

Ham Satting

Developer: Yousuf AL Balushi - Ham Satting Project. A41UX - Unixeer™

1. Introduction	5
What is Ham Satting?	5
Who Should Use This App?	5
Key Features at a Glance	5
2. Getting Started	7
First-Time Setup (IMPORTANT!)	7
3. Interactive Map & Grid Locator	8
Understanding the Map Page	8
Map Controls (Right Side)	8
Real-Time Satellite Tracking	8
Worked Grids on the Map	9
4. AR Tracking & Recording	9
What is Doppler Shift?	9
How to Access AR Doppler	9
Doppler Features	9
Using Doppler Correction	10
SSTV/SSDV Audio Recording	11
SSDV Mode	11
Digital Mode	12
Weather Mode	12
5. Satellite Pass Predictions	13
Understanding Satellite Passes	13
Understanding Pass Cards	13
Time Until Display Formats	13
Compass Pass Visualization	13
Exporting Predictions	14
6. QSO Logging & Management	15
What is a QSO?	15
Logging a New QSO	15
QSO List Management	16
Editing a QSO	16
7. SSTV Decoder	17
Accessing the SSTV Decoder	17
Supported SSTV Modes	17
How to Decode an SSTV Image	17
Adjustment Controls	17
Saving and Sharing	19
Tips for Best Results	19
8. Settings & Configuration	20
Default Values Section	20
API Management	20
9. Troubleshooting	21
API Counter Issues	21
Doppler Not Showing	21
SSDV/SSTV Recording Issues	21
Time Until Not Updating	23
10. Frequently Asked Questions	24
General Questions	26
11. Support & Contact	27

Getting Help.....	27
Acknowledgments	27
12. Legal & Copyright	28
Disclaimer.....	28
Privacy.....	28
13. Changing Your Callsign	28
Setting your new callsign	28
QSL cards and exports.....	28
Your online QSL services.....	28
Appendix — April 2026 Updates.....	28
Collapsible QSO List	28
Tips & Tricks Library Expanded	29
QSL Card Export	29
Appendix — April 22, 2026 Updates	29
Themed Auto-Complete Dropdowns.....	29
Appendix — April 23, 2026 Updates	29
My APRS Beacons on Map.....	29
Appendix — April 24, 2026 Updates	30
Heard By: Stations That RF-Received Your Beacon	30
Appendix — APRS Callsign + Live Refresh	31
Dedicated APRS Callsign Field	31
Live Position Refresh Every 30 Seconds.....	31
Appendix — APRS expansion (Apr 25 2026).....	32
Track lines for moving rigs	32
Velocity arrow on moving rigs	32
Tap-driven heard-by	32
Smaller markers with real APRS symbols	32
Object / Item shape distinction	32
Bulletins feed	32
SSID filter chips	32
Rate-limit safe-side budget	33
What didn't change.....	33
Appendix — April 26, 2026 Updates	33
Map: Followed APRS Station Shrunk	33
Map: YOU Marker Auto-Hides Behind Followed Station.....	33
Map: SSID Filter Strip Moved to the Bottom.....	33
Map: APRS Velocity Arrows Removed	33
Appendix — April 26, 2026 Satellite Batch (v4.0.0+40).....	33
Eight New Satellites — All With Permanent NORAD IDs.....	33
Settings Page — Visual Balance Polish	34
Map Page — Wi-Fi Scanning Dialog Loop Fix	34
Other Robustness Improvements	34
Appendix — April 27, 2026 Updates (Audio Session + N2YO Errors)	34
Recording coexists with music and podcasts	34
Why this matters during a pass.....	35
Bluetooth and speaker routing	35
Better N2YO error messages.....	35
Appendix - April 29, 2026 - AMSAT Coverage Audit	35
New APRS / Digipeater Service on Already-Tracked Satellites.....	35
Three New Satellites - Permanent NORADs	35
Three New SSDV Satellites (Geoscan Family)	35
Music Broadcast - New Service Category	36
About Page Refresh	36
Pending Satellites - Held for Future Promotion	36

Music Mode in AR Tracking - Toggle and Recording	36
Scheduled Service Events - Frequency Overrides for 4 Modes	36
SSTV Decoder Info Icon.....	37
Long Satellite Names - Adaptive Sizing.....	37
Appendix - April 29, 2026 - AMSAT Live Activity Indicator	38
Color Scale	38
No-Data States.....	38
Tap for Detail	38
Pass Info Popup Share	38
Refresh Policy	38
Privacy and Attribution	38
Coverage Notes.....	39
Appendix — May 10, 2026 Updates (Production Hardening v4.2.0+42).....	39
Notification Race Fix	39
AR Page Smoothness	39
Faster QSO Imports	39
Diagnostic Crash Log (NEW).....	39
Cleaner Error Messages	39
APRS Map Performance	39
Internal Hardening.....	39
Build & Release Polish	40
Appendix — May 2026 Update: 10-Language Support (v4.2.0).....	40
ملحق (v4.2.0) — تحديث مايو 2026: دعم 10 لغات.....	40
Appendix — May 23, 2026 Updates (v4.3.0+43)	41
Appendix — May 30, 2026 Updates (v4.5.0+45)	41
APRS reliability.....	41
SSTV decoder	41
Diagnostic log.....	42
macOS.....	42
QSO log export.....	42
About page	42
Under the hood.....	42
Appendix — May 30, 2026 PM Updates (v4.5.0+45 catalogue).....	42
Satellite catalogue additions	42
QSO entry frequency auto-fill expansion	42
Tiangong (CSS) frequencies corrected	43
OrigamiSat-2 → OrigamiSat-2 (FO-126)	43
About page footer.....	43
Appendix — June 11, 2026 Updates (v4.7.0+47)	43
Sat Match — Mutual-Visibility Pass Finder.....	43
Hams.at Activations.....	43
Larger Text on Every Card	44
Appendix — June 13, 2026 Updates (v4.7.0+47)	44
Prediction Start Date & Time — Tap to Pick.....	44
Satellite Catalogue Refresh	44
Appendix - June 23, 2026 - Satellite Catalogue Update (v4.9.0+49)	44
Three New Satellites	44
LAPAN-A3 Frequency Correction	44
Grid Locator Map - Info Panel	44
Rig Control (CAT).....	45
What Rig Control Does.....	45
Enabling Rig Control	45
Choosing Your Radio — The Rig Picker	45
Connecting Over the Network	46

Network Serial Bridge (Serial-over-TCP).....	46
Connecting Over USB (Android USB-OTG).....	47
Connecting Over Bluetooth.....	47
When No Radio Is Connected — On-Screen Fallback.....	48
Rotator Control.....	48
What Rotator Control Does.....	48
Enabling Rotator Control.....	48
Choosing Your Controller — Protocols.....	48
Azimuth-Only Rotators.....	49
Travel Limits and Azimuth Zero.....	49
When No Rotator Is Connected — On-Screen Fallback.....	49
Appendix - July 22, 2026 - Satellite Catalogue Update (v5.0.0+50).....	49
Two New Satellites (Transporter-17, July 7, 2026).....	49
Music Broadcast Additions.....	50
ISS APRS Frequency Change.....	50
Corrections and Retirements.....	50
Appendix - August 7, 2026 - Catalogue Corrections (v5.0.0+50).....	50
GRBBeta - Now Correctly Listed as Workable.....	50
AO-27 - No CTCSS Tone, and a Word of Caution.....	50
CatSat - A Microwave Transponder, Not an FM Repeater.....	51
FSI-SAT2 - Receive Frequency Now Consistent.....	51
QO-100 - Loggable, Deliberately Not Trackable.....	51
macOS - Calendar Files and the Manual Now Reach Your Downloads Folder.....	51
Stability Fixes.....	51
GRBBeta - Two Digipeaters, Not One Cross-Band Link.....	51
CroCube and LASARSat - Digipeaters That Were Never Listed.....	51
SNUGLITE-3 HANA - No Uplink After All.....	52
HYPERVIEW-1G Retired - Terminal Decay.....	52
Two Additions to the Music List.....	52
Catalogue Frequency Clean-Up.....	52
Twenty Historical Satellites Added.....	52
Satellites That Were Confused With Each Other.....	53
The Six Unidentified Entries, Resolved.....	53
Appendix - August 26, 2026 - Hams.at Announcing (v5.0.0+50).....	53
Announce your own activation to Hams.at.....	53
Dark map basemap.....	53
Pass length on followed passes.....	54
Activation comments.....	54
Appendix - August 29, 2026 - Satellite Catalogue Update.....	54
Three New Satellites.....	54
One New Receive-Only Curiosity.....	54
Two Satellites Retired.....	54
ISS SSTV Has Moved to 437.550 MHz.....	54
Two Historic Digipeaters for Back-Dated Contacts.....	55
Exports That Logging Services Accept.....	55
Rig and Rotator Controls Marked Experimental.....	55

1. Introduction

What is Ham Satting?

Ham Satting is a comprehensive satellite tracking application designed specifically for Amateur Radio (Ham Radio) operators who engage in satellite communications. The app provides real-time satellite tracking, pass predictions, contact logging, and comprehensive grid locator mapping functionality.

Who Should Use This App?

- Amateur Radio Operators with valid licensing
- Satellite Communication Enthusiasts
- ARISS Operators (Amateur Radio on the ISS)
- Grid Square Hunters working towards VUCC awards

Key Features at a Glance

Real-Time Satellite Tracking

- Visualize amateur radio satellites with arrows on the map
- Track many amateur radio satellites with icons in real-time
- Color-coded directional arrows showing satellite position and elevation

Comprehensive Pass Predictions

- Detailed pass predictions (AOS, LOS, duration, azimuth, elevation)
- Countdown timer showing time until each pass
- Timeline visualization for multiple passes
- Pass quality indicators (Excellent/Good/Fair/Poor)
- Export predictions as images or CSV files

AR Doppler Shift Correction

- Real-time Doppler frequency correction during satellite passes
- Mode-specific correction logic (SSB, CW, APT, FM)
- Live frequency updates every 2 seconds
- Visual blinking indicator when Doppler correction is active

Satellite Selection Colors

The satellite list uses a color-coding system to indicate each satellite's capabilities:

- FM/SSB/APT satellites: white label
- SSTV-capable (non-FM): blue label — if also FM-based, blue dot next to name
- SSDV-capable (non-FM): green label — if also FM-based, green dot next to name
- Digital-capable (non-FM): orange label — if also FM-based, orange dot next to name

Smart API Management

- Automatic pause of satellite tracking when navigating away from map
- API hit counter with visual bar chart showing daily usage
- Warning alerts at 80% and 100% of daily API limit
- Prevents accidental API limit hits and saves battery

Interactive Map Features

- Maidenhead grid squares at all zoom levels
- Current GPS location and saved QTH
- Real-time satellite tracking with footprint visualization
- Grid Hunters mode to visualize worked grids from your QSO log

QSO Management

- Save satellite contacts to local database
- Filter and search by callsign or satellite
- Export complete QSO list via email or file sharing
- Automatic grid square extraction for Grid Hunters

Smart Notifications

- Schedule alerts for upcoming satellite passes
- Background notifications (with proper battery settings)
- Customizable alert timing (minutes before pass)
- Visual and audio notification options

SSTV/SSDV Audio Recording

- Record satellite SSTV and SSDV audio directly from AR tracking
- Smart filename format: SatName_SSTV/SSDV_Date_Time_FreqkHz.wav
- Automatic Doppler-corrected frequency in filename
- Supports both SSTV and SSDV capable satellites

Digital Mode Recording

- Record APRS, FSK packet, and GMSK digital mode audio directly from AR tracking
- DIGI button (orange) appears for digital-capable satellites alongside SSTV and SSDV buttons
- Doppler-corrected frequency for UHF downlinks; nominal frequency for VHF (below 300 MHz)
- Filename format: SatName_Digital_Date_Time_FreqkHz.wav

Compass Pass Visualization

- Interactive compass dialog showing satellite pass trajectory
- Download and share pass images with watermark
- Local time display in-app, UTC in exported images
- Square format export for clean sharing

- **Weather Satellite Tracking**

- Track active VHF weather satellites — Meteor-M N2-3 and N2-4 on 137.900 MHz LRPT
- Dedicated purple Weather mode button on the AR page with Doppler-corrected frequency
- Audio session recording during pass for your own logging or decoder archiving
- Legend filter pill lets you isolate weather satellites in the selection list

2. Getting Started

First-Time Setup (IMPORTANT!)

