



Working via satellite in 2026

Michel – ON6QO

Working via satellite has never been so accessible. A ham with a dual-band transceiver, a basic directional antenna and a smartphone can make their first satellite QSOs by next weekend. For those who want to go further, the geostationary satellite QO-100 has quite simply revolutionised the field since 2019.

But to get started properly, you need to know what works in May 2026, what no longer works, and how best to approach the subject. This article takes stock of the situation. The historical background and orbital mechanics are covered separately in "The origins of amateur radio satellites".

1. First things first: listen before you transmit

It is the golden rule of all amateur radio, and satellites are no exception. Even before considering an antenna or a transceiver, you can listen — free of charge, from any computer connected to the internet.

To listen to QO-100 in real time, simply open the WebSDR of Goonhilly Earth Station (eshail.batc.org.uk/nb), hosted in Cornwall, UK. The bandwidth of the narrowband transponder is displayed as a waterfall, with the upper and lower CW beacons clearly visible and, in the middle, the stations on the air — Spanish, Italian, German, South American, Indonesian. An hour of listening is worth more than an hour of reading.

For the passing LEO satellites, online tracking is just as simple: N2YO.com shows the real-time position of all amateur satellites, with the next passes over your QTH. Heavens-Above offers a similar view. amsat.org/status shows live reports from operators worldwide, indicating which satellites are active or out of service.

The purpose of this listening phase is not only to become familiar: it is also to see for yourself that some satellites mentioned in old books or dated bulletins simply no longer respond. The up-to-date list is given in section 9.

Écouter avant d'émettre : trois vérifications simples



Objectif : ne transmettre qu'après avoir vérifié l'activité, la fenêtre de passage et la bande

Figure 1 - Listen before you transmit: WebSDR, tracking and real status of the satellites.

Source: original diagram produced for the article based on BATC/AMSAT-UK WebSDR QO-100, AMSAT

2. Two families, two philosophies: LEO and GEO

Amateur radio satellites fall into two broad categories that call for very different approaches.

Low-orbit satellites (LEO, Low Earth Orbit), at roughly 400 to 1,000 km altitude, pass over our heads in about ten minutes. They make up the vast majority of amateur satellites: ISS, SO-50, RS-44, FO-29, AO-7, GreenCube. They require real-time tracking — an antenna that must rotate (manually or with an automatic rotator) and a frequency that must be compensated for the Doppler effect. The window is short, but the experience is lively: you wait for the pass the way you wait for a sunset.

The geostationary (GEO) satellite Es'hail-2, alias QO-100, sits at 36,000 km altitude, apparently motionless above the equator at 25.9° East. Seen from Ronse, it lies due south, at about 25° elevation. It is always there, day and night, with no apparent movement. The antenna does not move. The frequency stays stable. Its geographic reach runs from eastern Brazil to Thailand: you work South Africans, Pakistanis and Israelis every day as you would neighbours.

Which one should you choose to start with? If the appeal of DX is close to your heart, QO-100 is probably more satisfying: fifty stations at any hour, no stress from the pass, and remarkable audio quality. If you enjoy the challenge of "timing" and the idea of chasing a satellite does not put you off, the FM LEO satellites (SO-50, ISS) offer a more sporting experience — and it is fair to say that most hams eventually try both families, in one order or the other.

Deux familles de satellites radioamateurs : LEO et GEO

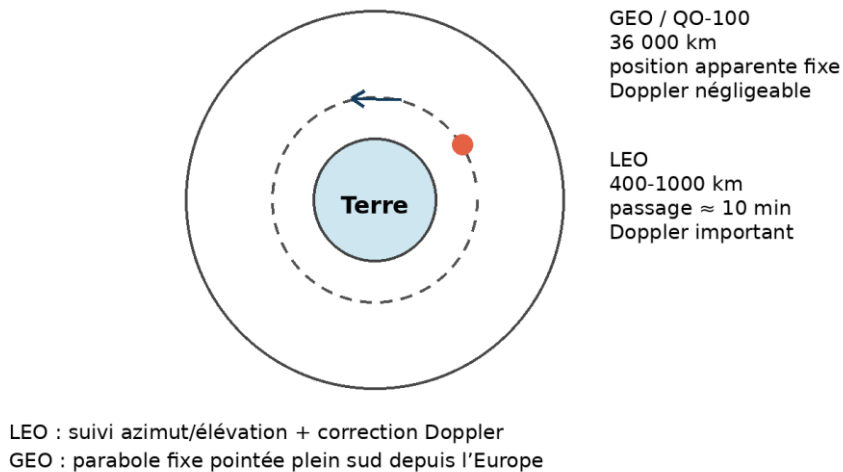


Figure 2 - Practical difference between LEO and GEO satellites.

Source: original diagram, sections 2-3 of the text and the AMSAT-UK / AMSAT-DL documentation on QO-100.

3. QO-100: the silent revolution

Launched on 15 November 2018 from Cape Canaveral and opened to amateur traffic on 14 February 2019, Es'hail-2 is the first geostationary amateur radio satellite in history. It is a multi-tonne Qatari commercial satellite to which two transponders were added and donated to the amateur radio community: a 250 kHz narrowband transponder (NB), and an 8 MHz wideband transponder (WB) reserved for amateur digital television (DATV).

For everyday use — SSB phone, CW, digital modes — it is the NB transponder that interests us. The frequencies are as follows: uplink in the 13 cm band from 2400.050 to 2400.300 MHz, downlink in the 3 cm band from 10489.550 to 10489.800 MHz. Down-conversion is typically handled by a satellite-TV LNB, which brings the signal down to around 739 MHz, a frequency that most SDRs can process without difficulty.

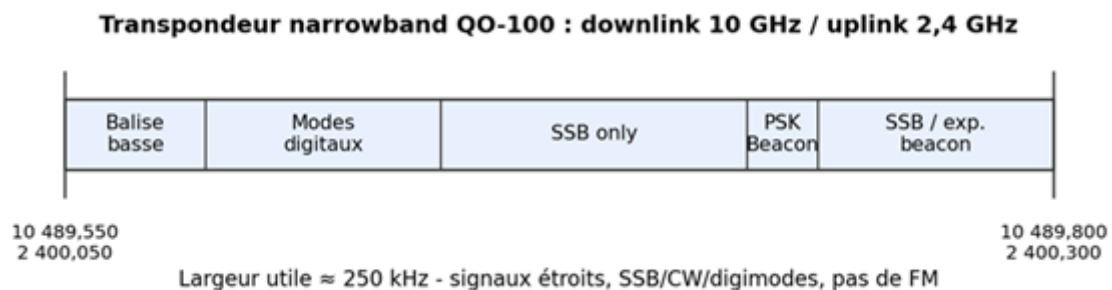


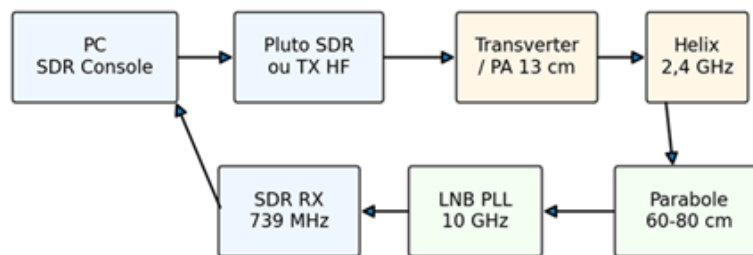
Figure 3 - Simplified layout of the QO-100 narrowband transponder.

