AMATEUR RADIO SATELLITE COMMUNICATIONS

AMATEUR RADIO SATELLITE COMMUNICATIONS

Communication modes I've tried with satellites

1. **APRS with the ISS**
2. **SSTV with the ISS**
3. **FM 2m/70cm with SO-50, AO-91, ISS, …..**

Communication modes I've not tried with satellites

1. **CW**
2. **Telemetry and Weather/Radar Images**

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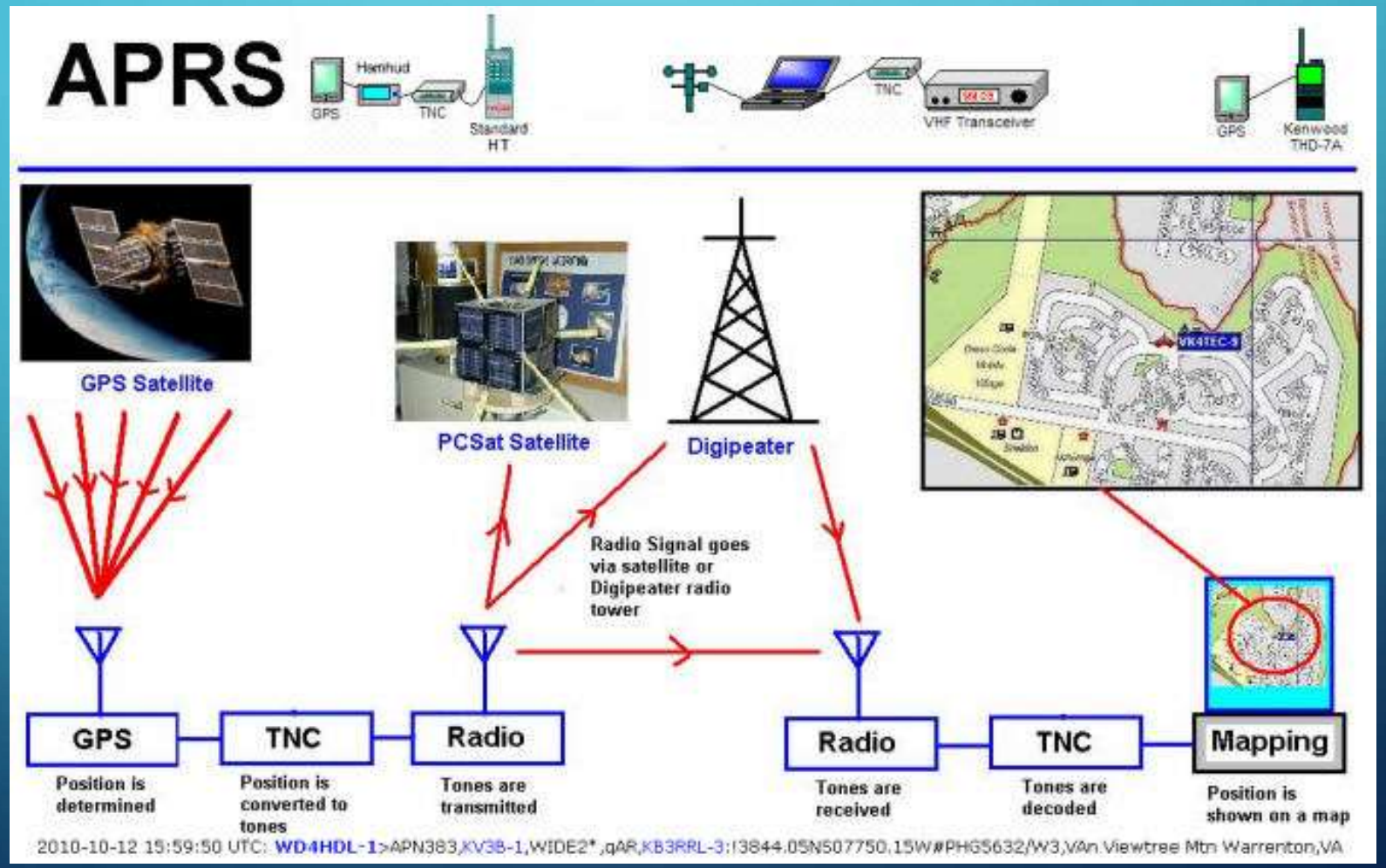
http://www.w3pga.org/APRS.htm