When you first open Ham Satting, you'll see a welcome dialog. Follow these steps carefully:

Step 1: Navigate to Settings

Tap the Settings icon at the bottom navigation bar (gear icon)

Step 2: Enter Your Default Values

Configure these essential settings:

- 1. Default Grid Location** (e.g., LL93eo33)
 - Enter your home station's Maidenhead grid square
 - Can be 4, 6, or 8 characters
 - Example formats: LL93, LL93eo, LL93eo33
- 2. Default Callsign** (e.g., A41UX)
 - Your amateur radio callsign
- 3. Default Email**
 - For support and exporting QSO logs

Step 3: Get Your N2YO API Key (REQUIRED)

Important: Pass predictions and satellite map tracking require a free API key from N2YO.

- Visit: <https://www.n2yo.com/api/>
- Sign up for a free account
- Get your API key
- Paste it into the N2YO API Key field in Settings then press Save

Step 4: Set Minimum Pass Angle

- Min Pass Angle: 0° (shows all passes, even low ones)
- Higher values (e.g., 15°) filter out low elevation passes
- Recommendation: Start with 0° and adjust based on your horizon

Step 5: Select Satellites

Scroll down to the Satellite Settings section and enable the satellites you want to track. Popular Amateur Radio Satellites:

- ISS, SO-50, IO-86, AO-91, AO-73, PO-101, RS-44 and more
- **Tip:** Enable 3-5 satellites initially to avoid overwhelming data.

Step 6: Android Battery Optimization (CRITICAL!)

For notifications to work in the background on Android:

- Go to your phone's Settings → Apps → Ham Satting → Battery
- Select "Unrestricted" or "Don't optimize"

3. Interactive Map & Grid Locator

Understanding the Map Page

The Map page (first icon in bottom navigation) is the heart of Ham Satting. It shows:

- Maidenhead grid square overlay
- Real-time satellite positions
- Your current location
- Saved QTH location
- ISS and other satellites footprint (radio coverage area)
- ISS and other satellites ground tracking
- Directional arrow to satellites selected and highlighted

Map Controls (Right Side)

1. Satellite Toggle (Purple Icon)

- ON (Dark Purple): Shows all enabled satellites in real-time
- OFF (Gray): Hides satellites
- Small progress indicator appears during updates
- **Smart Pause:** Automatically pauses when you navigate away to save API calls and battery
- **Tip:** Turn off when not needed to save battery

2. Grid Toggle (Purple Icon)

- ON (Dark Purple): Shows Maidenhead grid squares
- OFF (Gray): Hides grid overlay
- Grid automatically adjusts detail based on zoom level

3. API Hit Counter

Visual bar chart at the top of the screen showing your daily N2YO API usage:

- Displays current usage as percentage and count (e.g., "80% (800/1000)")
- Green bar: 0-79% usage - Safe
- Yellow bar: 80-99% usage - Warning
- Red bar: 100% usage - Limit reached
- Automatic reset at UTC midnight
- Prevents API key reuse after changes

Real-Time Satellite Tracking

Satellite Icons

Each satellite appears as a colored circle with:

- Satellite name (short version, e.g., "SO-50")
- Altitude in km
- Velocity in km/s (at high zoom)

Directional Arrow

A color-coded arrow points from your location toward the satellite:

- Green Arrow: Elevation > 10° (Excellent visibility)
- Orange Arrow: Elevation 0-10° (Difficult, near horizon)
- Red Arrow: Below horizon (Not visible)
- The arrow appears at 1/4 distance between you and the satellite

Worked Grids on the Map

When Grid mode is enabled, every Maidenhead grid square you have worked (based on your QSO list) is drawn on the map as a red circle. The circles scale with zoom level so that they remain readable whether you are looking at a single country or the full globe.

Tap a Worked Grid for Details

Tap any red circle to see a panel showing the callsigns you have worked in that grid, the bearing from your home station (in degrees plus cardinal direction, e.g. 245° / SW), and the great-circle distance in kilometres. Tap the X on the panel or tap another grid to dismiss it.

Great-Circle Paths

When a worked grid is selected, a curved orange line is drawn between your home station and the grid following the true great-circle path (the shortest path on the surface of the Earth). This is more accurate than a straight line on a flat map projection, especially for long-distance contacts.

The same great-circle rendering is used for the distance line drawn when you use the Enter Grid Location feature to preview the path to any arbitrary grid.

Automatic Zoom to Fit

When you toggle Grid mode ON, the map automatically zooms and centres to fit all of your worked grids into view. If you have only one worked grid, it is centred with a sensible default zoom. When you toggle Grid mode OFF, the map returns to the zoom and position it had before you enabled the grid.

Auto-Refresh After Changes

The worked-grid layer refreshes automatically whenever you add, edit, delete, or clear QSOs, or after a JSON / CSV import. No app restart is needed.

4. AR Tracking & Recording

What is Doppler Shift?

As a satellite moves toward or away from you, its radio frequency shifts due to the Doppler effect. This shift can be several kHz, causing you to miss contacts if your radio frequency isn't adjusted. Ham Satting now provides real-time Doppler correction during AR tracking!

How to Access AR Doppler

- Navigate to the Map page
- Enable satellite tracking (purple icon)
- Tap on a satellite to highlight it
- Tap the "Track in AR" button
- Point your phone at the satellite using the on-screen guidance

Doppler Features

Real-Time Frequency Correction

- Updates every 2 seconds with current Doppler shift
- Shows corrected TX (transmit) and RX (receive) frequencies
- Frequencies rounded to nearest 1 kHz for radio convenience
- Zero extra API calls - uses existing position data

Mode-Specific Logic

Doppler correction is applied based on the satellite's operating mode:

Mode	Doppler Correction	Reason
FM VHF (2m)	✗ No	Wide bandwidth
FM UHF (70cm)	✓ Yes	Narrower bandwidth
SSB	✓ Yes	Very narrow (~3 kHz)
CW	✓ Yes	Extremely narrow
APT (Weather)	✓ Yes	Precise freq needed

Visual Indicators

- **Blinking Orange Circle:** Appears when Doppler correction is active
- **Phone Alignment Panel:** Shows TX and RX frequencies with Doppler applied
- **Alignment Arrows:** Guide you to point at the satellite correctly
- **Phone Pitch Indicator:** Shows elevation angle for precise pointing

Using Doppler Correction

- Start AR tracking for your selected satellite
- Point your phone at the satellite using the alignment guides
- Watch for the blinking orange circle (Doppler active)
- Read the corrected TX and RX frequencies from the phone panel
- Set your radio to the displayed frequencies
- Make your contact with perfect frequency alignment!

SSTV/SSDV Audio Recording

- Ham Satting can record satellite audio directly during AR tracking for later SSTV or SSDV decoding.

How to Record

- While in AR tracking mode, look for the SSTV button (right side) or SSDV button (left side)
- The SSTV button appears for SSTV-capable satellites (e.g., ISS, IO-86, UmKA-1)
- The DIGI button (orange) appears for digital-capable satellites (e.g., KNACKSAT-2, BOTAN, SPIRONE) — all three buttons (SSTV, SSDV, DIGI) stack on the right side of the screen
- Some satellites support both modes (e.g., Lobachevsky)
- Tap the button to start recording - it will pulse to indicate active recording
- Tap again to stop recording
- Only one mode can be active at a time — all other mode buttons hide while one is active

Recording File Format

Audio files are saved with a descriptive filename:

- Format: {ShortName}_{SSTV|SSDV}_{Date}_{Time}_{FreqkHz}kHz.wav
- Example: RS40S_SSTV_2026-02-16_18-42-03_437625kHz.wav
- Example: ISS_SSTV_2026-02-16_20-15-30_145800kHz.wav
- The frequency includes Doppler correction at the time of recording
- The short satellite name is extracted automatically from the full name:
- "UmKA-1 (RS40S)" becomes RS40S
- "GALAPAGOS-UTE-SWSU (HC1PX)" becomes HC1PX
- "ISS" stays as ISS (no parentheses, uses full name)

SSDV Mode

SSDV (Slow Scan Digital Video) is a digital image transmission mode used by some amateur satellites. Unlike SSTV which is analog, SSDV uses packet-based digital encoding.

SSDV vs SSTV

- SSTV: Analog image transmission - decoded from audio waveforms
- SSDV: Digital image transmission - uses packet-based digital encoding
- Some satellites transmit SSTV, some SSDV, and some both

AR Display in SSDV Mode

- TX Panel: Shows "SSDV Mode" indicator in red when SSDV is active
- RX Panel: Shows SSDV frequency with real-time Doppler correction
- The SSDV button pulses while recording is active

SSDV-Capable Satellites

AO-123, Lobachevsky, SilverSat, CroCube, LASARsat, GEOSCAN 1-6, Vizard Ion, TUSUR GO, INNOSAT16, INNOSAT3

Digital Mode

Ham Satting can record digital-mode satellite audio during AR tracking for later decoding using packet radio software (APRS clients, Direwolf, etc.).

Digital vs SSTV/SSDV

SSTV/SSDV: encodes images into audio or digital packets — decoded by the built-in SSTV Decoder or external apps

Digital: packet-based encoding (APRS, FSK, GMSK) — decoded by external packet software

AR Display in Digital Mode

TX Panel: shows TX frequency (orange background) if satellite has uplink, or "Digi Mode" (red) if receive-only

RX Panel: shows downlink frequency with Doppler for UHF; nominal for VHF (below 300 MHz)

The DIGI button pulses green while recording is active

Digital-Capable Satellites

KNACKSAT-2, BOTAN, e-kagaku-1, PARUS-T2, SPIRONE, HO-113 (XW-3), SNUGLITE-3 HANA, ISS (APRS channel), IO-86 (APRS channel)

Weather Mode

Weather vs Other Modes

Weather Mode targets VHF LRPT weather satellites. Unlike SSTV (analog FM audio) or SSDV (narrow digital on FM), LRPT is QPSK at 72 kSymbols/s and ~150 kHz wide. The standard decoding workflow for LRPT uses IQ capture (from SDR software such as SDR#, GQRX, SDR++) fed directly into SatDump or MeteorDemod for image decoding.

The Weather Mode audio recording in this app captures session audio during the pass for logging / archival purposes. It is NOT a substitute for IQ decoding. For actual imagery, run an IQ-capable decoder alongside this app.

AR Display in Weather Mode

Purple WX button on the right side of the AR screen (hidden when another mode is active)

TX panel shows "WX Mode" in purple — LRPT is receive-only, no uplink

RX panel shows the Doppler-corrected downlink frequency (137.9 MHz $\pm$ ~3 kHz)

Tap the WX button again to stop recording and save the WAV

Weather-Capable Satellites

Meteor-M N2-3 (NORAD 57166) and Meteor-M N2-4 (NORAD 59051) — both Russian polar-orbit LRPT weather satellites, 137.900 MHz. As of 2026 these are the only active amateur-accessible VHF weather satellites; the NOAA APT series (NOAA-15, NOAA-18, NOAA-19) was decommissioned in summer 2025.

Recording File Format

Filename pattern: {ShortName}_Weather_{date}_{time}_{freqKHz}kHz.wav — for example, N2-3_Weather_2026-04-19_14-30-45_137900kHz.wav. Files are saved to the app's documents folder.