Source: original diagram based on AMSAT-DL, 'QO-100 NB Transponder Bandplan and Operating Guidelines'.

A few strict rules govern traffic on QO-100 NB: no FM (this mode eats up the whole bandwidth), transmit power that must never exceed that of the lower CW beacon (otherwise the automatic LEILA system puts a siren alarm into your downlink), and mandatory full-duplex — you must be able to hear yourself while you transmit. Five watts into a 22 dBi directional antenna is more than enough; in practice, you adjust the power so as to stay just at the level of the lower CW beacon, never above it.

What equipment do you need to get started on QO-100? Several configurations are possible. The most economical is based on an Adalm Pluto SDR programmed for TX, a satellite LNB modified for reference stability, a 60 to 80 cm offset dish (recovered from a roof or bought second-hand) and a PC running SDR Console. Total budget: 250 to 400 €. The more classic configuration uses an HF or SDR transceiver driving a 13 cm transverter for transmit, and a separate SDR receiver for the 3 cm band. Higher performance, higher cost.

Chaîne QO-100 NB typique : émission 2,4 GHz et réception 10 GHz convertie



Full-duplex indispensable : on écoute son propre downlink pendant l'émission

Figure 4 - Block diagram of a typical QO-100 NB station.
Source: original diagram based on AMSAT-DL, BATC/AMSAT-UK and the F5LEN station example.

4. The FM LEO satellites: the classic entry route

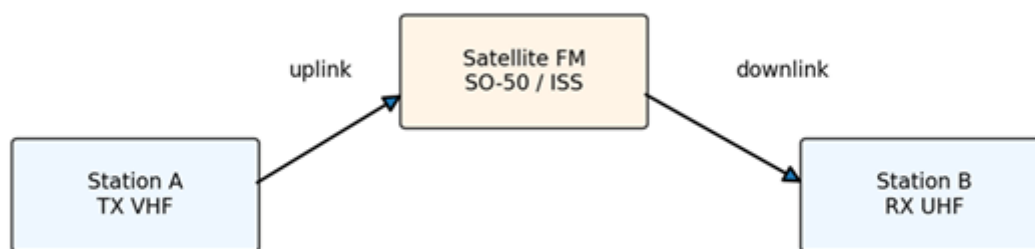
For many operators, entry into satellite operating has historically been through the low-orbit FM satellites. The principle is that of a relay: you transmit on one frequency (uplink), and the satellite retransmits on another (downlink), generally in a different band — typically 2 m to 70 cm or vice versa. The band difference (cross-band) lets you listen to your own signal and avoids direct feedback between transmitter and receiver.

The great classic among the FM LEO satellites is SaudiSat 1C, alias SO-50, launched in December 2002 and still in service in 2026. Its uplink is on 145.850 MHz, its downlink on 436.795 MHz. To activate the transponder, you must send a two-second carrier with a CTCSS sub-tone of 74.4 Hz: this arms a ten-minute timer during which the satellite answers you. During the pass, you then use a CTCSS of 67.0 Hz to open the satellite squelch on each transmission.

The International Space Station also offers a cross-band FM transponder from the Columbus module equipment: uplink 145.990 MHz, downlink 437.800 MHz, CTCSS 67.0 Hz. The CTCSS must be active only on transmit, not on receive. When the repeater is active — most of the time, except during crew communications — it offers very strong, easy-to-work passes, sometimes almost too popular. The ISS makes about 16 passes per day; half a dozen are workable from a given site, with about 23° of longitude shift between successive passes.

FM etiquette on these satellites has its rules: one QSO at a time, ultra-short format (callsign + locator + 73), no long conversations, and above all no transmitting without having listened first. A beginner who throws their callsign into a crowded pass without proper timing will never be heard and risks annoying others. The implicit rule is this: if you do not hear your own signal coming back, you are probably bothering someone else — reduce power or wait for the next pass.

Principe d'un satellite FM défilant : relais cross-band



Cross-band : typiquement 145 MHz → 436/437 MHz ou inversement

Trafic très court : indicatif + locator + 73 ; un seul QSO à la fois

Figure 5 - Principle of a cross-band FM transponder on a LEO satellite. Source: original diagram based on AMSAT, 'Live FM Satellites', and the SO-50 / ISS frequencies cited in the text.

5. Linear transponders: SSB and CW in the sky

Technically more demanding but far more rewarding operationally, linear-transponder satellites receive a slice of band on the uplink and retransmit it in full, with its 30 to 60 kHz of spectrum, on the downlink. Several QSOs can thus take place simultaneously, just as on the HF bands in SSB.

RS-44 is one of the most active in 2026: an inverting transponder (USB on the uplink becomes LSB on the downlink), uplink 145.935-145.995 MHz, downlink 435.610-435.670 MHz, CW beacon on 435.605 MHz. It is a Russian satellite launched in December 2019 and still fully operational — the safe bet for starting satellite SSB.

FO-29, launched in August 1996 by the Japanese space agency, entered a particular new operating phase in early 2026: with its battery dead for years, the satellite works only during

periods when its orbit is in continuous solar illumination. When that is the case (illumination seasons), the transponder is permanently active; otherwise, you must follow the scheduled activation announcements from Japanese ground control. Characteristics: uplink 145.900-146.000 MHz LSB, downlink 435.800-435.900 MHz USB, CW beacon on 435.795 MHz.

AO-7, the old-timer launched in November 1974, has also worked intermittently since its resurrection in 2002 (its completely short-circuited battery reopened into an open circuit, allowing the satellite to run directly from its solar panels when in full sunlight). It is more a curiosity than a satellite for regular traffic, but when it answers, contacting "the oldest still-active satellite in the world" has a certain charm.

GreenCube (IO-117), launched in July 2022, is not a classic transponder but a 1,200 bps digipeater: you send it short digital packets, which it rebroadcasts in store-and-forward mode. Its peculiarity lies in its very high orbit (about 5,800 km altitude), which gives it continental coverage on each pass.

6. The Doppler effect in practice

Every passing satellite is affected by the Doppler effect: as it approaches, its perceived frequency rises; as it recedes, it falls. The magnitude of the phenomenon depends on the frequency and the radial velocity. In low orbit at 400-800 km, the maximum radial velocity is around 7.5 km/s, which in practice gives:

- On the 2 m band (145 MHz): shift of about ± 3.5 kHz
- On the 70 cm band (435 MHz): shift of about ± 10 kHz
- On the 23 cm band (1296 MHz): shift of about ± 30 kHz

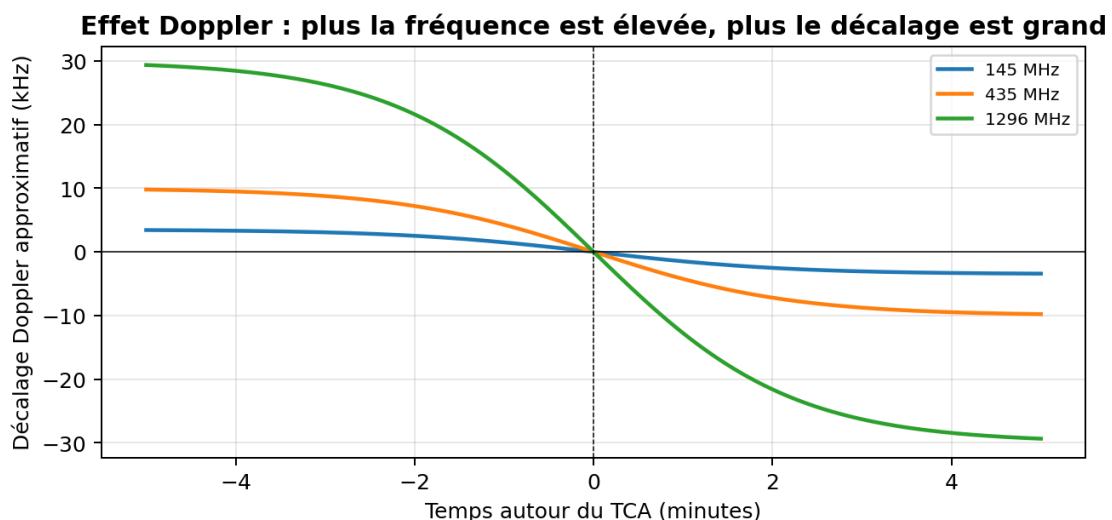


Figure 6 - Order of magnitude of the Doppler effect on 145, 435 and 1296 MHz. Source: original diagram based on the practical values given in the article and the relation $fD = (v/c) \times f$.