AMATEUR RADIO SATELLITE COMMUNICATIONS

ISS amateur radio capabilities include a voice repeater, digital packet radio (APRS) capabilities and a Kenwood VC-H1 slow scan television (SSTV) system.

The radio in the Columbus module is a “space-modified” JVC Kenwood D710GA transceiver
The FM cross band repeater mode uses an uplink frequency of 145.990 MHz with an access tone of 67 Hz and a downlink frequency of 437.800 MHz

Automatic Packet Reporting System
144.390 MHz
APRS path = WIDE2-1, WIDE1-1

The ISS PM3 packet mode (APRS) employs a downlink frequency of 145.825 MHz
APRS path = ARISS

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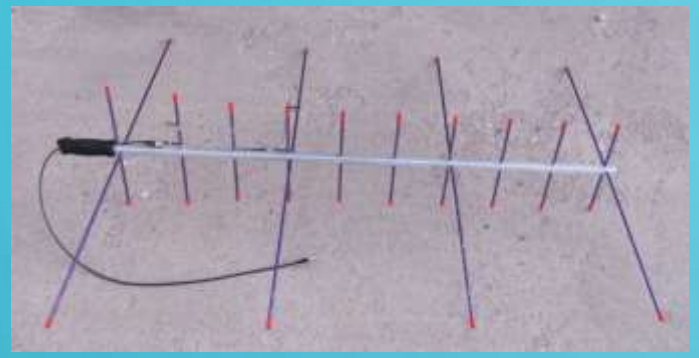
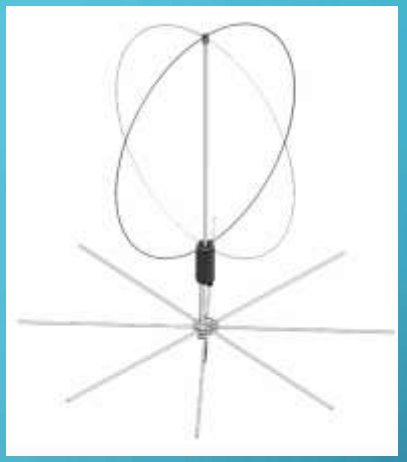
A terminal node controller (TNC) is a device used by amateur radio operators to participate in AX. 25 packet radio networks. It is similar in function to the Packet Assembler/Disassemblers used on X. 25 networks, with the addition of a modem to convert baseband digital signals to audio tones.

A **digipeater** is a digital repeater. The **digipeater** listens for data chirps that have been encoded with instructions to retransmit them and then retransmits what it hears when appropriate. This allows users with mobile or portable **APRS** stations to cover a wider geographic area.

Slow-scan television (**SSTV**) is a picture transmission method, used mainly by amateur radio operators, to transmit and receive static pictures via radio in monochrome or color. A literal term for **SSTV** is narrowband television.

