P4A\)](#) Geostationary at 25.9 degrees east.

Digital Satellites

[FalconSAT-3](#)

[NO-44 \(PCsat\)](#) Sporadically active

[NO-84 \(PSAT\)](#) PSK31 active continuously / Digipeater when power permits

[IO-86 \(LAPAN-A2\)](#) In equatorial orbit, activations by schedule

[AISAT-1](#)

[NO-103 \(BRICSAT2\)](#) In commissioning

[NO-104 \(PSAT2\)](#)

[ISS Digi/SSTV](#) - Check status

FM REPEATERS

SO-50 (SaudiSat-1C)

SO-50	Uplink FM (67 Hz CTCSS)	Downlink FM	Comments
SO-50 (SaudiSat-1C)	145.850 MHz	436.795 MHz	Operational
SO-50 also has a 10 minute timer that must be armed before use. Transmit a 2 second carrier with a CTCSS tone of 74.4 Hz to arm the timer.			



AO-91

AMSAT Fox-1 Satellites

AO-91	Uplink FM (67 Hz CTCSS)	Downlink FM	Comments
AO-91 (RadFxSat / Fox-1B)	435.250 MHz	145.960 MHz	Operational

ISS

ISS Crossband Repeater

ISS	Uplink FM (67 Hz CTCSS)	Downlink FM	Comments
ISS Crossband Repeater	145.990 MHz	437.800 MHz	Operational, active for testing

PO-101

PO-101 (Diwata-2)

PO-101	Uplink FM (141.3 Hz CTCSS)	Downlink FM	Comments
PO-101 (Diwata-2)	437.500 MHz	145.900 MHz	Operational
FM transponder activated by schedule. The Amateur Radio Unit can operate either as an FM transponder or APRS digipeater. See https://twitter.com/Diwata2PH for schedule. For more details, see http://phl-microsat.upd.edu.ph/diwata2			

A0-27

A0-27

A0-27	Uplink FM	Downlink FM	Comments
A0-27	145.850 MHz	436.795 MHz	Operational
Currently active for four minutes on ascending and descending passes over mid-latitudes of the Northern Hemisphere			

SO-50- Radio Programming



**AMSAT™**

850 Sligo Ave. Suite 600
Silver Spring, MD 20910
1-888-322-6728

Satellite Detail - Saudi-OSCAR 50

Launch Pad	Navigator	Sat Status	Keps	Passes	News	Store	Members	Contact Us	Return
------------	-----------	------------	------	--------	------	-------	---------	------------	--------

Saudi-OSCAR 50 (Saudisat-1C)

Spacecraft Summary

OSCAR Designation: Saudi-OSCAR 50	Oscar Number: SO-50
International Designator: 2002-058C	Norad Number: 27607
Common Name: Saudisat-1C	Satellite Type: Microsatellite
Launch Date: 20 December, 2002	Launch Location: Baikonur Cosmodrome
Launch Vehicle: Dnepr	Apogee: 713.00
Perigee: 603.00	Inclination: 64.56
Period: 97.89	Dimensions: ~25cm cube
Weight: 10.000 Kg	
Organization: King Abdulaziz University for Science & Technology	



Frequency Information

Mode V/U (J) FM Voice Repeater: **Operational**

Mode V/U (J) FM Voice Repeater (Downlink is sometimes ~5 kHz lower): **Operational**

Uplink: 145.8500 MHz FM, PL 67.0 Hz.

Downlink 436.7950 MHz FM

ADJUSTING FOR DOPPLER



CH #	NAME	TX FREQ	CTCSS (TX)	RX FREQ
101	SO50 ON	145.850	74.4	436.810
102	SO50-1	145.850	67.0	436.810
103	SO50-2	145.850	67.0	436.805
104	SO50-3	145.850	67.0	436.800
105	SO50-4	145.850	67.0	436.795
106	SO50-5	145.850	67.0	436.790
107	SO50-6	145.850	67.0	436.785

Program these Frequencies



ARISS

Amateur Radio on the International Space Station



Current Status of ISS Stations

as of 12/03/2020

Columbus Module radios:

- IORS (Kenwood D710GA) – **STATUS** - Cross Band Repeater V/u (145.990 - {67 Tone} up/ 437.800 down) is active.
 - System supporting USOS school events.
 - Next mode change [VHF packet system (145.825)] targeting late Jan or early Feb.