5. Satellite Pass Predictions

Understanding Satellite Passes

A satellite "pass" occurs when a satellite moves across your sky. Key terms:

- **AOS (Acquisition of Signal):** When satellite rises above your horizon
- **LOS (Loss of Signal):** When satellite sets below your horizon
- **Max Elevation:** Highest angle during the pass
- **Duration:** Length of the pass (typically 2-10 minutes)
- **Azimuth:** Direction (0° = North, 90° = East, etc.)
- **Time Until:** ★ NEW - Countdown showing how long until the pass starts

Understanding Pass Cards

Each pass prediction card now displays:

- Pass number and satellite name
- Max elevation and quality indicator (Excellent/Good/Fair/Poor)
- **Time Until badge** (green) - Shows countdown like "2h 30m" or "15m"
- AOS and LOS times in local time and UTC
- Duration of the pass
- AOS and LOS azimuth directions
- TX, RX, Mode, and Tone information (if available)
- Notification bell icon for scheduling alerts

Time Until Display Formats

Time Remaining	Display Format	Example
> 1 day	Days + Hours	2d 5h
1-24 hours	Hours + Minutes	3h 45m
1-60 minutes	Minutes only	25m
< 1 minute	Less than	<1m
Pass started	Status	Started

Compass Pass Visualization

- View and export detailed pass trajectory visualizations by tapping on a pass prediction card.
- The compass shows the satellite's path across your sky with AOS direction, max elevation point, and LOS direction
- Displays pass trajectory in local time while viewing in the app
- Close button (X) in the corner to dismiss the dialog

Exporting Pass Images

- Download Icon: Save the pass visualization to your photo gallery
- Share Icon: Share directly to other apps with "Generated by Ham Satting" watermark
- Exported images use UTC time (not local time) for universal reference
- Images are exported as square format with satellite name on one line, grid/date/time on another

Exporting Predictions

Screenshot Export

- Button: "Save Screenshot"
- Captures entire prediction view as image
- ★ **NEW:** Time Until countdown is included in the exported image
- Saved to your device's gallery/photos
- Great for sharing with your ham radio club

CSV Export

- Button: "Export CSV"
- Creates comma-separated file
- ★ **NEW:** Includes "Time_Until" column showing countdown to each pass
- Can open in Excel, Google Sheets, etc.
- Perfect for detailed planning and spreadsheet integration

6. QSO Logging & Management

What is a QSO?

A QSO is an amateur radio contact. Ham Satting lets you log satellite QSOs with detailed information.

Logging a New QSO

Navigate to New QSO (fourth icon in bottom navigation).

Required Fields:

- Worked Callsign - The callsign you contacted (e.g., 9A1CAL)
- Worked GRID - Their Maidenhead grid square (e.g., JN86dm)
- Date - Tap to open the calendar picker. Stored in UTC as YYYYMMDD (e.g., 20251115).
- Time - Tap to open the 24-hour time picker. Stored in UTC as HH:MM:SS (e.g., 14:30:00).
- Satellite - Which satellite was used (e.g., SO-50)
- Mode - Operating mode (e.g., FM, USB, LSB, CW)
- TX Band & Frequency - Your transmit band and frequency
- RX Band & Frequency - Your receive band and frequency

QSO List Management

The QSO list (third icon in bottom navigation) is where all your logged contacts are stored. Beyond simple browsing, it offers filtering, exporting, and bulk management.

Filtering the List

Use the filter fields at the top of the QSO list to narrow by callsign, satellite, date, or grid. Filters are case-insensitive and persist when you return from editing an individual QSO. Clear filters at any time by emptying the fields.

Clearing the Entire List

Tap the three-dot menu in the top-right of the QSO list and choose "Clear List". A confirmation dialog shows the number of QSOs that will be removed and warns that the action cannot be undone. This only clears QSOs stored on your device — it does not affect any exports or backups you have already made.

Exporting Your Log

Three export formats are available from the three-dot menu: CSV (spreadsheet-friendly), JSON (structured data), and ADIF 3.1.4 (the standard amateur-radio log exchange format accepted by contest, award, and DXCC logging programs). Exported files are named with a consistent "ham_satting_" prefix so they are easy to find when re-importing or sharing.

All exports include QSO date and time in UTC, as required for award submissions and contest logs. The satellite name, callsigns, grid squares, bands, frequencies, mode, and propagation mode (SAT) are included in every format.

To share the exported file, use the Share option, which opens the system share sheet. You can send the file via email, messaging apps, or save it to your Files app / cloud storage.

Importing a Log

Import JSON or CSV log files from the three-dot menu. The importer accepts files exported by this app as well as log files using standard key names. UTC / local time markers are handled automatically during import. Newly imported QSOs appear in the list immediately, and worked grids refresh on the map without needing an app restart.

Editing a QSO

Tap any QSO in the list to open it for editing. The entry form shows "QSO Entry Update" as its title and displays a back arrow on the left to return to the list without saving. All fields are pre-filled with the QSO's current values; change any field and tap Save to update.

While editing, the Clear button is hidden to prevent accidental data loss. Any filters you had active on the QSO list are preserved when you return after saving or cancelling.

Satellite Field Behaviour

The Satellite field's autocomplete is scoped to FM transponder satellites, since the QSO Entry page is designed for two-way voice contacts through FM repeaters. SSTV-only, SSDV-only, and digital-only satellites are not suggested in this dropdown but are fully supported elsewhere in the app (AR tracking, recording, map visualization). You can still type any satellite name manually if you need to log a contact on a satellite that is not in the suggestion list.

Fill Defaults

After choosing a satellite, tap the circular "Fill Defaults" button next to the Mode field to auto-populate Mode, TX Band, TX Frequency, RX Band, and RX Frequency with the satellite's standard values. This works for any FM transponder satellite regardless of how its name is capitalised. You can always adjust the filled values before saving.

Grid Square Auto-Formatting

When you type a Maidenhead grid square (Worked GRID or My GRID in settings), the app automatically enforces the standard per-position casing convention: uppercase for the first two letters (field), lowercase for

characters 5–6 (subsquare), and uppercase for characters 9–10 (extended subsquare). You do not need to worry about case while typing — it is applied live.

Back-to-Back QSO Logging

After saving a QSO in new-entry mode, the Clear button resets only the callsign, grid, and time fields, keeping the satellite, mode, bands, and frequencies from the previous entry. This streamlines logging multiple contacts on the same pass.

7. SSTV Decoder

The SSTV (Slow Scan Television) Decoder allows you to decode images from audio recordings of SSTV transmissions. These transmissions are commonly used by satellites like the ISS and amateur radio operators to send images over radio frequencies.

Accessing the SSTV Decoder

Navigate to the SSTV Decoder from the main menu or the Tools section.

Supported SSTV Modes

Ham Satting supports the following SSTV transmission modes:

Robot Modes (YCrCb color format):

- Robot 36: 320x240 pixels
- Robot 72: 320x240 pixels

Scottie Modes (RGB color format):

- Scottie 1: 320x256 pixels
- Scottie 2: 320x256 pixels
- Scottie DX: 320x256 pixels

Martin Modes (RGB color format):

- Martin 1: 320x256 pixels
- Martin 2: 320x256 pixels

PD Modes (YCrCb color format):

- PD 90: 320x256 pixels
- PD 120: 640x496 pixels
- PD 160: 512x400 pixels
- PD 180: 640x496 pixels
- PD 240: 640x496 pixels

How to Decode an SSTV Image

- Tap “Browse File” to select a WAV audio file containing the SSTV signal
- Select the correct mode from the dropdown menu. The default entry, Auto (VIS), reads the VIS header the transmitter sends at the start of a picture and selects the matching mode for you; if that header is missing or too weak to read, it falls back so you can still choose a mode by hand.

If you don’t know the mode, try Robot 36 first (most common)

ISS commonly uses PD 120 or PD 180

Try different modes if the image appears distorted

- The image will decode automatically after selecting the file
- Use the adjustment controls if the image needs fine-tuning (see below)
- Tap “Reset” to return all adjustments to default values

Adjustment Controls

SHIFT (-100 to +100 pixels)

Moves the image horizontally. Use this if you see color bars on the left or right edges of the decoded image.

- Positive values shift the image right
- Negative values shift the image left

SLANT (-2.0 to +2.0 ms)

Corrects diagonal skewing of the image. Use this if the image appears tilted like a parallelogram. This adjusts timing drift per scan line.

- Positive values correct clockwise skew
- Negative values correct counter-clockwise skew

START (0 to 5000 ms)

Adjusts where in the audio file decoding begins. Use this if colors are misaligned or you see noise at the start of the image. Increase this value to skip past the leader tone and VIS code.

Viewing the Decoded Image

- Pinch to zoom in/out on the decoded image
- Double-tap to reset zoom level
- Swipe to pan when zoomed in

Saving and Sharing

Save to Gallery:

Tap the green download button to save the decoded image to your photo gallery. Images are saved with "SSTV_Decoded_" prefix and timestamp.

Share:

Tap the blue share button to share the decoded image directly to other apps. The shared image includes a "Generated by Ham Satting" watermark.

Clear:

Tap the red X button to clear the current image and start fresh.

Tips for Best Results

Recording Quality:

- Record SSTV audio at 44100 Hz sample rate
- Use WAV format for best quality
- Avoid audio clipping (keep levels below maximum)
- Minimize background noise during recording

Mode Selection:

- ISS commonly uses PD 120 or PD 180
- Amateur radio operators often use Robot 36 or Scottie 1
- If unsure, try different modes until the image looks correct

Common Issues and Solutions:

Problem: Colored vertical bars on edges

Solution: Adjust the Shift slider, or try a different SSTV mode

Problem: Image is diagonally skewed

Solution: Adjust the Slant slider

Problem: Colors are completely wrong or misaligned

Solution: Increase the Start offset, or try a different SSTV mode

Problem: Image is too noisy or unclear

Solution: The original recording may have poor signal quality. Try recording with better reception.

Supported Audio Formats

- WAV (recommended)
- MP3
- M4A
- AAC
- OGG
- FLAC

8. Settings & Configuration

Default Values Section

- **Default Grid Location** - Your home station grid square (4, 6, or 8 characters)
- **Default Callsign** - Your amateur radio callsign
- **Default Email** - For support and exports
- **N2YO API Key** - REQUIRED for all satellite functionalities
- **Min Pass Angle** - Minimum elevation to show in predictions

Slider Controls

- All sliders now include +/- circle buttons for precise value adjustment
- Tap - to decrease or + to increase in small increments
- Especially useful for Min Pass Angle fine-tuning

Font Scale (Display Size)

Location: Settings → Advanced Settings (slider above the Ham Satting Dark Mode checkbox)

Range: 0.85x to 1.40x. Changes apply live to every screen as you drag the slider.

Preserved across app restarts. Reset All App Settings restores the default 1.00x.