AMATEUR RADIO SATELLITE COMMUNICATIONS





Antennas For Satellite Communications

AMATEUR RADIO SATELLITE COMMUNICATIONS

Satellite Tracking Software

http://www.amsat.org.ar/pass.htm
https://www.n2yo.com/
http://www.stoff.pl/

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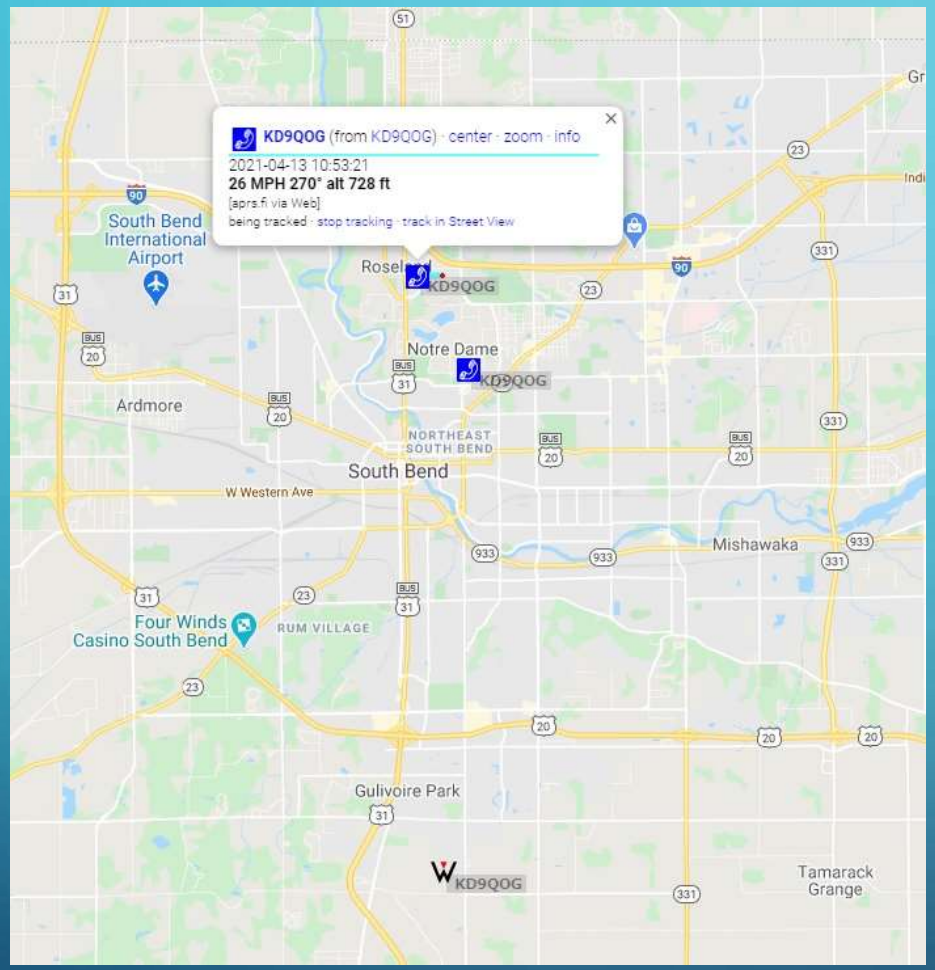
AMSAT Online Satellite Pass Predictions - ISS

View the current location of ISS

Date (UTC)	AOS (UTC)	Duration	AOS Azimuth	Maximum Elevation	Max El Azimuth	LOS Azimuth	LOS (UTC)
14 Apr 21	12:59:24	00:07:22	169	6	127	83	13:06:46
14 Apr 21	14:33:48	00:10:52	224	58	132	58	14:44:40
14 Apr 21	16:11:01	00:10:22	266	25	322	51	16:21:23
14 Apr 21	17:49:04	00:09:41	297	15	357	61	17:58:45
14 Apr 21	19:26:26	00:10:25	308	23	6	91	19:36:51
14 Apr 21	21:03:15	00:10:49	303	71	216	132	21:14:04
14 Apr 21	22:40:55	00:08:01	281	8	240	185	22:48:56
15 Apr 21	12:13:49	00:04:23	146	2	120	98	12:18:12
15 Apr 21	13:46:41	00:10:34	212	32	120	62	13:57:15
15 Apr 21	15:23:25	00:10:42	257	33	349	52	15:34:07