In practice, this means that in SSB or CW you must actively compensate the frequency throughout the pass. Three schools exist: manual compensation at the VFO (acrobatic but instructive), compensation on the uplink only with a fixed downlink (the method recommended by AMSAT), and automatic compensation by software that drives the transceiver via CAT (SatPC32, GPredict coupled with Hamlib).

The simple rule: compensate on the high frequency (the one that "slides" most, i.e. the UHF) and keep the low frequency (VHF) constant. In V/U mode (uplink VHF, downlink UHF) this amounts to touching only the receiver's VFO. In U/V mode (uplink UHF, downlink VHF), it is the uplink that must be compensated, which calls for a transceiver and a slightly more advanced methodology.

In FM, Doppler is less critical: the bandwidth of the FM demodulator tolerates several kHz of offset without audible degradation. On SO-50, you generally do not compensate — you accept a slight warble at the start and end of the pass. On the ISS, Doppler can be significant, on the order of 2 to 5 kHz. On QO-100, Doppler is negligible (the satellite is motionless relative to the ground), but a small drift of a few hundred hertz exists due to "station-keeping" — the orbital manoeuvres the satellite performs to maintain its position. This poses no problem in SSB.

7. Equipment: what you really need

The equipment for satellite work has evolved a great deal and now has little in common with the acrobatic rotators and antennas of the 1990s. Here are three typical configurations to get started.

FM LEO configuration: the simplest, from about 200 €. A dual-band VHF/UHF transceiver such as a Yaesu FT-65, FT-70D, Kenwood TH-D74 or even a well-adjusted Baofeng UV-5R. A dual-band crossed yagi antenna such as the Arrow II 146/437 or Elk Antennas 2M/440L5 (about 130 €). An Android smartphone with Look4Sat or an iPhone with ISS Detector. That's all. You hold the antenna in your hand, point it at the satellite and talk. For the SO-50 CTCSS, check that the transceiver can indeed use two different tones on TX (74.4 Hz for arming, 67.0 Hz for traffic).

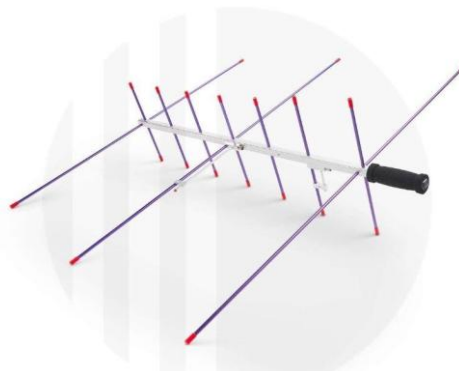
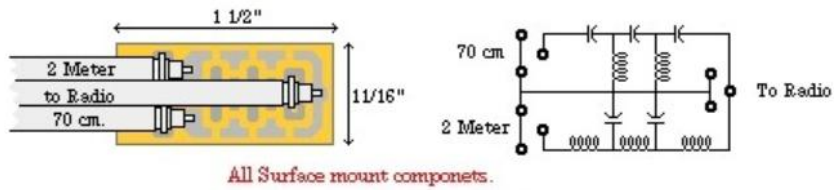


Figure 7 - Crossed yagi antenna 2 m / 70 cm held in the hand (Arrow II type)

Model 10W (Low Power) Duplexer for 146/437-10



Max. Power is 10 Watts.

Duplexer fits inside the Boom,
Coax is routed under Foam Grip

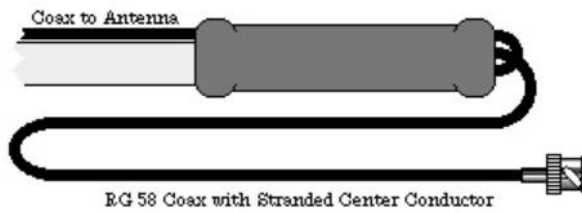


Figure 8 - Duplexer 146/437 (Arrow Model 10W): schematic and integration in the boom. Duplexer for transmit/receive with a single transceiver — www.arrowantennas.com

Diagram 1: Simplified standard configuration (with duplexer)

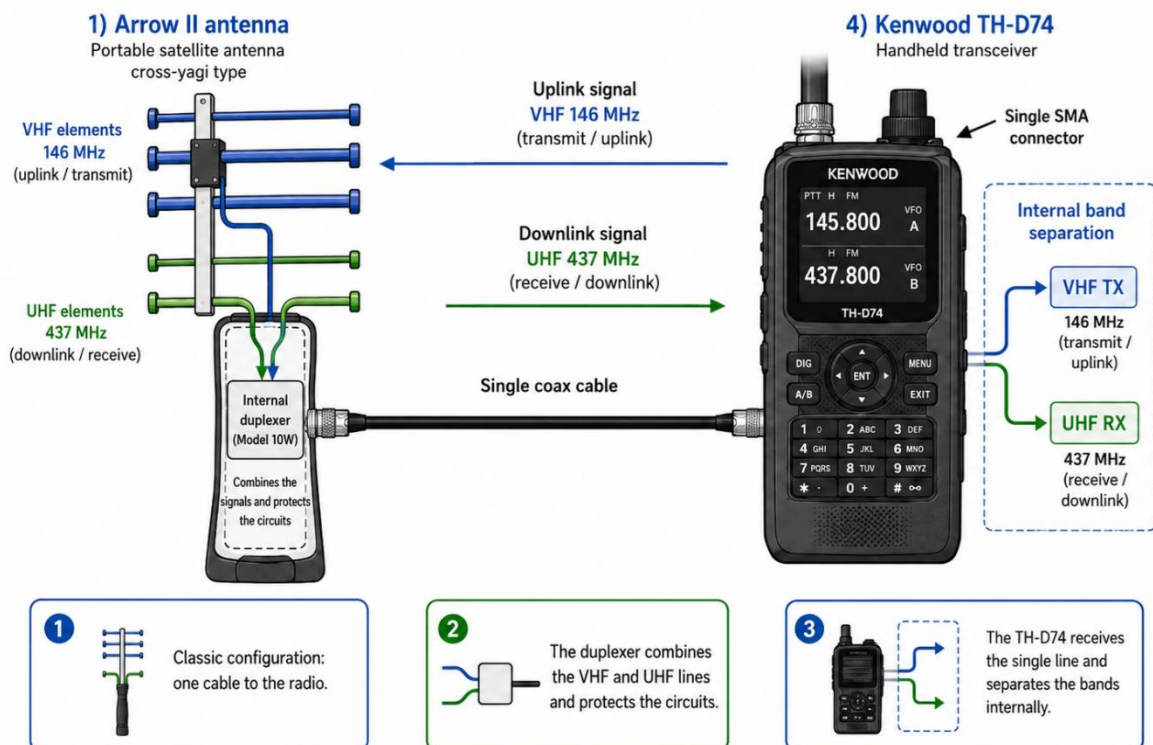


Figure 9 - Simplified standard configuration (with duplexer).