API Management

API Hit Counter Settings

- **Location:** Top of screen (visual bar chart)
- **Daily Limit:** 1000 API calls per day (N2YO free tier)
- **Warning at 80%:** Yellow bar when you reach 800 calls
- **Alert at 100%:** Red bar when you reach 1000 calls
- **Auto Reset:** Counter resets at UTC midnight
- **Key Protection:** Detects and prevents API key reuse after changes

Smart Pause Settings

- **Auto-Pause:** Automatically pauses tracking when navigating away from map
- **Auto-Resume:** Resumes tracking when returning to map
- **Triggers:** Tab switching, navigation to Settings, QSO Log, etc.
- **State Preservation:** Returns exactly as you left it
- **Benefit:** Prevents wasting API calls and saves battery

9. Troubleshooting

API Counter Issues

Problem: Counter stuck at 100%

Solution:

- The counter automatically resets at UTC midnight
- You can also change your API key in Settings to reset immediately
- Wait until midnight UTC or use a different API key

Problem: Smart Pause not working

Solution:

- Update to the latest version
- Smart Pause works automatically - no settings needed
- If API calls continue when navigating away, report bug to support

Doppler Not Showing

Problem: No blinking orange circle in AR mode

Solution:

- Check satellite mode - FM VHF (2m) doesn't show Doppler (not needed)
- Doppler only applies to SSB, CW, APT, and FM UHF modes
- Ensure you're pointing at the satellite (use alignment arrows)
- Wait 2 seconds for frequency update

Problem: Doppler frequencies seem wrong

Solution:

- Frequencies are rounded to nearest 1 kHz for radio convenience
- Doppler shift can be ± 3 to 10 kHz depending on satellite speed and frequency
- This is normal behavior - use the corrected frequencies on your radio

SSDV/SSTV Recording Issues

Problem: SSDV button not appearing in AR mode

Solution:

- Not all satellites support SSDV - check if your satellite is SSDV-capable
- SSDV button only appears for satellites in the SSDV frequency database
- SSDV and SSTV buttons hide each other when one mode is active
- Return to normal mode first before switching between SSTV and SSDV

Problem: Recording file not found

Solution:

- Recordings are saved as WAV files in the app's documents directory
- Check that you have sufficient storage space on your device
- Ensure you tapped the button to stop recording (it should stop pulsing)

Digital Mode Recording Issues

Problem: DIGI button not appearing in AR mode

Solution: Verify the satellite is in the digital list (KNACKSAT-2, BOTAN, SPIRONE, SNUGLITE-3 HANA, etc.)

Problem: DIGI button disappears after tapping SSTV or SSDV

Solution: Only one mode can record at a time; SSTV and SSDV buttons hide while DIGI is active — stop DIGI recording first

Time Until Not Updating

Problem: Countdown not changing

Solution:

- Time Until is calculated when predictions are fetched
- Refresh your predictions to get updated countdowns
- The countdown does not auto-update in real-time
- Tap "Get Passes" again to recalculate

10. Frequently Asked Questions

Q: How does AR Doppler Shift work?

A: AR Doppler Shift calculates the frequency offset caused by the satellite's motion relative to you. It updates every 2 seconds using the satellite's velocity (calculated from position deltas) and applies mode-specific correction. For SSB and CW, this is critical as even a few kHz can cause missed contacts.

Q: Why doesn't FM VHF show Doppler correction?

A: FM VHF (2-meter band) has a wide enough bandwidth (~10-15 kHz) that Doppler shift doesn't significantly affect reception. However, FM UHF (70cm), SSB, CW, and APT modes do need correction due to their narrower bandwidths.

Q: Does Smart Pause drain battery?

A: No! Smart Pause actually SAVES battery by stopping satellite position updates when you're not looking at the map. It also prevents wasting your daily API calls.

Q: What happens when I hit the API limit?

A: At 80% (800 calls), you'll see a yellow warning bar. At 100% (1000 calls), the bar turns red and you won't be able to make more API requests until UTC midnight when it resets automatically. You can also change your API key to reset immediately.

Q: How often does Time Until update?

A: Time Until is calculated at the moment you fetch predictions. It doesn't auto-update in real-time. To get fresh countdown times, simply refresh your predictions by tapping "Get Passes" again.

Q: What is the difference between SSTV and SSDV?

A: SSTV (Slow Scan Television) is an analog image transmission mode that encodes images into audio tones. SSDV (Slow Scan Digital Video) is a digital packet-based image format. Some satellites use SSTV (like ISS, IO-86), some use SSDV (like AO-123, SilverSat), and some support both (like Lobachevsky).

Q: How do I record satellite audio for SSTV/SSDV decoding?

A: While in AR tracking mode, tap the SSTV or SSDV button (depending on the satellite's capability). The button will pulse while recording. Tap again to stop. The audio is saved as a WAV file with the satellite name, mode, date, time, and Doppler-corrected frequency in the filename.

Q: Can I use both SSTV and SSDV at the same time?

A: No. Only one mode can be active at a time. When SSTV recording is active, the SSDV button is hidden, and vice versa. Stop the current recording before switching modes.

Q: What is Digital Mode in Ham Satting?

A: Digital mode covers packet radio modes such as APRS digipeating, FSK 9600 bps, and GMSK beacons — used by CubeSats for telemetry and data relay. Unlike SSTV/SSDV which encode images, digital satellites transmit data packets decoded by external software such as APRS clients or Direwolf.

Q: How do I record a digital-mode satellite pass?

A: While in AR tracking, tap the DIGI button (orange circle). It will pulse green while recording. Tap again to stop. The file is saved as SatName_Digital_Date_Time_FreqHz.wav.

Q: Can I record SSTV/SSDV and Digital simultaneously?

A: No. Only one mode can record at a time. Stop any active recording before tapping another mode button.

Q: How does the compass pass visualization work?

A: Tap on any pass prediction card to open an interactive compass dialog showing the satellite's trajectory across your sky. You can download or share the visualization as an image with a watermark. The in-app view shows local time, while exported images use UTC.

General Questions

Q: Is the app free?

A: Yes, completely free! You need a free N2YO API key for pass predictions and tracking multiple satellites.

Q: How often does satellite data update?

A: Satellite positions update every 0.5 seconds (twice per second) for smooth real-time tracking when satellite tracking is enabled.

Q: What does "pass quality" mean?

A:

- **Excellent:** Max elevation $>50^\circ$ - Perfect passes high overhead, very strong signals
- **Good:** Max elevation $30-50^\circ$ - Good elevation, strong signals
- **Fair:** Max elevation $15-30^\circ$ - Moderate elevation, decent signals
- **Poor:** Max elevation $<15^\circ$ - Low elevation, weak signals, may be difficult

11. Support & Contact

Getting Help

In-App Support

- **User Manual** - About page → "Open User Manual"
- **Contact Support** - About page → "Contact Support" (Developer responds within 24-48 hours)

Social Media

- X: @Unixeer
- Instagram: @unixeer
- TikTok: @unixeer
- UpScrolled: @Unixeer

Acknowledgments

Special thanks to:

- Zvonko and club in Croatia (9A6WW / 9A1CAL) - Extensive testing
- Torsten Fechner from Germany (DG7RO) - Extensive testing
- AMSAT-India for their active involvement in the App Testing stage
- Amateur Radio Community - Continuous support and feedback
- N2YO.com - Satellite tracking API

12. Legal & Copyright

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Disclaimer

Provided 'as is' without warranty. Developer assumes no liability. Predictions are for informational purposes only. Always verify satellite schedules and orbital data before critical operations.

Privacy

Ham Satting:

- Stores all data locally on your device
- Does NOT collect or transmit personal information
- N2YO API requests only include satellite names and location coordinates
- Email and callsign are stored locally only

73 from A41UX - RF for Life!

Developed with Flutter & Dart for smooth performance.

Future updates are unstoppable and inevitable.

End of User Manual

13. Changing Your Callsign

If you upgrade your licence or change your callsign, Ham Satting keeps your satellite log intact. Each QSO stays logged under the callsign you used at the time; only new QSOs use your new call.

Setting your new callsign

Open Settings, update your callsign, and Save. New QSOs use it from then on, and the app asks whether to keep your previous callsign, so your identity stays consistent across the change. You can change it any number of times.

QSL cards and exports

A QSL card you export for an older QSO shows the callsign and grid you used for that contact, not your current Settings values. ADIF, CSV and the share image already use each QSO's own callsign, so all exports stay correct after a callsign change.

Your online QSL services

Each service ties confirmations to a callsign, so add your new call alongside the old one: request a new LoTW certificate, create a new QRZ.com logbook, add a new eQSL nickname, and register the new call on Club Log.

Appendix — April 2026 Updates

Collapsible QSO List

The My QSO List page now groups your contacts by year and month with collapsible headers. By default, the most recent year is expanded, and within it the most recent month with QSOs is expanded; everything else collapses. Tap a year header to expand or collapse a year; tap a month header to do the same. Each header

shows the QSO count for that period. Filters (callsign, satellite, date range) work the same way and the count badges always reflect the filtered subset.

You can disable the grouped view from Settings → Advanced Settings → Collapsible QSO List. With the toggle off, the page returns to the original flat list.

Tips & Tricks Library Expanded

The in-app tips library has grown from 50 to 100 unique tips covering the full feature set — including weather satellites, digital modes, the SSTV events scheduler, the SSTV decoder, and the AR recording filename pattern. Tips appear at most twice per rolling seven-day window with at least three days between appearances. Tap Never show again in any tip dialog to disable, or re-enable from Settings.

QSL Card Export

Each row in the My QSO List page now carries a QSL Card icon (left of Edit). Tap it to render a themed postcard-style PNG and share via the system share sheet. The card shows your callsign and grid (DE strip from Settings), the worked station's callsign, the QSO date and UTC time, the satellite name, the mode, and the TX band and frequency. The design is theme-aware — cyan accents on a navy background in dark mode, deep blue accents on a cream background in light mode. Filename pattern: ham_satting_qls_<callsign>_<date>.png.

Appendix — April 22, 2026 Updates

These updates were added in the April 22, 2026 cross-app session. After opening this manual in Word, right-click the Table of Contents → Update Field → Update entire table to refresh the page numbers.

Themed Auto-Complete Dropdowns

Type-as-you-go fields (Satellite search on Add QSO, Duration on the prediction pages) now show a dropdown that is exactly as wide as the longest visible match — no more wide white panel covering the form. The dropdown background and text follow the app's dark/light theme.

Appendix — April 23, 2026 Updates

My APRS Beacons on Map

A new opt-in map layer shows your own APRS position beacons after they reach the worldwide APRS-IS network. It is a confirmation tool: when you transmit an APRS packet from any APRS-capable rig, if any internet-connected ground station ("iGate") decoded your packet, it appears on the map within seconds. Useful for verifying your transmit setup, antenna performance, or simply seeing how far your signal reached today.

How to Enable

Settings → Advanced Settings → "Enable Grid Hunting" → "Show My APRS Beacons on Map" (the new checkbox just below the existing Place Worked Grids / Coverage Circles / Grid Lines options). The checkbox shows only when Grid Hunting is enabled. Tap "Save All" to persist the setting. The (i) icon next to the checkbox opens a quick reference.

Activating on the Map

After enabling in Settings, go to the Map tab. A purple tower icon appears in the floating button stack on the right side (in the slot where the old "Head North" button used to be — that button was removed because the map is now permanently locked to north-up, no rotation possible). Tap the purple tower to start showing beacons. The button pulses softly while active.

What You See

Each beacon transmitted from your callsign (and any SSID variant like -1, -7, -9 for mobile rigs) appears as a purple circle marker at the position your rig encoded into the packet. Markers fade gradually over 60 minutes, then disappear. Tapping a marker shows a popup card with: callsign+SSID, Maidenhead grid, time-since-heard (live counter that ticks every second), and distance + bearing from your saved QTH grid. Tap anywhere on the map outside the popup to dismiss it.

Testing Your Beacon

Transmit a single APRS beacon from your rig (most rigs have a manual "send beacon now" button on the APRS menu). Wait 5–30 seconds. If the marker appears on the map, an iGate received your transmission and uploaded it to APRS-IS. If no marker appears after 60 seconds, your signal did not reach an iGate this time — try again from a more open location, or check your TX power, antenna, and APRS path settings.

Battery and Background Behaviour

The APRS connection uses a single TCP socket to the APRS-IS server. When you switch to another tab in Ham Satting (Settings, QSO List, etc.), the connection automatically closes — zero battery drain while away. When you switch back to the Map tab, the connection re-opens automatically and your markers resume appearing. The same auto-pause behaviour applies when you open a sub-screen like AR Tracking or the Notification list. Markers already on the map stay visible during the pause.

Changing Your Callsign

If you upgrade your license, change your callsign, or want to test using a friend's callsign, edit it in Settings → Default Callsign and tap "Save All". The APRS connection automatically reconnects with the new callsign in the background — no need to toggle the feature off and on. Existing markers stay visible across the swap.