AMATEUR RADIO SATELLITE COMMUNICATIONS

Google Maps https://aprs.fi/



APRS station **KD9QOG** - show graphs

Comment:	*Greetings! From South Bend Indiana*
Location:	41°35.86' N 86°14.41' W - locator EN61VO13EK - **show map - static map** 1.1 miles South bearing 166° from Gulivoire Park, Saint Joseph County, Indiana, United States [?] 5.9 miles South bearing 175° from South Bend, Saint Joseph County, Indiana, United States 6.1 miles Southwest bearing 223° from Mishawaka, Saint Joseph County, Indiana, United States 66.0 miles Northwest bearing 300° from Fort Wayne, Allen County, Indiana, United States
Last position:	2021-04-13 19:27:26 CDT (12h22m ago) 2021-04-13 20:27:26 EDT local time at Gulivoire Park, United States [?]
Altitude:	863 ft
Course:	0°
Speed:	0 MPH
Device:	unknown: D-Star APDPRS (D-Star)
Last path:	KD9QOG>APDPRS via DSTAR*,qAR,KD9QOG-C ***Good path!***
Positions stored:	169
Other SSIDs:	KD9QOG-7 KD9QOG-9 **KD9QOG-C**

Stations near current position of **KD9QOG** - show more

callsign	distance	last heard - CDT	callsign	distance	last heard - CDT
KD9QOG C	0.0 yards 0°	2021-04-13 19:34:36	KD9QOG-C	0.0 yards 0°	2021-04-13 19:34:36
AB9QB-14	1.2 miles 271°	2021-04-14 07:48:55	KD9SFW-7	2.0 miles 354°	2021-03-30 22:01:17
FW9588	2.8 miles 8°	2021-04-14 07:40:59	KE8GIM-N	3.7 miles 225°	2021-04-14 07:34:08
147.330IN	4.1 miles 93°	2021-04-14 07:45:36	KD9EYW-7	5.5 miles 38°	2021-04-12 07:52:01
KG9QT B	5.6 miles 28°	2021-04-04 00:44:33	KG9QT-B	5.6 miles 28°	2021-04-04 00:44:43
N1EWO-N	5.9 miles 39°	2021-04-14 07:30:47	N1EWO	5.9 miles 38°	2021-04-14 07:46:41
K9KJD-9	5.9 miles 28°	2021-04-14 06:04:45	KD9BNL-1	6.1 miles 46°	2021-04-14 07:47:55
KC9MEC B	6.4 miles 346°	2021-04-13 16:34:55	KC9MEC-B	6.4 miles 346°	2021-04-13 16:35:05
CW2578	6.7 miles 59°	2021-04-14 07:15:04	KC9MEC-N	6.7 miles 337°	2021-04-14 07:42:58
KD9QOG	6.8 miles 3°	2021-04-13 12:24:34	KO4LUV	6.9 miles 1°	2021-04-10 10:33:56

Stations which heard **KD9QOG** directly on radio - 2021-04

callsign	pkts	first heard - CDT	last heard	longest	(tx => rx)	longest at - CDT
W9LRT-1	7	2021-04-01 21:21:24	2021-04-13 16:31:59	EN61VO > EN61WL	10.0 miles 156°	2021-04-13 16:31:59
W9LRT-2	1	2021-04-13 16:27:02	2021-04-13 16:27:02	EN61VO > EN61WQ	7.7 miles 48°	2021-04-13 16:27:02
NA1SS	12	2021-04-01 21:33:15	2021-04-13 16:56:04	EN61VO > JJ00CA	6028.5 miles 92°	2021-04-13 16:56:04