Graphics: ON7VZ.

Diagram 2: Direct full-duplex configuration (without duplexer)

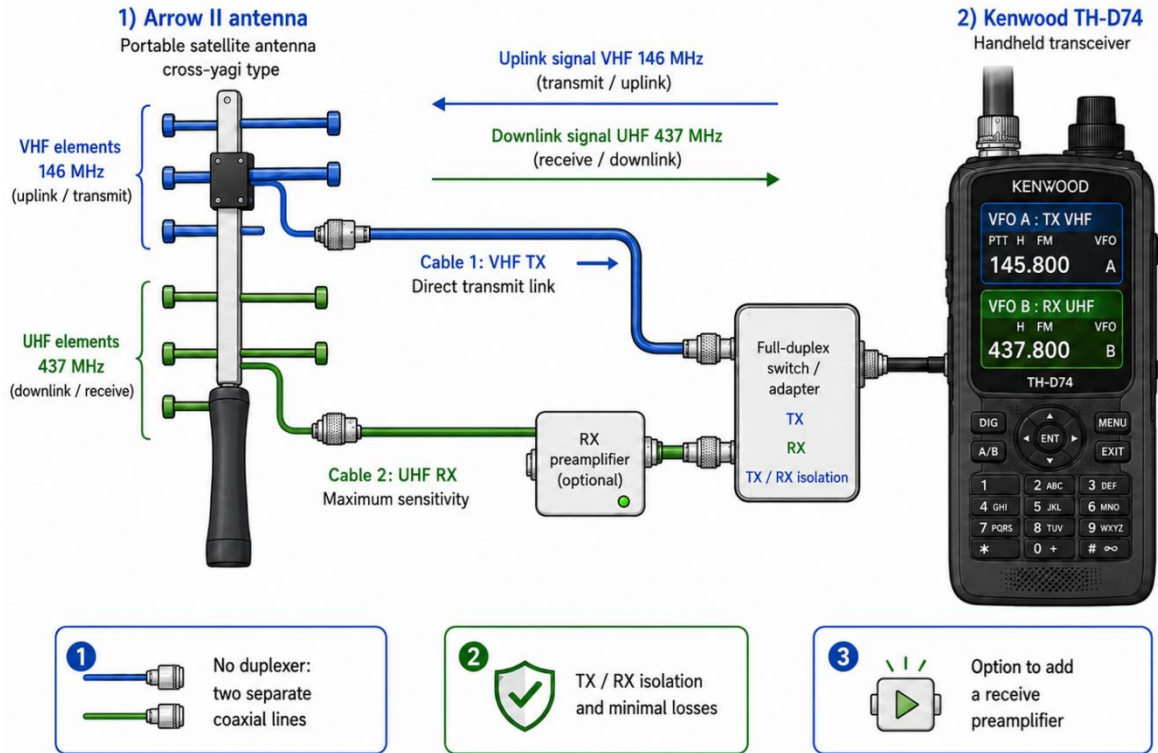


Figure 10 - Direct full-duplex configuration without duplexer.

Graphics: ON7VZ.

Diagram 3: Configuration with 2 TH-D74

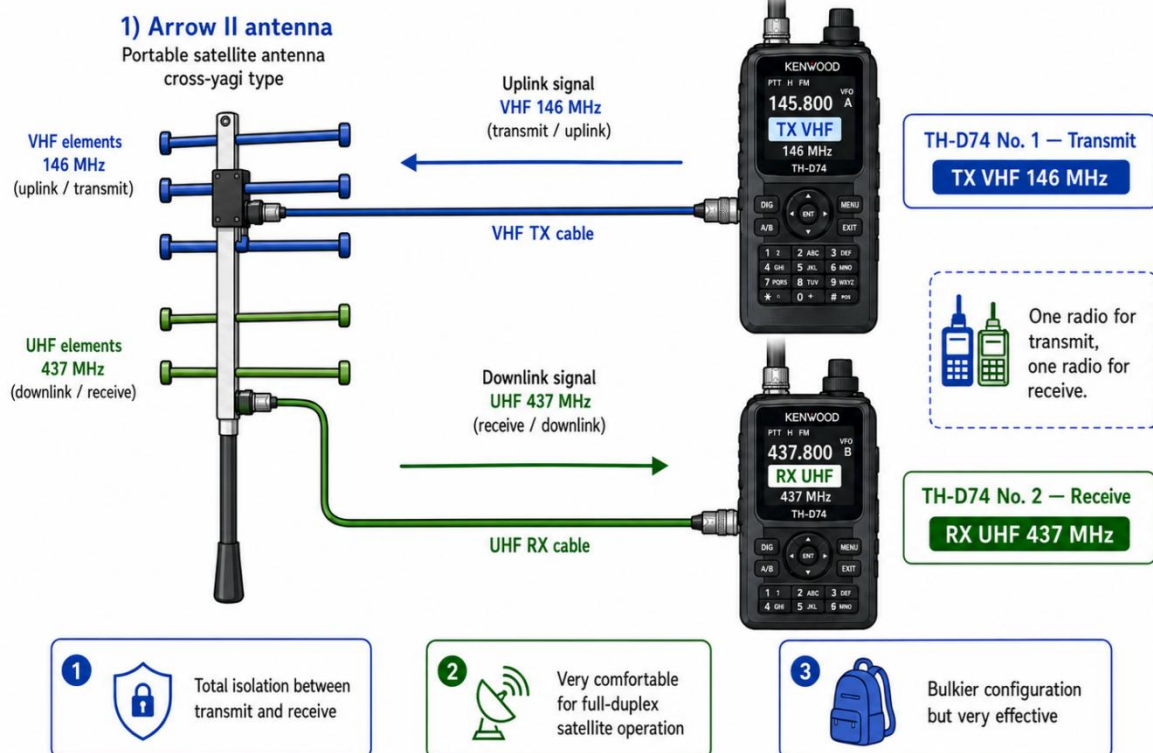


Figure 11 - Configuration with 2 TH-D74.

Graphics: ON7VZ.