International Space Station

Cross band FM amateur radio repeater

Uplink frequency of 145.990 MHz

Access tone [CTCSS] of 67 Hz

Downlink frequency of 437.800 MHz

MORE VIDEOS



**SSTV-
145.800
Packet-
145.825**

International Space Station

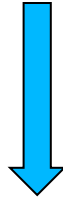
Cross band FM amateur radio repeater

Radio Programming

118										
119	437.81500	145.99000	Split	FM	ISS RPTR P3	Tone	67.0 Hz	1600 Hz	High (5 W)	
120	437.81000	145.99000	Split	FM	ISS RPTR P2	Tone	67.0 Hz	1600 Hz	High (5 W)	
121	437.80500	145.99000	Split	FM	ISS RPTR P1	Tone	67.0 Hz	1600 Hz	High (5 W)	
122	437.80000	145.99000	Split	FM	ISS RPTR MID	Tone	67.0 Hz	1600 Hz	High (5 W)	
123	437.79500	145.99000	Split	FM	ISS RPTR -1	Tone	67.0 Hz	1600 Hz	High (5 W)	
124	437.79000	145.99000	Split	FM	ISS RPTR -2	Tone	67.0 Hz	1600 Hz	High (5 W)	
125	437.78500	145.99000	Split	FM	ISS RPTR -3	Tone	67.0 Hz	1600 Hz	High (5 W)	
126										

MORE VIDEOS

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PASS Predictions



AMSAT Online Satellite Pass Predictions

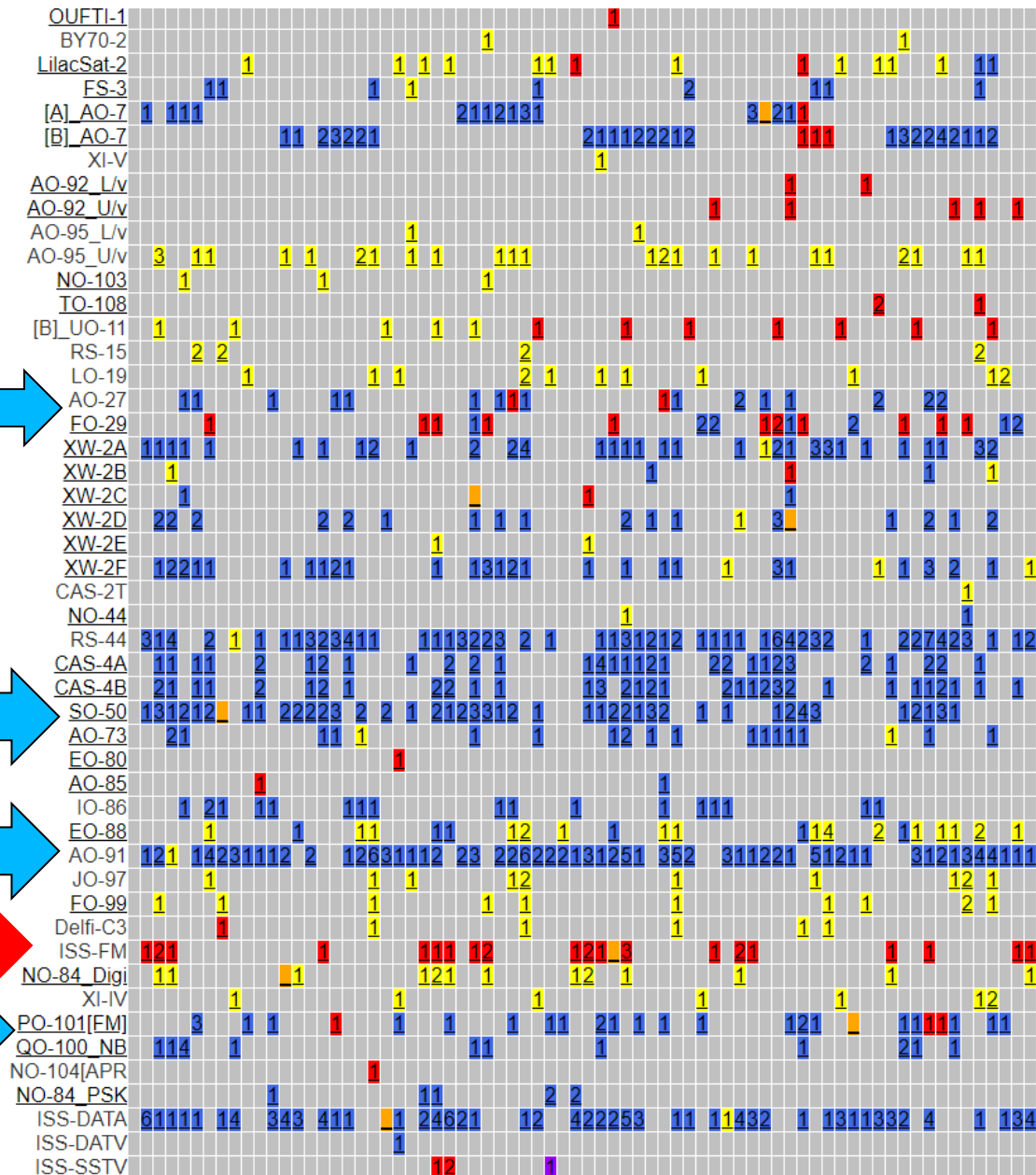
Please select a satellite and provide your latitude, longitude and elevation or calculate them from your grid square. If you choose we will save your position information in a cookie on your system for future predictions.