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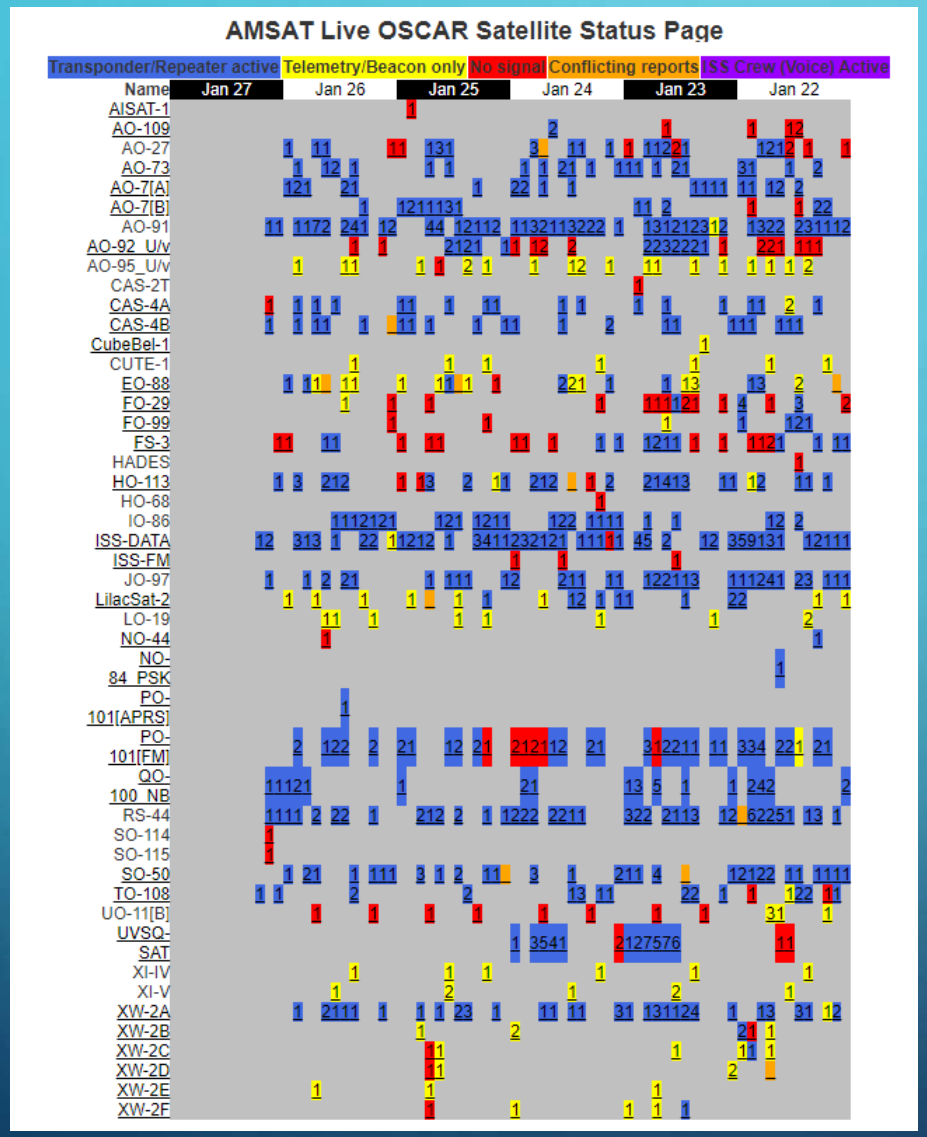
https://www.amsat.org/status/



AMATEUR RADIO SATELLITE COMMUNICATIONS

https://www1.findu.com/

KD9QOG 1 2021-03-14 22:11:18 2021-03-14 22:11:18 EN61VO > JJ00CA 6028.5 miles 312° 2021-03-14 22:11:18

KD9QOG>T1SU8V,NA1SS*,qAR,KD8THX-6:`r*Fl!<[/>"6^}Greetings! From South Bend Indiana^ 5.3 miles 311° 2021-03-14 22:10:28