Privacy

Ham Satting does NOT transmit anything via APRS-IS. The app connects as a passive read-only listener. Your callsign appears in APRS-IS server connection logs as a logged-in listener — this is required by the protocol for any client connection. The map markers you see are YOUR OWN beacons that you transmitted from your radio, not other people's observations of you. No other personal data is shared.

Note: The "Head North" Button

The teal navigation button at the top-right of the map (third from the top in the floating button stack) has been removed. The map is now permanently locked to north-up — pinch and pan still work, but the two-finger rotate gesture is disabled. The button slot is reused for the new APRS toggle described above.

Appendix — April 24, 2026 Updates

Heard By: Stations That RF-Received Your Beacon

The APRS map layer now does more than just show your own beacons. For each beacon you transmit, Ham Satting parses the packet header and extracts the iGate (and any digipeaters) that received your signal over the air. These "heard by" stations appear on the map as darker-purple circle markers, connected back to your QTH by light-purple great-circle bearing lines.

How It Works

Every APRS packet that travels via RF carries a path field showing which stations relayed it. Packets gated to APRS-IS via radio (qAR q-construct) name the iGate that decoded your signal. Ham Satting extracts those callsigns from your beacons, queries aprs.fi for each station's last known position, and plots them on the map.

aprs.fi API Key (required for markers)

To draw markers + bearing lines for "heard by" stations, the app needs to look up each iGate's position. This is done via the free aprs.fi REST API. Sign up for a free key at aprs.fi/account, then paste the key into Settings → "aprs.fi API Key (optional)" — it sits directly under the "Show My APRS Beacons on Map" checkbox.

Test Button (Green Tick)

A small circle button next to the API key field lets you verify your key works. Tap it: spinner appears, then turns green with a tick when the key is valid, or red with an X if the key is wrong or aprs.fi is unreachable. Status resets when you edit the key.

Without an API Key (Text Fallback)

If you don't enter an aprs.fi key, the heard-by callsigns are still extracted from your beacon packets — they're shown as a simple text list inside the popup that opens when you tap your own beacon marker on the map. No markers, no bearing lines drawn.

Tap a Heard-By Marker

Tapping any darker-purple "heard by" marker opens a detail panel showing: the iGate callsign, its Maidenhead grid (computed from aprs.fi position), distance and bearing from your QTH, and a live "Heard X minutes ago" counter that ticks every second. Tap anywhere on the map outside the panel to dismiss it.

Privacy Note

aprs.fi is a public service — your callsign appears in their access logs as a passive read-only listener (the same as it does in APRS-IS server logs). The app does not transmit anything to either service.

Appendix — APRS Callsign + Live Refresh

Dedicated APRS Callsign Field

The APRS feature now uses its own dedicated callsign field, kept completely separate from the default callsign you use for QSO logs. This means an APRS-only SSID like -13 (weather), -9 (mobile), or -7 (handheld) lives only in the APRS row — it does not bleed into your QSO records, exports, or any other part of the app.

Where It Lives

In Settings, when "Show My APRS Beacons on Map" is ticked, a single row appears below the checkbox with three controls side by side: the aprs.fi API key field (about two thirds wide), the new APRS Call field (about one third wide), and the test button. When the checkbox is unticked, the entire row is hidden — there is nothing to configure when the feature is off.

Strict Behavior

When you toggle APRS on the map, the app strictly requires this APRS callsign to be set. There is no silent fallback to your default QSO callsign — that is exactly what this separation prevents. If the APRS Call field is empty, the toggle shows a warning snackbar and will not connect.

Changing the Callsign

When you save a new APRS callsign in Settings, the app treats it as a brand new identity. The active APRS-IS connection is fully torn down, all cached station markers and heard-by entries are dropped, the aprs.fi position cache is wiped, and a fresh connection opens with the new callsign. This guarantees no stale data from the old identity remains on the map.

Format

Use uppercase letters, digits, and an optional dash + SSID. Common APRS SSIDs: no SSID = home base, -7 = handheld, -9 = mobile (vehicle), -11 = balloon or aircraft, -13 = weather station. The field auto-capitalizes and rejects spaces, slashes, and lowercase characters as you type.

Live Position Refresh Every 30 Seconds

When APRS is active, the map now refreshes positions from the aprs.fi REST API every 30 seconds in addition to the live RF stream. This keeps your beacons fresh on the map even when the live socket is quiet (no recent transmission from your rig).

Why Both Sources

The live APRS-IS socket pushes packets in real time when your rig transmits. The 30-second REST refresh is a safety net: it picks up positions that may have been transmitted while the app was backgrounded, and refreshes the "last seen" timestamp on the popup so you always see the most recent server-side reality.

aprs.fi Rate Limit Friendliness

Each refresh is a single batched call (your callsign plus all common SSIDs in one request). With the heard-by lookups also sharing the budget, total traffic stays well under aprs.fi free-tier limits. A 15-second per-callsign guard prevents toggle-spam from burning the rate-limit budget.

Appendix — APRS expansion (Apr 25 2026)

The APRS map layer received a substantial expansion. All additions live on the Map page only — Settings is unchanged. Your APRS callsign and aprs.fi key fields work exactly as before.

Track lines for moving rigs

Whenever any visible APRS station moves, a thin purple polyline trails behind its marker. The trail fades with age — recent movement is full opacity, segments older than an hour fade out and drop off automatically. Stationary stations don't accumulate clutter; the recorder suppresses no-movement re-hears.

Velocity arrow on moving rigs

Stations whose packets include course + speed get a small rotated arrow at their marker showing direction of travel. Arrow size grows with speed (capped) so a fast aircraft is instantly distinguishable from a slow mobile.

Tap-driven heard-by

When you tap any APRS station that has known iGate-reception data, the map automatically draws bearing lines from THAT station's position to each iGate that received its packets. Lines are the same light-purple as your own QTH-origin heard-by lines for visual consistency.

Smaller markers with real APRS symbols

APRS markers are now ~30% smaller than before so dense clusters don't drown out the rest of the map. When the parsed APRS symbol code matches a known station type (car, iGate, weather station, aircraft, balloon, boat, motorcycle, repeater, etc.), the marker renders that icon inside a thin purple ring. Unknown symbols fall back to the legacy purple dot.

Object / Item shape distinction

APRS supports three packet kinds — position, object, and item — that previously all rendered as identical circles. Now each has its own silhouette: position = circle (rig location), object = diamond (operator-placed entity, e.g. weather alert), item = rounded square (named reference, e.g. satellite ground track or repeater).

Bulletins feed

When any visible station broadcasts an APRS bulletin (BLN1–BLN9, BLNA–BLNZ), an amber megaphone button appears on the map. Tap it to open a chronological list of every active bulletin across all stations. Bulletins from your own callsign are displayed alongside others, with sender + age timestamps.

SSID filter chips

A small chip strip in the top-left corner of the map (visible only while APRS is active) lets you scope what renders to a specific SSID class: All, –9 (Mobile), –13 (Weather), –11 (Aircraft / Balloon), or Other. Selection persists across app restarts. Bulletins are always shown regardless of filter — broadcasts apply to everyone.

Rate-limit safe-side budget

The periodic aprs.fi REST refresh was doubled from 30 seconds to 60 seconds as a safe-side measure. The live APRS-IS TCP socket already provides sub-second freshness while your rig is beaconing, so 60-second REST polls are comfortable as a safety net. The 15-second per-callsign refetch guard still prevents toggle-spam from burning rate-limit slots, and the 25-call-per-minute global cap remains unchanged.

What didn't change

Your existing APRS callsign, aprs.fi API key, "Show My APRS Beacons on Map" toggle, the purple APRS FAB, the 60-minute stale-fade window, and dispose-on-callsign-change all behave exactly as they did before. The expansion is purely additive — turn off APRS in Settings and nothing new is visible.

Appendix — April 26, 2026 Updates

Map: Followed APRS Station Shrunk

When you tap an APRS station to follow it, that one marker now renders about 30% SMALLER than the surrounding markers. The smaller pin makes the station's exact position more precise on the map and reduces occlusion of nearby data you're comparing against.

Map: YOU Marker Auto-Hides Behind Followed Station

When you're tracking a callsign and the followed station's screen position is within roughly 24 pixels of YOUR live GPS position, the YOU marker is hidden so the two markers don't visibly overlap. Zoom out and they re-separate; YOU reappears the moment they're visually distinguishable. The threshold is zoom-aware: at street zoom you can be ~30 m apart and both stay visible; at world zoom you can be ~50 km apart and YOU still hides because both pins overlap on screen.

Map: SSID Filter Strip Moved to the Bottom

The "All / -9 / -13 / -11 / Other" SSID filter strip now docks at the BOTTOM-LEFT of the map (above the bottom navigation bar). When you tap an APRS station and the details panel slides up from the bottom, the filter strip automatically reflows to sit just above the panel — so you can always see both at once and the strip never overlaps the station details.

Map: APRS Velocity Arrows Removed

The small directional arrows that previously rendered on top of moving rigs (course/speed indicators) have been removed. Track polylines that fade with age remain unchanged — you can still see where a rig has been, just without the extra arrow on top.

Appendix — April 26, 2026 Satellite Batch (v4.0.0+40)

Eight New Satellites — All With Permanent NORAD IDs

Ham Satting v4.0.0+40 adds eight new satellites with confirmed permanent NORAD catalog IDs and TLE-derived orbital parameters. The list reflects two recent rideshare missions:

Transporter-16 (SpaceX, March 30, 2026)

HADES-SA (SpinnyONE) — NORAD 68446. Operator: AMSAT-EA, Spain. Multi-service: Digital (FSK 200 / CODEC2 voice) + SSDV image downlink, all on 436.875 MHz. BBS messaging uplink on 145.875 MHz. The SSTV decoder tab can decode SSDV when it is transmitting.

PARUS-T3 (BN0TIT) — NORAD 68456. Operator: National Taipei University of Technology, Taiwan. APRS digipeater on 145.825 MHz simplex (also has a 437.195 MHz GMSK 9k6 telemetry beacon).

HYPERVIEW-1G (RS66S) — NORAD 61772. Operator: Samara National Research University (Russia, SPUTNIX 6U platform). Robot 36 SSTV event-based downlink on 436.540 MHz. Note: this frequency is flagged "uncoordinated" in SatNOGS but the satellite is active and transmits SSTV during scheduled events.

JAXA Kakushin Rising (Rocket Lab Electron, April 23, 2026)

Five amateur payloads from this rideshare are in this batch. The sixth amateur sat from the launch (MAGNARO-II Tigris) and KOSEN-2R are still on provisional NORADs and will be added in a future update once their permanent catalog IDs are assigned.

MAGNARO-II Piscis (JJ2YXG) — NORAD 68798. Operator: Laboratory of Aerospace Vehicle Dynamics, Nagoya University. 1U formation-flying companion to the (still-pending) MAGNARO-II Tigris. Digital telemetry on 436.325 MHz (CW + AFSK 1k2 + GMSK 9k6/19k2).

ARICA-2 (JS1YSD) — NORAD 68796. Operator: Aoyama Gakuin University, Sakamoto Lab. Mission is gamma-ray-burst alert via commercial satellite modems; the amateur UHF link is a backup channel, so expect intermittent activity. Digital downlink on 436.830 MHz (CW 20 wpm + GMSK 4k8 AX.25).

FSI-SAT2 (JS1YQU) — NORAD 68792. Operator: Fukuoka Institute of Technology lineage (Trifne Future Sciences). Multi-service on 437.175 MHz: Digital (CW 18.5 wpm + GMSK 9k6) plus a DTMF-triggered SSTV reply — unique in our list. The user transmits an FM-DTMF tone on 437.175 MHz; the satellite responds with an SSTV image on the same channel.

WASEDA-SAT-ZERO-II (JK1UDE) — NORAD 68797. Operator: Waseda University. Digital telemetry on 437.200 MHz (CW 8 wpm + FSK AX.25 1k2).