Show Predictions for: RS-44 ▼ for Next 10 ▼ Passes	
Calculate Latitude and Longitude from Gridsquare:	FN30iv Calculate Position
Or	
Enter Decimal Latitude:*	40.8959 North ▼
Enter Decimal Longitude:*	73.2916 West ▼
Elevation in meters AMSL:	
Predict	
☒ Save my location for later use	

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





SAT Check List- PART 1

FIRST TEST MAY BE RECEIVE ONLY

- DUAL BAND RADIO PROGRAMMED FOR DOPPLER**
- RADIO HAS THE CORRECT CTCSS TONE**
- ANTENNA CONNECTED RECEIVING EARTH REPEATERS**
- SQUELCH OPEN**
- WATCH IS SET TO UTC**
- VISITED AMSAT.ORG FOR SATELLITE PASSES FOR FM SATELLITE**
- BETTER TO CHOOSE OFF HOURS FOR BEST CHANCE**
- AMSAT.ORG FOR PATH AND HEIGHT OF SATELLITE**



SAT Check List-Part- 2

- OUTSIDE MARKED PATH OF PASS USING FIXED OBJECTS
-
- AMSAT.ORG-CHECK SATELLITE STATUS PAGE
-
- LISTEN-LISTEN FOR OTHER STATIONS
- PICK OUT A CALL WHEN THERE IS A BREAK
- GIVE YOUR CALL ONLY SAY HAND HELD USING ITU PHONETICS
- IF YOU HAVE A GOOD LOCATION – SEE HORIZON
- YOU SHOULD MAKE A CONTACT
- USING TO HT'S IS PREFERRED – HEARING YOUR DOWNLINK
- ALLOWS YOU TO ADJUST POLARIZATION OF ANTENNA

Prepare for a Successful SO-50 Pass



- Go to WWW.AMSAT.ORG
- FOLLOW TWITTER-FACEBOOK FOR GRID ROVERS
- “Passes” top menu- 30 degrees minimum
- Show predictions for SO-50
- Add Grid Square- FN30
- RADIO- SPLIT FREQUENCIES
- Doppler Shift Freq. Programmed
- Squelch Open
- WATCH- UTC
- COMPASS
- DIGITAL RECORDER
- Set your watch
- Compass to trace path
- Check watch
- BE EARLY

Making Contacts

- Listen to the satellite, pick out some call-signs
- Know your Grid Square
- Schedule a contact
- Call a specific station, **DO NOT CALL CQ!**
- Contacts are usually quick - callsign, location, maybe your name (similar to HF contests or DXpeditions)
- Regular operators can recognize new operators, and are happy to make contacts and help with operating advice
- Satellite operators like to exchange “grids” for awards



Satellite Tracking Software

I-Phone- GoSatWatch- App- store

Droid- AMSAT droid free

Web- Orbitron.com

Heaven's Above.com

N2YO.com

SatPC32- Radio/Antenna control

SAT- Self contained Antenna Tracker-igatemini.com/sat

AMSAT.org

Satellite Resources



AMSAT.ORG

<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/>

WHAT WENT WRONG??

- **SATELLITE PASS TO LOW**
- **TOO MUCH ACTIVITY**
- **OBSTRUCTIONS**
- **PL 67Hz ON TX- SO-50- AO-91**
- **SQUELCH CLOSED**
- **NOT ON THE CORRECT PATH OF SAT.**
- **ADJUST FOR LH/RH POLARIZATION-polarity**
- **NOT TUNING FAST ENOUGH-Doppler**
- **WATCH NOT SYNCHRONIZED**
- **UPLINK, DOWNLINK INCORRECT**
- **NOT ON CORRECT FREQUENCIES**
- **Neighbor –don't point that thing at my house!!**