Amateur Radio Stations heard via Satellite

```
00:10:34:39 : W3ADO-1]BEACON,SGATE,qAU,DH0FAA-2:T#001,040,129,069,048,216,11111111,0000,1
00:12:19:05 : W3ADO-1]BEACON,SGATE,qAU,DC8LZ-10:T#001,041,151,070,047,216,11111111,0000,1
00:12:39:06 : KE4AZZ]SPCL,PCSAT-11*,qAR,VE3DVC-10:=2702.06N/08209.93Wy KE4AZZ EL87
00:12:42:14 : KE4AZZ]CQ,W3ADO-1*,XBAUD,qAO,W0ARP-14:=2702.06N/08209.93W-KE4AZZ el87
00:12:42:21 : KE4AZZ]SPCL,PCSAT-11*,qAR,N6DAN-1:=2702.06N/08209.93Wy KE4AZZ EL87
00:14:03:07 : W3ADO-1]BEACON,SGATE,qAU,DL1NUX-1:T#001,047,145,070,047,216,11111111,0000,1
00:14:22:19 : KE4AZZ]SPCL,PCSAT-11*,qAR,KG4PID-12:=2702.06N/08209.93Wy KE4AZZ EL87
00:14:23:48 : KE4AZZ]SPCL,PCSAT-11*,qAR,KC5DR-5:=2702.06N/08209.93Wy KE4AZZ EL87
00:14:23:50 : KE4AZZ]CQ,W3ADO-1*,XBAUD,qAS,P43L-5:=2702.06N/08209.93W-KE4AZZ el87
00:14:23:53 : KE4AZZ]SPCL,PCSAT-11*,qAS,P43L-5:=2702.06N/08209.93Wy KE4AZZ EL87
00:15:07:44 : W3ADO-1]BEACON,SGATE,qAR,VK5ATN-3:T#001,040,154,071,046,216,11111111,0000,1
00:19:17:33 : OE5RPP-1]CQ,W3ADO-1*,qAR,ON7EQ-10:=4756.37N/01328.94E`Hello to all via SAT de Peter {U
00:19:17:41 : OE5RPP-1]CQ,W3ADO-1*,qAR,ON7EQ-10:73 to all via SAT from Austria http://qsl.net/oe5rpp
00:19:19:39 : OE5RPP-1]CQ,W3ADO-1*,qAR,ON7EQ-10:73 to all via SAT from Austria http://qsl.net/oe5rpp
00:19:20:08 : OE5RPP-1]CQ,W3ADO-1*,qAR,ON7EQ-10:=4756.37N/01328.94E`Hello to all via SAT de Peter {U
00:19:20:27 : OE5RPP]CQ,W3ADO-1*,qAO,SQ5MJA-15:73 to all via SAT from Austria http://qsl.net/oe5rpp
00:19:22:24 : OE5RPP-1]CQ,W3ADO-1*,qAR,ON7EQ-10:73 to all via SAT from Austria http://qsl.net/oe5rpp
00:19:22:27 : OE5RPP]CQ,W3ADO-1*,qAR,ON7EQ-10:=4756.37N/01328.94E`Hello to all via SAT de Peter {UIS