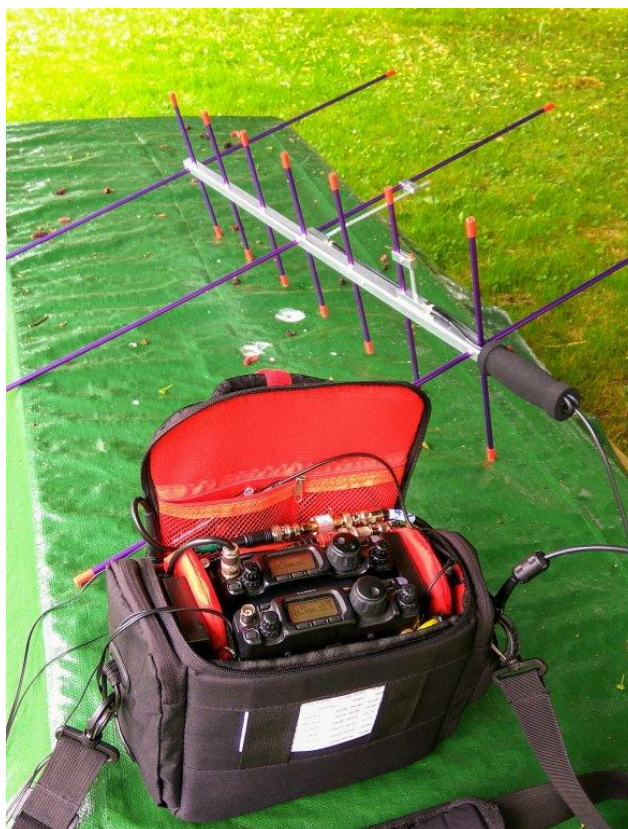
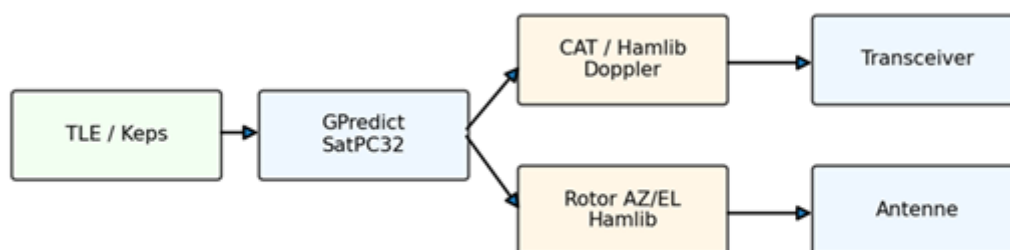


Figure 12 - Complete portable station: two transceivers and a crossed Arrow yagi in the field.
setup ON6QO

SSB/CW LEO configuration for the linear transponders, from 800 €. A VHF/UHF transceiver in SSB: Icom IC-705 (portable, built-in battery), Yaesu FT-991A, or Icom IC-9700 (the satellite reference, native full-duplex). A higher-performance crossed yagi antenna (M2 LEO-Pack, Wimo X-Quad...). Ideally, an azimuth/elevation rotator such as the Yaesu G-5500, but you can start with manual pointing. A PC running GPredict or SatPC32 provides prediction and Doppler control via CAT.

Chaîne logicielle de suivi satellite



Le logiciel calcule la position du satellite puis pilote fréquence et/ou rotor.

Figure 13 - Software chain: prediction, Doppler CAT and rotator. Source: original diagram based on the GPredict / Hamlib documentation and the software cited in the article.

Diagram 4: Satellite SSB station with IC-9700, Az/El rotor and PC



Figure 14 - SSB satellite station with IC-9700, Az/El rotator and PC.

Graphics: ON7VZ.



Figure 15 - Yaesu antenna rotator



Figure 16 - Crossed yagi antenna in a fixed outdoor installation.

QO-100 NB configuration, from 250-400 €. A 60-80 cm offset dish (often recoverable for free from rooftops). A consumer satellite-TV LNB, modified for reference stability (PLL OCXO model or GPS reference oscillator modification). On the transmit side, either a 13 cm driver transverter (DXpatrol, SG-Lab) coupled to an HF transceiver, or an Adalm Pluto SDR programmed for TX. A small 2.4 GHz directional antenna (helix, patch or horn). On the receive side, an SDR such as an RTL-SDR v3 or Airspy R2. On the software side, SDR Console v3 (free and very complete) or Linrad. This is the most modular configuration, and the one that opens the most doors to advanced modes (DATV, measurements, experiments).

Diagram 5: Modular microwave satellite station with offset dish, modified LNB, SDR and transverter

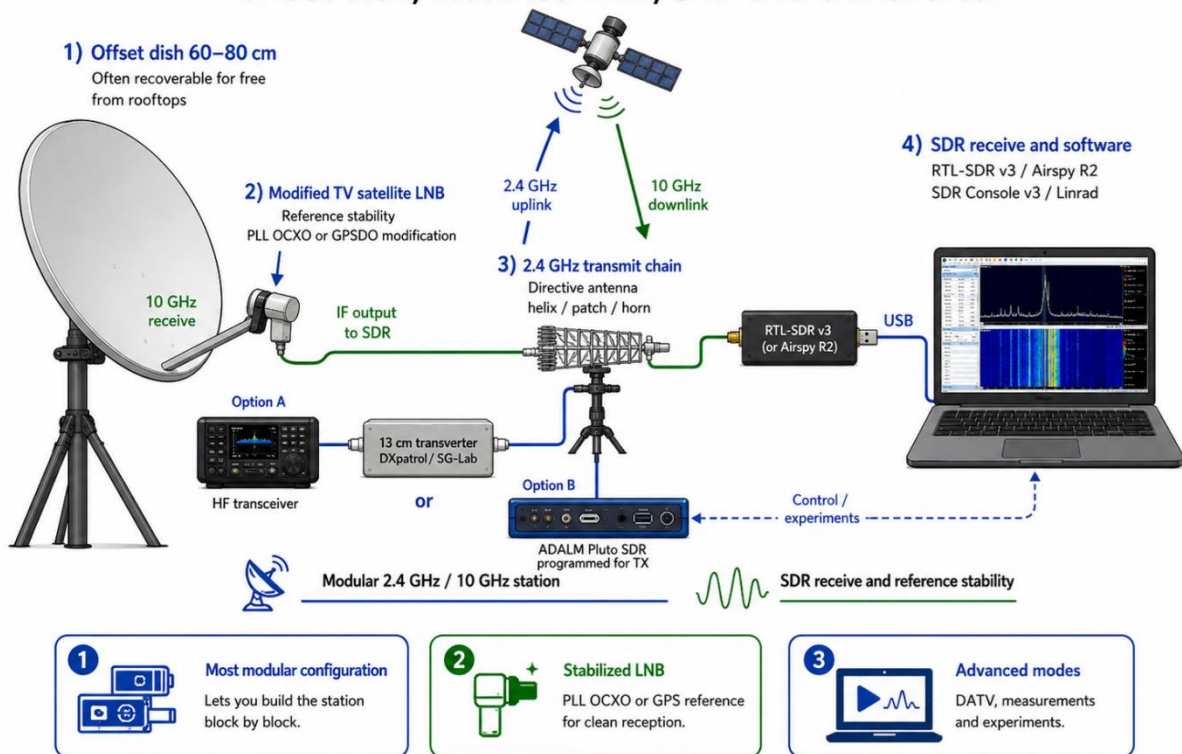


Figure 17 - Modular microwave satellite station with dish, modified LNB, SDR and transverter.

Graphics: ON7VZ.

8. Software and tools in 2026

The landscape of satellite tracking and prediction software has modernised considerably. Here is the current selection.

For predictions and real-time tracking: GPredict, free and cross-platform (Linux, Windows, macOS), is the open-source reference. Look4Sat on Android is an excellent mobile app to prepare your passes on the move. SatPC32 remains the paid reference (60 €), notably for advanced CAT control of transceivers like the IC-9700 with bidirectional Doppler compensation. N2YO.com offers a web view with no installation, handy to start out or check occasionally. For Mac, MacDoppler from Dog Park Software is an excellent option.

There are also many other programs: Satview, Nova, Instanttrack, Orbitron, Satexplorer, Jsattrak and Heavens-Above.