OrigamiSat-2 — NORAD 68795. Operator: Tokyo Institute of Technology (Titech). Deployable origami reflectarray antenna technology demonstrator. Tracked downlink: 437.505 MHz (AFSK 1k2 + CW 80 cpm). Also has a 5.840 GHz S-band link (BPSK/QPSK 100 kbps to 20 Mbps), which is outside the app's supported band range and is not tracked.

Settings Page — Visual Balance Polish

When the satellite list count would render with an asymmetric two-column layout (an odd total with no service filter active), the Silent-Ghost memorial entry is hidden on first render so the columns come out even. The entry is not removed permanently — it returns whenever the count happens to be even after additions. Silent-Ghost is the SO-124 (HADES-R) memorial; it re-entered in February 2025 and never produces live passes.

Map Page — Wi-Fi Scanning Dialog Loop Fix

Earlier versions could trigger an Android "For a better experience, your device will need to use Location Accuracy" dialog every single second of the 1 Hz live-position refresh — once dismissed it would re-pop on the next tick, never stopping. v4.0.0+40 fixes this in two layers: periodic location ticks now use medium accuracy (which does not insist on Wi-Fi scanning), and a failure-streak backoff throttles the actual platform call after 3 consecutive failures while the timer keeps firing at 1 Hz. On the next success the streak resets and full-rate polling resumes immediately — refresh rate stays high in the normal path.

Other Robustness Improvements

Every `Geolocator.getCurrentPosition` call now has a `timeLimit` (15s on the first fix, 10s on periodic ticks) so weak-GPS or cold-start scenarios cannot indefinitely stall the page. The periodic-location timer also has a reentrancy guard so a slow fix cannot stack concurrent platform calls. ADIF PROP_MODE export now emits spec-correct UTF-8 byte counts, resolving an LoTW / TQSL upload rejection that affected satellite-mode QSO uploads.

Appendix — April 27, 2026 Updates (Audio Session + N2YO Errors)

Recording coexists with music and podcasts

AR Tracking's four capture modes — SSTV, SSDV, Digital, and Weather — now configure the device audio session before recording starts so they no longer interrupt music, podcasts, or navigation prompts you may already be playing. Tap a mode's record button and your audio keeps going; the recorder mixes alongside it. This works on iOS, iPadOS, and Android.

Why this matters during a pass

Operating amateur radio satellite passes mobile, you often want background audio (a club net stream, a podcast, music) running while you record SSTV / SSDV / digital telemetry to disk. Earlier builds yanked the audio focus the moment recording began and forced you to stop and re-start your other audio app. The new audio-session configuration eliminates that interruption.

Bluetooth and speaker routing

Recording also defaults to your built-in speaker for the AR page's tone feedback (so you don't lose audio cues to a paired headphone) and allows Bluetooth mics if you have a paired headset. The session is set up once when the AR page opens — no per-mode configuration needed.

Better N2YO error messages

Pass-prediction failures now show specific, actionable messages: invalid API key (point you at Settings), rate-limit exceeded (asks you to wait), connection timeout (check internet), no network (no signal), SSL handshake failure (check device date), or unknown satellite (NORAD lookup miss). Earlier builds collapsed all of these into a generic "Unable to fetch passes" — frustrating when the right action depended on the cause.

Appendix - April 29, 2026 - AMSAT Coverage Audit

New APRS / Digipeater Service on Already-Tracked Satellites

A deep audit against the AMSAT live-digipeater status page surfaced two satellites already in the tracking list that were missing their APRS digipeater service tag. Both are now correctly flagged with the orange Digital indicator in Settings and on the prediction cards.

SONATE-2 (DP0SNX) - half-duplex APRS digipeater on 145.825 MHz simplex, 1200 bps AFSK AX.25. Distinct from its existing 145.880 MHz Martin M1 SSTV downlink. Activations are scheduled and announced by the operator (University of Wuerzburg).

NO-44 (PCSAT, W3ADO-1) - the original 2001 PCSAT mission. APRS digipeater on 145.825 MHz simplex, 1200/9600 bps AFSK AX.25. Power-budget-limited: comes alive in mid-day sunlight passes only.

IO-86 (LAPAN-A2) gained a secondary SSDV channel on 145.880 MHz (1k2 IL2P) in addition to its 70cm SSTV. Operators alternate, so only one mode is active per pass.

Three New Satellites - Permanent NORADs

TO-108 (CAS-6, BJ1SO) - NORAD 44881. Inverting Linear V/u transponder (UL 435.270-290 LSB / DL 145.915-935 USB). Has a CW beacon on 145.910 MHz and a 4k8 GMSK telemetry channel on 145.890 MHz. Currently operating intermittently (~2 seconds on, 5 seconds off) due to ongoing investigation; pass predictions still work.

GRBBeta (HA2GRB) - NORAD 60237. Slovak 2U from the Technical University of Kosice on the Ariane 6 inaugural launch (July 2024). Cross-band 9k6 GFSK G3RUH digipeater (UL 145.935 / DL 436.785). Mid-inclination orbit (62 degrees) - unlike most amateur sats which are sun-synchronous, GRBBeta has noticeably different pass timing.

Foresail-1p - NORAD 66778. Aalto University 3U on Transporter-15 (December 2025). Skylink-protocol digipeater on 437.125 MHz simplex, 9k6 FSK with FORESAIL-1 framing. Skylink uses virtual-channel routing - operators need the Aalto Skylink ground software to format packets correctly.

Three New SSDV Satellites (Geoscan Family)

Three additional Russian SSDV satellites from the Geoscan family were added per the AMSAT image-transmitting satellites page. They use the same Geoscan framing as the GEOSCAN-1 through GEOSCAN-6 birds already in the app.

Horizon (RS59S) - NORAD 61757. Baltic State Technical University (Voenmekh), launched November 2024 from Vostochny on the same Geoscan-platform batch as HYPERVIEW-1G. SSDV downlink on 435.430 MHz, 9k6 GFSK Geoscan framing.

239Alferov (RS61S) - NORAD 64881. Russian 3U on the Ionosfera-M 3-4 launch (July 2025). Carries an SSDV downlink on 436.270 MHz plus a gamma-ray-burst spectrometer payload.
Luca (RS90S) - NORAD 67287. Space Research Montenegro 1U, launched December 2025. SSDV on 437.180 MHz, 2k4 GMSK. SatNOGS flags this frequency as IARU-uncoordinated; the satellite is operational and tracked, the frequency choice is the open issue.

Music Broadcast - New Service Category

A new Music service was added to track satellites that periodically broadcast short music tones as a unique RF identifier in place of a CW Morse beacon. These are NOT amateur-radio satellites - they operate on UHF 400-402 MHz (Space Operations band, just below the 70cm amateur band). They are receive-only curiosities best heard with an SDR; standard amateur radios will not tune there.

BALKAN-1 - NORAD 62611. EnduroSat 16U Earth-observation satellite. Broadcasts a classical composition on 401.360 MHz.

Flamingo-1 - NORAD 67391. Vyoma Space Domain Awareness 12U. Broadcasts a classical composition on 401.050 MHz.

OTP-2 - NORAD 63235. Rogue Space Systems thruster demonstrator. Broadcasts a video-game theme on 400.500 MHz.

T.MicroSat-1 - NORAD 66766. Tron Future Tech (Taiwan) 8U. Broadcasts the opening notes of Beethoven's "Ode to Joy" on 401.025 MHz, followed by a telemetry burst.

In Settings, the new "Music" filter pill (rightmost in the row) isolates these four satellites. The pill row uses Wrap layout so it reflows gracefully on narrow phones - on iPhone SE you may see two rows of pills instead of one. The Music indicator color is brown, theme-aware (warmer in dark mode, deeper in light).

About Page Refresh

The About page first paragraph was rewritten to be satellite-agnostic. The previous wording highlighted "the ISS satellite pass" which was misleading since the app tracks dozens of satellites. The 16-feature key list is unchanged.

Pending Satellites - Held for Future Promotion

Several satellites confirmed amateur-active per AMSAT or SatNOGS are not yet in the tracking list because their permanent NORAD catalog IDs have not been issued by CSpOC. They wait on a single consolidated list inside the app source and will be added once their permanent IDs land. Held entries currently include: MarmotSat, Coconut, INCA-2, TCU-100, SOLARAS, Replicator-2 and FOSM-1 (awaiting permanent NORAD catalog IDs, first confirmed signals, or activation of an amateur service). MarmotSat received the designation Canada-OSCAR 128 (CO-128) on August 2, 2026 and is healthy, but it remains held because its permanent catalog number is not yet published and its digipeater has not been switched on. No satellite was promoted in the August 7, 2026 audit; six entries were dropped from the watch list as telemetry-only or dormant.

Music Mode in AR Tracking - Toggle and Recording

For satellites that carry a Music broadcast service (BALKAN-1, Flamingo-1, OTP-2, T.MicroSat-1), the AR Tracking page shows a brown "MUS" toggle button on the right-side stack alongside the existing SSTV / SSDV / Digital / Weather toggles. Tap MUS to enter Music mode: the TX panel switches to a brown "MUS Mode" label and the RX panel displays the music downlink frequency (401.025 / 401.050 / 401.360 / 400.500 MHz depending on the sat) with Doppler correction applied. Doppler at ~400 MHz is similar magnitude to 70cm passes (about 10 kHz at AOS) so listeners will hear a slight pitch glide on the music tones during the pass.

Tap MUS again to start recording. While recording, the toggle pulses green just like every other recording mode. The output WAV file is saved to the app documents directory under the standard naming convention: shortname_Music_yyyy-mm-dd_HH-MM-SS_freqkHz.wav (for example BALKAN-1_Music_2026-04-29_18-42-03_401360kHz.wav). Only one recording mode can be active at a time across all five modes, so the app will prompt you to stop a current recording before starting another.

Scheduled Service Events - Frequency Overrides for 4 Modes

Some satellites occasionally use a non-primary frequency for short windows. The Scheduled Service Events feature lets you register an override so the AR page picks the right frequency during the event and automatically falls back to the published default outside it. The feature covers four services:

SSTV - alternate frequencies for special transmissions, e.g. ARISS school events on the ISS or operator-announced shifts on smaller birds.

SSDV - occasional schedule shifts on Geoscan-style Russian birds where the operator announces an alternate downlink for an event window.

Digital - APRS or digipeater channel changes during ARISS school contacts (the ISS sometimes moves between cross-band voice and standard APRS for a short period) or test windows announced by the satellite team.

Weather - the most concrete current case: Roscosmos rotates Meteor-M N2-3 and N2-4 between 137.900 MHz and 137.100 MHz on operational cycles. Add an event with the active frequency to keep the AR page tuned correctly.

Music broadcasts are intentionally excluded - their frequency IS the unique identifier so they cannot drift without becoming a different satellite.

Adding a Scheduled Event

Open Settings and scroll to the satellite list panel. The button "Add Scheduled Event (SSTV / SSDV / Dig / WX)" sits below the minimum-pass-angle slider. The (i) info icon to its right opens a quick reference dialog explaining the four service types and when an override is useful.

Tap the button. The dialog opens with four service-type chips at the top: SSTV / SSDV / Dig / WX. Pick the service first; the satellite dropdown automatically narrows to satellites that have that service. Then pick the satellite, enter the override frequency in MHz, and pick the From and To dates from the calendar pickers. Tap Save.

Validation rules: the override frequency must differ from the satellite's published default for that service, and you cannot create two overlapping events for the same satellite and same service type. Different services on the same satellite can overlap in time - they listen on different downlinks - so an SSTV event and a Digital event for the ISS during the same week is fine.

Event List - Type Badges and Sharing

Once events exist, the panel shows a table with a colored type badge before each satellite name: blue for SSTV, green for SSDV, orange for Dig, purple for WX. Active events (today within the date range) show the satellite name in green. The share icon at the top of the table renders the events list as a PNG with the same type badges and theme-aware colors - share to messaging apps or save to Photos.