00:20:54:38 : SV2CPH]TPQX16,W3ADO-1*,qAR,LA3SHA-15:`1KEl @-/`efarmogigr@hotmail.com_"
01:03:20:11 : W3ADO-1]BEACON,SGATE,qAR,KG4PID-12:T#001,041,145,071,048,216,11111111,0000,1
01:03:22:29 : W3ADO-1]BEACON,SGATE,qAR,N6DAN-1:T#001,041,094,071,048,216,11111111,0000,1
01:06:36:44 : W3ADO-1]BEACON,SGATE,qAR,EA8BQD:T#001,041,135,072,058,216,11111111,0000,1
01:08:20:52 : W3ADO-1]BEACON,SGATE,qAR,CT1EBQ-3:T#001,041,138,071,061,216,11111111,0000,1
01:09:14:36 : W3ADO-1]BEACON,SGATE,qAR,VK2TV-4:T#001,040,150,071,047,216,11111111,0000,1
01:10:09:38 : W3ADO-1]BEACON,SGATE,qAR,2E1DWP:T#001,041,151,072,048,216,11111111,0000,1
01:11:51:18 : W3ADO-1]BEACON,SGATE,qAR,ON7EQ-10:T#001,051,131,072,048,216,11111111,0000,1
01:12:07:40 : KE4AZZ]SPCL,PCSAT-11*,qAR,AE7AF:=2702.06N/08209.93Wy KE4AZZ EL87
01:12:09:59 : KE4AZZ]SPCL,W3ADO-1*,XBAUD,qAO,W0ARP-14:=2702.06N/08209.93W-KE4AZZ el87
01:12:10:01 : KE4AZZ]SPCL,PCSAT-11*,qAO,W0ARP-14:=2702.06N/08209.93Wy KE4AZZ EL87
01:12:11:56 : KE4AZZ]SPCL,W3ADO-1*,qAR,N6DAN-1:=2702.06N/08209.93W-KE4AZZ el87
01:12:12:06 : KE4AZZ]SPCL,PCSAT-11*,qAR,N6DAN-1:=2702.06N/08209.93Wy KE4AZZ EL87
01:12:14:04 : KE4AZZ]SPCL,W3ADO-1*,qAR,N6DAN-1:=2702.06N/08209.93W-KE4AZZ el87
01:12:14:23 : KE4AZZ]SPCL,PCSAT-11*,qAO,XE2KK-1:=2702.06N/08209.93Wy KE4AZZ EL87
01:13:35:12 : W3ADO-1]BEACON,SGATE,qAR,ON7EQ-10:T#001,042,105,071,048,216,11111111,0000,1
01:13:36:02 : OH2JIU]VPTW07,W3ADO-1*,qAU,DC8LZ-10:'5Hal @-/]=
01:13:52:05 : KE4AZZ]APS224,PCSAT-11*,qAR,KC2GOW-1:=2702.06N/08209.93Wy KE4AZZ EL87
01:13:53:40 : KE4AZZ]APS224,PCSAT-11*,qAR,KG4PID-12:=2702.06N/08209.93Wy KE4AZZ EL87
```