N2YO.com Tracking **18983** objects as of 12-Feb-2018
 HD Live streaming from Space Station
 1,613 objects crossing your sky now


188 will cross your sky in 11h 51m 14s

Find a satellite... Search
 N2YO.com on Facebook Advanced

Home Most tracked Just launched Satellites on orbit Alerting tools More stuff Sign In

Monitor Clients Remotely

SolarWinds RMM: Remote Monitoring & Management that Really Works. Finally.
 pages.solarwindsmrp.com



FOX-1D (AO-92)

NORAD ID:	43137
LOCAL TIME:	23:24:51
UTC:	22:24:51
LATITUDE:	-78.54
LONGITUDE:	128.50
ALTITUDE (km):	527.04
ALTITUDE (mi):	327.49
SPEED (knots):	7.8
SPEED (mi/s):	4.72
AZIMUTH:	162.3 SSE
ELEVATION:	-72.3
RIGHT ASCENSION:	19h 19m 15s
DECLINATION:	-85° 18' 25"
Local Station Time:	08h 16m 46s

The satellite is in day (night)

SATELLITE PERIOD: 95m

10-DAY PREDICTIONS FOR FOX-1D (AO-92)

Make A Donation

Your current location

Your IP address: 81.245.128.104
 Latitude: 60.88923°
 Longitude: 6.06082°
 Magnetic decl.: 0° 53' E
 Local time: GMT+1
 zone: GMT+1

Is this incorrect?
 Set your custom location

Draw orbits Draw footprint Keep selection centered Large map

Figure 18 - Tracking N2YO

N2YO.com Tracking **18983** objects as of 12-Feb-2018
 HD Live streaming from Space Station
 1,651 objects crossing your sky now

ISS will cross your sky in 11h 43m 32s

Find a satellite... Search
 N2YO.com on Facebook Advanced

Home Most tracked Just launched Satellites on orbit Alerting tools More stuff Sign In

Streaming Video Hosting **FOX-1D (AO-92)**

Real Time Satellite Tracking [Track FOX-1D \(AO-92\) now!](#)
[10-day predictions](#)

Satellite Views FOX-1D (AO-92) is classified as:
 Amateur radio

Live Satellite Images

Cell Phone Tracking Device
 NORAD ID: 43137
 Int'l Code: 2018-004A
 Perigee: 498.9 km
 Apogee: 512.5 km
 Inclination: 97.6°

GPS Cell Phone Tracking
 Period: 94.6 minutes
 Semi major axis: 6876 km
 RCS: Unknown


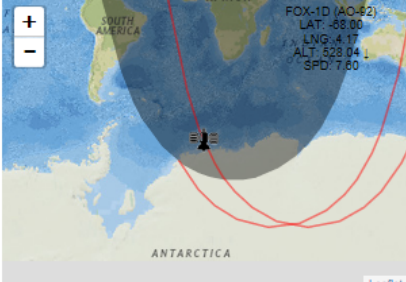
Live Streaming TV
 Launch date: **January 12, 2018**
 Source: United States (US)
 Launch site: SRIHARIKOTA (SRI)
 Uplink (MHz): 435.350/1267.350
 Downlink (MHz): 145.880
 Beacon (MHz): 145.880
 Mode: FM CTCSS 67.0Hz/200bps DUV
 Call sign:
 Status: **Active**

Outer Space Videos

Free Satellite Television

GPS Tracking Services

Your satellite tracking list
 FOX-1D (AO-92) is on your list
 FOX-1D (AO-92)
[Track 1 satellite\(s\)](#)

Powered by N2YO.com Local Time: GMT+1

Figure 19 — Tracking N2YO – detail of a satellite

For QO-100 specifically: SDR Console v3 (Simon Brown), free and particularly suited to the NB transponder; it lets you display uplink and downlink in a synchronised waterfall. Linrad is the alternative for those who like more academic tools. For the initial pointing of the dish, the calculator eshail.batc.org.uk/point gives the azimuth and elevation angles from any QTH.

9. Which satellites can you really use in May 2026?

This is the question every beginner should ask before buying an antenna or putting together a station. The situation evolves continuously — one satellite may fail, another may re-enter the atmosphere, and a third may be restarted. The table below gives the state of play as of May 2026, to be confirmed before each session on amsat.org/status.

Satellite	Status	Type	Practical notes
QO-100 / Es'hail-2	Active 24/7	GEO, NB and WB transponder	The satellite of choice. No FM. Full-duplex mandatory.
SO-50 (SaudiSat 1C)	Active	LEO FM cross-band	CTCSS 74.4 Hz to arm, 67.0 Hz for traffic
ISS	Active (FM, APRS)	LEO	FM repeater Columbus. APRS on 145.825 MHz simplex.
RS-44	Active	LEO linear transponder	One of the most active in 2026. SSB/CW. Inverting.
FO-29 (JAS-2)	Intermittent	LEO linear transponder	Active only in continuous solar illumination.
AO-7	Intermittent	LEO linear transponder	Over 50 years in orbit. Historical curiosity.
GreenCube (IO-117)	Active	LEO digipeater, 1200 bps	4FSK mode. Continental coverage.
AO-91, AO-85, AO-92	Out of service	—	Fox-1 family: no longer to be considered usable.

See also the KH2XX tables in the appendix.

10. Etiquette and golden rules on the satellites

Good practice on satellites comes down to a few simple but essential principles.

On QO-100 NB: no FM, no signal stronger than the lower beacon (otherwise LEILA triggers its alarm), and full-duplex mandatory to hear your own downlink. Accepted modes are SSB, CW, FT8, RTTY and PSK. No internet gateway allowing remote operation — only operation from the operator's physical station is allowed.

The maximum-bandwidth rule of 2,700 Hz must be respected. No DSTAR, C4FM or other wideband digital modes on the NB transponder (they belong on the WB).

On the FM LEO satellites: one QSO at a time, short format (callsign + locator + 73 or a quick exchange), no monopolising the pass, and listen first. If you hear several stations calling each other, wait your turn or the next pass. Courtesy on a much-sought-after satellite like the ISS during a favourable pass can make all the difference between success and frustration.

On the linear transponders (RS-44, FO-29, AO-7): SSB and CW share the same passband. No AM, no FM. Stay within the transponder's bandwidth (check the limits). Compensate Doppler by turning the transmit VFO (or receive VFO, depending on the convention), not by increasing power.

Always and everywhere: log the QSO. Request a QSL if it pleases you, respecting the correspondent's preference (paper via the UBA bureau, LoTW, eQSL, QRZ.com).

11. Your first satellite QSO: the step-by-step procedure

In practical terms, how do you make your first satellite QSO? Let's take the most accessible case: SO-50 in FM, with a dual-band transceiver and a hand-held crossed yagi antenna.

Step 1, planning: the day before or a few hours ahead, check in GPredict or Look4Sat the passes of SO-50 over Ronse for the coming twelve hours. Choose a pass with maximum elevation above 30° (a "high" pass) and duration over 8 minutes. Note the time of AOS (Acquisition Of Signal), TCA (Time of Closest Approach) and LOS (Loss Of Signal).

Step 2, preparing the transceiver: store the uplink and downlink frequencies of SO-50 in two memory channels (145.850 MHz on TX, 436.795 MHz on RX), with the CTCSS sub-tone 67.0 Hz programmed on TX. Check that the mode is indeed FM, not DV or anything else. Set the power to low (typically 5 W).