Editing and Deleting Events

Tap the edit icon on any row to change the satellite, frequency, or dates. The service-type chips are greyed out during edit because changing the type would invalidate the satellite eligibility check; if you need to change type, delete and create a new event. The delete icon shows a confirmation dialog with the event's service type, satellite, dates, and frequency.

Expired events (end date strictly before today) are removed automatically the next time you open the app.

SSTV Decoder Info Icon

The SSTV Decoder button now has its own (i) info icon to the right. Tapping it opens a quick reference dialog covering the decoding workflow: record SSTV audio on the AR page (or import a WAV), open the decoder, pick the file and the SSTV mode (Robot 36, PD 120, PD 180, Martin, Scottie, etc.), then view the decoded image. The dialog also reminds you that the ISS commonly uses PD 120 or PD 180 and that Russian Geoscan-family birds use Robot 36 - color bands or skew in the result usually mean the wrong mode was selected.

Long Satellite Names - Adaptive Sizing

Long satellite names in the Settings list (for example "GALAPAGOS-UTE-SWSU (HC1PX)" or "WASEDA-SAT-ZERO-II (JK1UDE)") now automatically shrink to fit on a single line, even when global Font Scale is increased above 1.0. The shrinking is visual only - the name itself is preserved unchanged - so identification is never lost to truncation. The same behavior applies to the satellite-selection dialog opened via the magnifier icon: very long names auto-fit while short names render at full size.

Appendix - April 29, 2026 - AMSAT Live Activity Indicator

A small color-coded activity dot now appears on every prediction card (both single-satellite and multi-satellite views), every notification list card, and is baked into the image-share exports of all three pages. The dot reflects real-world activity sourced from the AMSAT Live OSCAR Satellite Status page (<https://www.amsat.org/status/>) over the last 24 hours UTC.

Color Scale

The dot uses the AMSAT cell palette so it mirrors what you see on [amsat.org/status/](https://www.amsat.org/status/): blue = Active (heard), purple = ISS Crew Voice, amber = Telemetry/Beacon only, orange = Conflicting reports (with a small "?" overlay glyph), magenta = No-signal reported, grey = no reports. The dot also carries a small inner glyph (check / tilde / dot) so the indicator stays readable for color-blind users and in monochrome image exports. / beacon only OR conflicting reports (a small "?" overlay glyph appears on conflict). Orange = operators tried and reported "No signal". Red = no positive reports in the 24-hour window. The dot also carries a small inner glyph (check mark / tilde / dot / cross) so the indicator stays readable for color-blind users and in monochrome image exports.

No-Data States

Three distinct grey states tell you when the indicator has no opinion to offer: a hollow grey ring means AMSAT does not currently track this satellite (no reports are being collected for it - this is normal for non-AMSAT-list birds like Meteor-M weather sats and the Tevel constellation). A solid grey dot means the data has not yet been fetched (give it a few seconds on first launch). A solid grey dot with a "!" overlay means the cached data is older than the 15-minute refresh window, usually because your network was offline.

Tap for Detail

Tapping the dot opens a themed popup with the last 48-hour strip from AMSAT, one row per mode. For ISS this means six rows - Crew Voice, FM, SSTV, UHF Digi, VHF Digi, and DATV - so you can see at a glance which transponder is up. Each cell is a 2-hour UTC window; tapping a cell with reports expands an inline list showing the reporter callsign, Maidenhead grid square, status text, and the precise 15-minute UTC slot of each individual report. A small refresh button forces a fresh fetch from AMSAT; an expandable Source / About section discloses the AMSAT attribution; and a small share button on the popup exports the current view as a compact themed PNG suitable for posting to social media or sharing with your club.

Pass Info Popup Share

The (i) Pass Info popup, available from every prediction card, gained the same compact share button. Tap it to export the pass details (date, max elevation, AOS, LOS, mode, tone, frequencies) as a watermark-sized PNG share image.

Refresh Policy

Activity data is fetched at most once every 15 minutes while a prediction page or the notification list is open, and is cached on your device for offline display. The same in-memory snapshot is shared across every dot in the app - there are no extra fetches per card. If the network is unreachable, the indicator shows the last data with a "!" stale overlay; the app silently retries in the background every 15 minutes - you don't need to do anything. You can also tap the refresh button inside the popup to force a fresh fetch.

Privacy and Attribution

The fetch is read-only: Ham Satting does NOT submit reports back to AMSAT. No callsign, location, or any other personal data is sent in the request - only the standard headers your operating system attaches to outbound HTTPS connections. To submit your own "Heard" / "Telemetry Only" / "Not Heard" reports, visit <https://www.amsat.org/status/> in a browser and use AMSAT's own submission form. The popup's expanded

Source / About section, and every share image, carry the attribution: "Activity data: AMSAT Live OSCAR Satellite Status (amsat.org). © Radio Amateur Satellite Corporation (AMSAT-NA)."

Coverage Notes

AMSAT's status page covers a subset of amateur satellites - primarily the active linear / FM / digital birds the AMSAT community reports on. Approximately 32 of the satellites Ham Satting tracks have at least one mode row on AMSAT; the other ~44 (Meteor-M weather sats, the Tevel constellation, formation-flying CubeSats, etc.) display the hollow-ring state. When AMSAT adds new satellites in the future, Ham Satting picks them up automatically as long as the local catalog uses the standard naming convention. When you export the popup as a share image, the currently-open cell detail panel is INCLUDED in the export — what you see is what you share. Dismiss the panel before tapping share if you want a clean strip-only image.

Appendix — May 10, 2026 Updates (Production Hardening v4.2.0+42)

Notification Race Fix

When you toggled multiple pass-notification bells in quick succession, one of the scheduled entries could disappear from the in-app list (the OS-level alarm still fired at the right time, but you couldn't see or cancel it from inside the app). The save path now serialises rapid mutations the same way the QSO log does, so the list always reflects what's actually scheduled.

AR Page Smoothness

The AR tracking page used to redraw on every magnetometer event (10-20 times a second) even when your phone was sitting still. The compass listener now only updates the screen when the heading changes by at least 0.5° — the smooth arrow motion you see is unchanged because the dedicated 60 FPS arrow timer still drives it. Lower CPU on the AR page, especially on older devices.

Faster QSO Imports

Importing a large QSO log (e.g. cross-app from Ham Logging) used to slow down on big lists because the duplicate-check ran in $O(N \times M)$ time. The dedup is now $O(N)$ via a hash-set lookup — same dedup criteria, dramatically less wait time on 5,000+ row imports.

Diagnostic Crash Log (NEW)

A new in-memory diagnostic capture mechanism. When the app catches an unexpected error during your session, a one-shot snackbar appears with an EMAIL action — tapping it opens your mail app pre-filled with a plain-text report (callsign, app version, error trace) addressed to support. Repeat errors stay silent for 5 minutes after the first surface so you don't get spammed. No third-party crash reporter; nothing leaves your device unless you tap EMAIL.

Cleaner Error Messages

Failed shares, downloads, or saves no longer leak the per-install sandbox path (e.g. `/private/var/mobile/Containers/Data/Application/<UUID>/...`) or URL-embedded API keys into the snackbar. Messages are sanitised to a clean prefix + the actual failure reason, capped at 160 characters.

APRS Map Performance

The APRS packet parser used to allocate up to ten regular-expression objects per inbound packet. In dense APRS coverage at 5-20 packets per second, that was a real CPU draw. The patterns are now compiled once at app start and reused for every packet — same matches, lower battery cost when the APRS layer is active on the map.

Internal Hardening

Tightened Android FileProvider scope so external storage access is limited to user-visible Documents/ and Download/ folders only (defense-in-depth — share_plus only ever exposes URIs we explicitly grant). Notification IDs now use a collision-resistant scheme that prevents one alarm from silently overwriting another. AMSAT-resolver fetch errors no longer expose URLs in the cached error badge. Added tolerant HTTP-body decoding across the network layer so a stray legacy byte from N2YO / aprs.fi / CelesTrak can't crash a refresh.

Build & Release Polish

macOS app metadata corrected (was showing a placeholder copyright). Production AAB builds now refuse to silently sign with debug keys (Play Store would reject the upload anyway, now you find out at build time with a clear message). Multiple mounted-checks added throughout async code paths to prevent setState-after-dispose races on the support page and QSO list.

Appendix — May 2026 Update: 10-Language Support (v4.2.0)

Ham Satting v4.2.0 ships with full interface localisation across ten languages: English, العربية (Arabic), Español, Français, Deutsch, 日本語, 中文, Português, Русский, and Italiano.

Switch language from Settings → Default Values → Language. The picker uses the Ham-Satting One-Sat-style dropdown — tap to see all ten native names; the currently-selected language has a filled radio dot. Like every other Default Values setting, your language choice is held in memory until you tap the Save All FAB at the bottom-right of Settings. On Save All the entire app rebuilds in the new language instantly.

Arabic is the only right-to-left language at present. When Arabic is selected, most pages flip RTL (About / Support / User Manual / Tips Dialog / First-Time Dialog / Settings). Three pages deliberately stay left-to-right regardless of language: the Map page, the AR Tracking page, and image-export pages (Compass / AMSAT / Pass Timeline / QSL card). This is intentional — those pages render directional layouts (zoom +/- buttons, mode buttons, time axis, compass arrows) that must stay consistent so screenshots and exports look the same worldwide.

Ham-radio technical terms stay English in every language for compatibility with the wider ham-radio ecosystem. Terms like AOS, LOS, AMSAT, SSTV, SSDV, APRS, NORAD, TLE, Maidenhead, callsign, grid, FM, USB, CW, ISS, QSO, QSL, ADIF, MHz, TX, RX, Doppler, N2YO — these are international amateur-radio terms-of-art and stay literal English so your ADIF, CSV, and JSON exports remain compatible with LoTW, eQSL, ClubLog, and desktop logging software.

Entry-field labels (the small floating labels above text inputs in Settings — Callsign, Grid Location, Email Address, N2YO API Key) also stay English literal. This protects ADIF field-name mental models for experienced operators. Form hints follow the same rule, except the Support page's main message box which translates fully so non-English users can write the prompt in their language.

Image-export watermarks ('Generated by Ham Satting') always read English, left-to-right, in every language. This applies to compass dialog PNG exports, AMSAT activity sharing, pass-timeline screenshots, QSL card exports, service-events table sharing, and per-pass info share cards. Outbound support emails also stay English so they're readable in any inbox.

ملحق (v4.2.0) — تحديث مايو 2026: دعم 10 لغات

الإصدار 4.2.0 يدعم 10 لغات للواجهة بالكامل: الإنجليزية، العربية، الإسبانية، الفرنسية، الألمانية، اليابانية، الصينية، البرتغالية، الروسية، والإيطالية.

بذل اللغة من الإعدادات → القيم الافتراضية → اللغة. القائمة تستخدم نفس تصميم منتقي قمر واحد — اضغط لرؤية الأسماء العشرة بلغاتها الأصلية؛ اللغة المحددة حالياً تحمل نقطة دائرية. مثل كل القيم الافتراضية، اختيار اللغة محفوظ في الذاكرة حتى تضغط زر «حفظ الكل» أسفل يمين الإعدادات. عند الضغط يُعاد بناء التطبيق فوراً باللغة الجديدة.

/ حول / الدعم / دليل المستخدم / النصائح RTL العربية هي اللغة الوحيدة الحالية المكتوبة من اليمين إلى اليسار. عند اختيارها تنقلب معظم الصفحات / وصفحات تصدير الصور (البوصلة، AR، الترحيب / الإعدادات). (ثلاث صفحات تبقى من اليسار إلى اليمين مهما كانت اللغة: الخريطة، التتبع، هذا متعمد — تلك الصفحات تعرض تخطيطات اتجاهية) أزرار التكبير، أزرار الأوضاع، محور الوقت. (QSL الجدول الزمني / بطاقة / AMSAT / أسهم البوصلة (يجب أن تبقى ثابتة لتظهر لقطات الشاشة والصور المُصدرة بنفس الشكل عالمياً).