AMATEUR RADIO SATELLITE COMMUNICATIONS

Slow Scan TV (SSTV) from ISS

ARISS SSTV Event Scheduled for Dec 26

December 21, 2021— An ARISS Slow Scan TV (SSTV) event is scheduled from the International Space Station (ISS). The event is slated to begin on **December 26 at 18:25 UTC** for setup and operation and continue until **December 31 ending at 17:05 UTC**. Dates and times subject to change due to ISS operational adjustments.

Images will be downlinked at 145.8 MHz +/- 3 KHz for Doppler shift and the expected SSTV mode of operation is PD 120. The main theme will be for this event will be lunar exploration. Radio enthusiasts participating in the event can post and view images on the ARISS SSTV Gallery at https://www.spaceflightsoftware.com/ARISS_SSTV/ .

After your image is posted at the gallery, you can acquire a special award by linking to https://ariss.pzk.org.pl/sstv/ and follow directions for submitting a digital copy of your received image.

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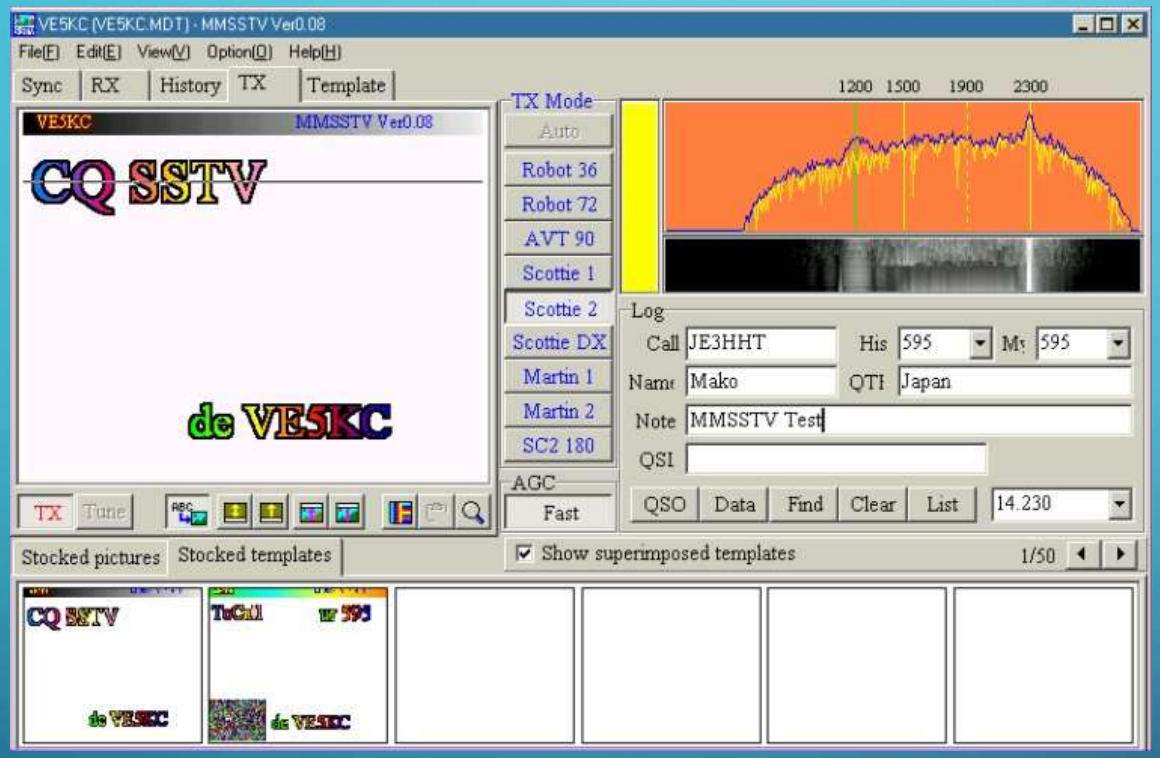
https://hamsoft.ca/pages/mmsstv.php



QSSTV - Linux
Macrobot - Mac
Multimode - Mac
ChromaPix - Win
JVComm - Win
GSH-PC - Win
MMSSTV - Win
MScan - Win

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https://www.spaceflightsoftware.com/ARISS_SSTV/
http://ariss-sstv.blogspot.com/

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https://www.amsat.org/fm-satellite-frequency-summary/

AMSAT Fox-1 Satellites			
	Uplink FM (67 Hz CTCSS)	Downlink FM	Comments
AO-91 (RadFxSat / Fox-1B)	435.250 MHz	145.960 MHz	Operational – Due to battery status, please do not attempt to access while in eclipse.

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.			

AO-27			
	Uplink FM	Downlink FM	Comments
AO-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			

ISS Crossband Repeater			
	Uplink FM (67 Hz CTCSS)	Downlink FM	Comments
ISS Crossband Repeater	145.990 MHz	437.800 MHz	Operational
See ARISS Status for status information			

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https://amsat-uk.org/beginners/how-to-work-fm-satellites/

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http://www.aprs.org/
https://www.ariss.org/
https://www.amsat.org/amateur-radio-on-the-iss/
https://www.ariss.org/current-status-of-iss-stations.html
https://amsat-uk.org/beginners/how-to-work-the-iss-on-aprs-packet-radio/
https://wiki.satnogs.org/
https://wireless.nd.edu/notre-dame-radio-society/
https://www.astroviewer.net/iss/en/
https://www.amsat.org/track/index.php
https://www.amsat.org/status/
https://amsat.org.ar
https://www.n2yo.com/
https://in-the-sky.org/satmap_worldmap.php
https://aprs.fi/
http://www.findu.com/cgi-bin/pcsat.cgi
http://www.ariss.net/
http://hamradiocrashcourse.com/

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Ham Radio Crash Course, Ham Nation
How to Talk to Satellites Using Ham Radio Part 1 With Sean KX9X
https://www.youtube.com/watch?v=Q0NLo1LSIKU
How to Talk to Satellites Using Ham Radio Part 2 with Sean Kutzko KX9X!
https://www.youtube.com/watch?v=W9sDWItdBII
https://spotthestation.nasa.gov/tracking_map.cfm