Step 3, just before AOS: take out the yagi antenna, check the connections, switch on the transceiver, and listen to the downlink on the RX channel. A few minutes before the calculated AOS, switch to TX and send a two-second carrier with the CTCSS changed to 74.4 Hz to arm the satellite (this requires a transceiver that allows the CTCSS tone to be changed on the fly). The internal timer of SO-50 will then start a ten-minute window during which it will answer you.

Step 4, during the pass: point the antenna in the expected direction (Look4Sat does the work) and listen to the signal as it appears. First you hear stations calling each other. Wait for a quiet moment. Transmit briefly: « Oscar November Six Quebec Oscar », then pause. If a station answers with your callsign, exchange quickly: « Tango Hotel Five X-ray, you're Five Nine, JO10TR ». Log immediately afterwards.

Step 5, after LOS: note the complete QSO in the log (date, UTC time, callsign, locator, satellite mode SO-50). If the contact really has value (distant DX, first time), prepare the QSL.

Premier QSO satellite FM : déroulé pratique d'une pass

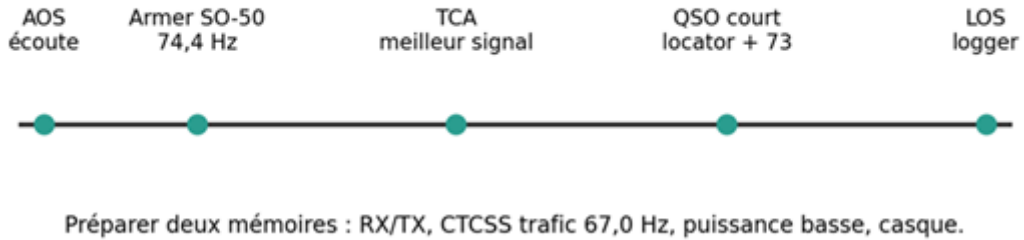


Figure 21 - Practical sequence of a first FM QSO on SO-50. Source: original diagram based on the step-by-step procedure of section 11 and the AMSAT SO-50 data.

And then? One successful QSO calls for ten more. You'll want to try SSB on RS-44, then QO-100 as a fixed station, then the GreenCube digipeater in digital. Each satellite opens a door. Good DX, and looking forward to hearing you in the sky.

— Article written by Michel ON6QO

Bibliography and sources of the illustrations

AMSAT-DL, 'QO-100 NB Transponder Bandplan and Operating Guidelines', <https://amsat-dl.org/en/p4-a-nb-transponder-bandplan-and-operating-guidelines/>

AMSAT-DL, 'International QO-100 Emergency Frequency' and QO-100 footprint, <https://amsat-dl.org/en/international-qo-100-emergency-frequency/>

BATC / AMSAT-UK / Goonhilly, 'Qatar-OSCAR 100 Narrowband WebSDR', <https://eshail.batc.org.uk/nb/>

AMSAT, 'Live FM Satellites', updated 25 May 2026, <https://www.amsat.org/live-fm-satellites/>

[F5LEN, 'Station satellite Es'hail 2 / QO-100', 10 May 2019, <https://f5len.org/blog/station-satellite-eshail-2-qo-100/>

Csete / GPredict, GitHub repository and GPredict documentation, <https://github.com/csete/gpredict> and <https://oz9aec.dk/gpredict/>

BATC / AMSAT-UK, QO-100 pointing calculator, <https://eshail.batc.org.uk/point/>

AMSAT, 'AMSAT Live OSCAR Satellite Status Page', <https://www.amsat.org/status/>

N2YO, satellite tracking web, <https://www.n2yo.com/> ; Heavens-Above, satellite predictions, <https://www.heavens-above.com/>

AMSAT-UK, 'Es'hail 2 / QO-100', <https://amsat-uk.org/satellites/geo/eshail-2/>

Hamlib project, CAT and rotator control library, <https://hamlib.github.io/>

Essential web resources

A few links worth bookmarking when preparing your satellite operating sessions.

- amsat.org/status — real-time satellite status, activity reports
- amsat.org — AMSAT-NA reference site
- amsat-uk.org — AMSAT UK, rich in tutorials and documentation
- amsat-dl.org — AMSAT Deutschland, QO-100 and P4-A documentation
- n2yo.com — real-time multi-satellite web tracking
- celestrak.com — up-to-date TLEs and Keplerian elements for all software
- eshail.batc.org.uk/nb — WebSDR QO-100 narrowband (Goonhilly)
- eshail.batc.org.uk/wb — Spectrum viewer QO-100 wideband DATV
- eshail.batc.org.uk/point — QO-100 dish pointing calculator
- gpredict.oz9aec.net — official GPredict site (free)
- satpc32.com — SatPC32 (paid reference, Windows)






Active FM satellites – KH2XX

 FM Satellite Table By KH2XX Updated 27MAY2026											
Satellite Voice FM		CH#	TX Uplink	CTSS	RX Downlink	Doppler Shift					
ISS Crossband Repeater NORAD ID: 25544 http://www.amsat.org/status				67.0	437.810	AOS					
				67.0	437.805	1/4					
			145.990	67.0	437.800	MID					
				67.0	437.795	3/4					
				67.0	437.790	LOS					
<table border="1"> <tr><td>Aquisition of Signal</td></tr> <tr><td>1/4 through pass</td></tr> <tr><td>Mid pass</td></tr> <tr><td>3/4 through pass</td></tr> <tr><td>Loss of signal</td></tr> </table>							Aquisition of Signal	1/4 through pass	Mid pass	3/4 through pass	Loss of signal
Aquisition of Signal											
1/4 through pass											
Mid pass											
3/4 through pass											
Loss of signal											
SO-50 SaudiSat 1-C (Saudi-OSCAR 50) NORAD ID: 27607 Requires an activation Tone (Open): 74.4 Hz (activates 10-minute operating window)			145.850	74.4	N/A	Open					
				67.0	436.805	AOS					
			145.850	67.0	436.800	1/4					
				67.0	436.795	MID					
				67.0	436.790	3/4					
AO-123 ASRTU-1 (ASRTU-OSCAR 123) NORAD ID: 61781 (Activation of FM Voice Repeater Weekends only)				67.0	435.410	AOS					
				67.0	435.405	1/4					
			145.850	67.0	435.400	MID					
				67.0	435.395	3/4					
				67.0	435.390	LOS					
IO-86 LAPAN-A2 (Indonesia-OSCAR 86) NORAD ID: 40931 https://lx.com/pr_teksat				88.5	435.890	AOS					
				88.5	435.885	1/4					
			145.880	88.5	435.880	MID					
				88.5	435.875	3/4					
				88.5	435.870	LOS					
AO-91 FOX-1B (OSCAR 91/RADFxSAT) NORAD ID: 43017 Due to Battery life:			435.260	67.0		AOS					
			435.255	67.0		1/4					
			435.250	67.0	145.960	MID					
			435.245	67.0		3/4					
			435.240	67.0		LOS					
QMR-KWT-2 RS95S (Moon of Kuwait 2) NORAD ID: 67291 Check Schedule for status				67.0	436.960	AOS					
				67.0	436.955	1/4					
			145.920	67.0	436.950	MID					
				67.0	436.945	3/4					
				67.0	436.940	LOS					
Tevel 2-3/2-7 NORAD ID: 63218/ 63238 All Tevel Objects have the same Uplink and downlink				N/A	436.410	AOS					
				N/A	436.405	1/4					
			145.970	N/A	436.400	MID					
				N/A	436.395	3/4					
				N/A	436.390	LOS					

Active SSTV satellites – KH2XX

 FM Satellite SSTV Table By KH2XX Updated 14MAY2026				
SSTV Satellites		Mode	RX Downlink	Status
ISS Zarya http://www.amsat.org/status 		1200bps AFSK SSTV PD-120	800 MHz/437.550 MHz	MAY 8 - 12 UHF Robot 36 Speculation on frequency
ArcticSat-1 RS74S NORAD ID: 61782 Set to deorbit soon Service life extended until June 22 		2k4 GMSK_USP SSTV Robot 36	435.890 MHz	Active Check Schedule
HyperView-1G RS66S NORAD ID: 61772 		2k4 GMSK_USP SSTV Robot72, among others	436.540 MHz	Active Check Schedule
IO-86 LAPAN-A2 (Indonesia-OSCAR 86) NORAD ID: 40931 		FM tone 88.5Hz/APRS SSTV P90	435.880 MHz	Active Check Schedule
Luca-1 RS90S NORAD ID: 67287 		AX.25/GMSK 2k4 to 19k2 bps SSTV Robot 36	437.180 MHz	Sporadic
Ruzaevka-390 RS44S NORAD ID: 61765 		1143bps AFSK SSTV Robot 36	437.050 MHz	Active Check Schedule
SONATE-2 DP0SNX NORAD ID: 59112  		SSTV Martin M1	145.880 MHz	Active Check Schedule
UmKA-1 RS40S NORAD ID: 57172 May 24 01:36 UTC - May 25, 11:59UTC 		2k4/4k8/9k6*GMSK _USP SSTV Robot 36 sometimes supports PD 120	437.625 MHz	Active Check Schedule
Vizard-Meteo RS38S NORAD ID: 57189 		SSTV Robot 36 (sometimes Robot72)	437.825 MHz	Active Check Schedule
Monitor-3 RS58S (Sputnik-Monitor-3) NORAD ID: 57180 		SSTV Robot 36	435.290 MHz	Active Check Schedule
SAKHACUBE-CHOLBON RS18S NORAD ID: 67290 		SSTV Robot 36	437.350 MHz	Active Check Schedule
GALAPAGOS-UTE-SWSU (HC1PX) NORAD ID: 98428 Equinocial Technological University, Ecuador 		SSTV Robot 36	437.050 MHz (AFSK) Alternative/Data Downlink: 435.750 MHz (FSK)	Active Check Schedule






Active SSDV satellites – KH2XX

Working SSDV Table By KH2XX Updated 27/MAY/2024			
SSDV Satellites	Mode	RX Downlink	Status
IO-86 LAPAN-A2 (Indonesia-Oscar 86) NORAD ID: 40201 The satellite operates in a low-inclination orbit, making it primarily visible within 60° degrees of the equator.	 FM tone 06500APRS 88TV P90	405.880 MHz	Active Check Schedule
AO-123 ASRTU-1 (ASRTU-Oscar 123) NORAD ID: 51751 Check Status	 APRS at 9000 baud	406.310 MHz	Active Check Schedule
DISCO-2 NORAD ID: 58381 In-Orbit Operational Commissioning	  APRS at 2 Mbps PDX at 9000 baud	1500 MHz-437.070	Testing
HADES-SA (SpinnyONE) NORAD ID: 58380 In-Orbit	 PDX at 200-1800 baud	406.075 MHz	Active Check Schedule

Satellites under study – KH2XX

 FM Satellite Table By KH2XX Updated 27MAY2026						
Upcoming Fm Satellites		CH	TX Uplink	CTSS	RX Downlink	Note
Chinese Space Station 1 V/U Tiangong NORAD ID: 48274 Chinese Space Station 1 U/V Installation and Activation TBD. Also SSTV, Crew Voice, and Packet Frequencies https://www.amsat.org/upcoming-fm-satellites/			145.900	TBD	436.520	AOS
				TBD	436.515	1/4
				TBD	436.510	MID
				TBD	436.505	3/4
				TBD	437.790	LOS
			435.085	TBD		AOS
			435.080	TBD		1/4
			435.075	TBD	145.985	MID
	435.070	TBD		3/4		
	435.065	TBD		LOS		
Lobachevsky RS83S (UNN-S-Lobachevsky) NORAD ID: 98429				435.510	67.0	AOS
				435.505	67.0	1/4
			435.500	67.0	145.910	MID
			435.495	67.0		3/4
			435.490	67.0		LOS
CAS-7C (Chinese Amateur Satellite 7C) NORAD ID: 44909				67.0	435.700	AOS
				67.0	435.695	1/4
			145.900	67.0	435.690	MID
				67.0	435.685	3/4
				67.0	435.680	LOS
CRAC-01 NORAD ID: TBD				435.910	TBD	AOS
				435.905	TBD	1/4
			435.900	TBD	145.980	MID
				435.885	TBD	3/4
				437.880	TBD	LOS
HADES-E2 (UNNE-1B) NORAD ID:TBD Launch planned for June 2026				TBD	436.885	AOS
				TBD	436.880	1/4
			145.875	TBD	436.875	MID
				TBD	436.870	3/4
				TBD	436.865	LOS
Lilium-4 NORAD ID:98391 In-Orbit/ Operational. Commissioning				TBD	TBD	AOS
				TBD	TBD	1/4
			145.825	TBD	TBD	MID
				TBD	TBD	3/4
				TBD	TBD	LOS
EM/FM2 Momiji (Gardens 5) NORAD ID:TBD In development Launch planned for 2026				TBD	TBD	AOS
				TBD	TBD	1/4
			TBD	TBD	TBD	MID
				TBD	TBD	3/4
				TBD	TBD	LOS
MARINA NORAD ID:TBD Launch planned for SpaceX Transporter-17 Rideshare 2026				TBD	TBD	AOS
				TBD	TBD	1/4
			TBD	TBD	TBD	MID
				TBD	TBD	3/4
				TBD	TBD	LOS
MARMOTsat Launch planned for SpaceX Transporter-17 Rideshare 2026				TBD	TBD	AOS
				TBD	TBD	1/4
			TBD	TBD	TBD	MID
				TBD	TBD	3/4
				TBD	TBD	LOS
Gemini-Pollux NORAD ID: 98320 (Temp) In-Orbit Not active yet				TBD	437.210	AOS
				TBD	437.205	1/4
			145.900	TBD	437.200	MID
				TBD	437.195	3/4
				TBD	437.190	LOS

Inactive satellites – KH2XX

 In-Orbit Inactive Updated 27MAY2026		CH#	TX Uplink	CTSS	RX Downlink	Doppler Shift			
PO-101 DIWATA-2 (Philippines-OSCAR 101) NORAD ID: 43678 Archiving soon due to inactivty 			437.510	141.3	145.900	AOS	Acquisition of Signal		
			437.505	141.3		1/4	1/4 through pass		
			437.500	141.3		MID	Mid pass		
			437.495	141.3		3/4	3/4 through pass		
			437.490	141.3		LOS	Loss of signal		
LilacSat-2 CAS-3H NORAD ID: 42725 Planned to be active for 24 hours at a time starting around 2200 UTC on Mon, Wed, and Fri. 				N/A	437.210	AOS			
					N/A	437.205	1/4		
			144.350		N/A	437.200	MID		
					N/A	437.195	3/4		
					N/A	437.190	LOS		
DISCO-2 NORAD ID:98381 In-Orbit/ Operational. Commissioning  					TBD	435.260	AOS		
						TBD	435.255	1/4	
			145.825			TBD	435.250	MID	
						TBD	435.245	3/4	
						TBD	435.240	LOS	