AOS, LOS, مصطلحات الراديو الهواة التقنية تبقى بالإنجليزية في كل اللغات لضمان التوافق مع منظومة الراديو الهواة العالمية. مصطلحات مثل AMSAT, SSTV, SSDV, APRS, NORAD, TLE, Maidenhead, callsign, grid, FM, USB, CW, ISS, QSO, QSL, ADIF, MHz, TX, RX, Doppler, N2YO — هذه مصطلحات راديوية دولية وتبقى حرفياً بالإنجليزية حتى تظل صادرات و CSV و ADIF وبرامج التسجيل المكتبية ClubLog و eQSL و LoTW متوافقة مع JSON.

تبقى أيضاً (N2YO API key، البريد، grid، callsign — التسميات الصغيرة فوق صناديق النص في الإعدادات) تسميات حقول الإدخال عند المشغلين ذوي الخبرة. تلميحات النماذج تتبع نفس القاعدة، عدا صندوق رسالة ADIF بالإنجليزية حرفياً. هذا يحمي النموذج الذهني لأسماء حقول الدعم الرئيسي الذي يُترجم بالكامل ليتمكن المستخدمون غير الإنجليز من كتابة رسالتهم بلغتهم.

تظل بالإنجليزية من اليسار إلى اليمين دائماً، في كل اللغات. هذا ينطبق على («Generated by Ham Satting») علامة مائية لتصدير الصور جدول الأحداث المجدولة، وبطاقات معلومات المرور. البريد الإلكتروني، QSL لقطات الجدول الزمني، بطاقات AMSAT، صور البوصلة، صور الصادر للدعم يبقى أيضاً بالإنجليزية ليكون قابلاً للقراءة في أي صندوق وارد.

Appendix — May 23, 2026 Updates (v4.3.0+43)

Ham Satting v4.3.0+43 adds an in-app Version History page, improves map stability, refines the About-page layout for right-to-left languages, and updates the satellite catalogue after a re-entry.

Version History page. A new Version History entry sits next to Support on the About page. Tap it to open a bundled archive of every release — the newest at the top and expanded by default, older releases collapsed. Each entry lists that version's headline changes. Because the archive ships inside the app it works with no internet connection. The page follows your light / dark theme, is shown in English, and stays left-to-right in every language.

Map stability. The interactive map now recovers cleanly from a rapid two-finger pinch-and-flick that previously could leave the camera in an invalid state. Momentum 'fling' panning is disabled so a fast gesture can no longer push the view past the world bounds.

About-page layout. The developer signature and the copyright line on the About page now stay left-aligned and left-to-right regardless of the interface language. Previously, selecting Arabic right-anchored these lines; they are brand and credit text and are intentionally kept consistent worldwide.

Satellite catalogue. HADES-ICM (also known as SO-125) re-entered the atmosphere on 23 May 2026 and has been removed from the active satellite list, joining the other re-entered birds. As always, the satellite selection menu in Settings shows the complete live list.

Appendix — May 30, 2026 Updates (v4.5.0+45)

Reliability + APRS lifecycle pass on top of the May 23 v4.3.0+43 republish-ready bundle. Version jumps from 4.3.0+43 (Apple) / 4.3.0+44 (Play) to 4.5.0+45 across both stores.

APRS reliability

Fixed a crash that could fire on a second packet from any APRS station first heard without an internet-gateway ("qAR") construct. The diagnostic email showed it as "Cannot change an unmodifiable set" — see the May 29 sibling-app notes for the same fix.

Toggling APRS OFF then ON again now reloads stations straight away — previously the first 15 seconds after toggle-ON silently returned an empty seed, and the live socket would only catch the next beacon (5–30 minutes on a low-traffic SSID) so the map appeared stuck loading.

Navigating away from the map (tab switch, push another page) while APRS is mid-connection or mid-callsign-change no longer leaves zombie redraw and refresh timers firing against a torn-down source. Changing your APRS callsign in Settings during an in-flight aprs.fi REST seed no longer lets the old identity's stations land in the new session's map. The seed compares its connected-callsign-at-entry against the current connected callsign post-fetch and bails if they've diverged.

The APRS export footer watermark now reads "Ham Satting" in every UI language and stays LTR even on Arabic — was previously a hardcoded English string outside the canonical app-name source.

SSTV decoder

Dragging the shift, slant, or start-offset sliders quickly no longer shows a stale image from an earlier decode finishing AFTER a newer one. Each decode now carries a monotonic token; only the latest one paints. Out-of-order completions are silently discarded.

Diagnostic log

Background network noise (map tile timeouts, transient CDN hiccups, offline retries) no longer fills the diagnostic email body. Only real app errors are captured.

Framework warnings in debug builds no longer pop a user-facing "something went wrong" snackbar — they already surface in the debug console. Release builds are unaffected.

The diagnostic log heading and email subject now read from the canonical app-name string — no "Ham Satting" drift anywhere in the diagnostics path.

macOS

Fixed a startup issue where the Mac build could fail to load on flutter run because the .app bundle path contained a space. The bundle is built as "HamSatting.app" internally; the displayed app name remains "Ham Satting" via CFBundleName + CFBundleDisplayName.

Release-build entitlement gates rewired so location access, photo-library access and outgoing network connections actually reach the signed binary. Previously they could be silently stripped at build time because three `ENABLE_RESOURCE_ACCESS_*` / `ENABLE_OUTGOING_NETWORK_CONNECTIONS` settings were NO in the Release config.

Added export-compliance attestation (`ITSApplUsesNonExemptEncryption=false`) and disk-space privacy-info entry for App Store upload parity with iOS.

QSO log export

ADIF file header line now reads "ADIF Export from Ham Satting" driven by the canonical app-name string (was hardcoded; now matches the in-file PROGRAMID tag).

About page

Footer copyright is now centered to match the rest of the Unixeer family. Developer signature line above the copyright remains left-anchored as before.

Under the hood

iOS project deployment target reverted to 15.6 (had drifted to an impossible 26.0 in three project-config slots, which would have failed App Store upload).

Appendix — May 30, 2026 PM Updates (v4.5.0+45 catalogue)

Round-two changes to Ham Satting 4.5.0+45. Built on top of the May 30 AM appendix; nothing in that entry is superseded.

Satellite catalogue additions

Ten new satellites were promoted from the parked-NORAD wait list once their permanent CelesTrak NORAD IDs landed: MESAT-1 (MO-122), OOV-Cube (TUBSAT-30), POLYTECH-UNIVERSE-3, KUZGTU-1 (RS47S), COLIBRI-S (RS67S), HORS 3 (RS81S), HORS 4 (RS82S), SVYATOBOR-1 (RS60S), MONITOR-2 (RS39S), RTU MIREA 1 (RS51S). Each entry is backed by a SatNOGS + AMSAT or IARU citation; the release notes carry the full source manifest. MESAT-1 (MO-122) is kept in the catalogue even though AMSAT announced end-of-mission March 2026 — back-dated QSO entries against it still resolve through the auto-fill maps.

QSO entry frequency auto-fill expansion

Sixteen additional satellites now populate TX/RX band, frequency and mode when you pick them in the Propagation & Satellite collapsible. The new entries are MESAT-1, Foresail-1p, Lobachevsky (RS83S),

CroCube, LASARSat, KNACKSAT-2 (HS0K), D-STAR ONE iSat, D-STAR ONE Sparrow, MAGNARO-II Piscis (JJ2YXG), ARICA-2 (JS1YSD), Meteor-M N2-3, Meteor-M N2-4, SNUGLITE-3 HANA, HADES-SA (SpinnyONE), PARUS-T3 (BN0TIT), and FSI-SAT2 (JS1YQU). The last four are flagged for operator confirmation — their uplink frequencies were inferred from sibling-sat family patterns because the IARU coordination pages only published the downlink figure.

Tiangong (CSS) frequencies corrected

The previous Tiangong entry had been showing 145.875 up / 436.510 down on FM. That was wrong — it was mirroring the ISS pattern. CSSARC's amateur payload is a V/u inverting SSB linear transponder per AMSAT-UK: uplink 435.130-435.150 MHz LSB, downlink 145.950-145.970 MHz USB at 5W EIRP. Auto-fill mid-band values now point to the correct place. This is the first satellite_defaults payload correction the app has shipped; it falls under the documented "correct payload of existing entries" carve-out in the append-only rule.

OrigamiSat-2 → OrigamiSat-2 (FO-126)

The Tokyo Institute of Technology origami-reflectarray demonstrator was assigned the FO-126 OSCAR designation by AMSAT-SE in May 2026. The catalogue key has been renamed to match the family naming convention used for HADES-ICM (SO-125), HADES-R (SO-124) and TO-108 (CAS-6). Stored QSO records pointing to the old "OrigamiSat-2" key continue to resolve through the normalized-lookup map.

About page footer

Footer copyright is now centered to match the rest of the Unixeer family (Ham Logging, Ham Learning, Ham Gaming). Developer signature line above the copyright remains left-anchored as before.

Appendix — June 11, 2026 Updates (v4.7.0+47)

Version 4.7.0 adds two new pages — Sat Match and Hams.at — each reachable from its own icon on the main app bar (ordered Hams.at, then Sat Match, then your notifications list). The API-hit indicator also appears at the top of both new pages; Sat Match's pass lookups count toward your N2YO daily total.

Sat Match — Mutual-Visibility Pass Finder

Sat Match finds the passes you can actually work with another station. Open it from the new satellite icon on the main app bar.

Sat Match shows two grid fields on the first row, with the satellite picker and the Check button on the second. Grid 1 is your home grid — prefilled from Settings, but editable, so you can also plan a match for a place you have not reached yet. Grid 2 is the destination. Pick a satellite from the dropdown (the first enabled one is selected for you) and tap Check.

Sat Match makes two pass lookups — one for Grid 1 and one for Grid 2 — then lists the windows where the satellite is above the horizon at both locations at the same time. That mutual-visibility window is when a two-way contact is possible. It looks ahead 7 days. On each match card the match line — both grids with their elevations, the mutual window and its length — appears at the end of the card. Your grids, satellite and results are kept if you leave the page and come back.

Each match is shown on a card identical to the prediction cards: tap the compass for the sky path, follow the pass to schedule a notification (it appears on the Notifications page just like a followed prediction), add it to your calendar, open it in AR (phones only), and share it as an image. The card also shows the mutual window, how long it lasts, and the maximum elevation reached at each grid, written next to each grid.

Both pass lookups count toward your N2YO daily API indicator, shown at the top of the page. Share a single match as an image from the card, or use the export icon at the top to save every match on the page as one combined image. Times in exported images are in UTC.

Hams.at Activations

The Hams.at page lists upcoming amateur-satellite rover activations. Open it from the new megaphone icon on the main app bar.

No login or API key is needed — the activations come straight from the public Hams.at feed. Each activation shows the callsign, satellite, mode, frequency and AOS/LOS times. The page refreshes itself every minute and keeps what you were viewing if you leave and come back; there is no refresh button, but you can pull down to refresh manually.

Each activation shows the activator callsign, the satellite, the grid, and the AOS and LOS times in UTC. Pull down to refresh. Share a single activation as an image, or use the export icon to save the whole list as one image.

Larger Text on Every Card

The Font Scale setting now affects every field on the prediction cards, the notifications list, and the new Sat Match and Hams.at cards — including the frequency and mode rows, which previously stayed at the default size regardless of your Font Scale choice.

Appendix — June 13, 2026 Updates (v4.7.0+47)

Prediction Start Date & Time — Tap to Pick

On both prediction pages — single satellite and multiple satellites — the Start Date and Start Time fields no longer need typing. Tap either field to open a calendar or a clock, exactly the way the New QSO page works. These two fields stay in your device's local time (only the QSO log and shared images use UTC), so the passes you predict line up with the local times shown on the cards.

Satellite Catalogue Refresh

The satellite catalogue was refreshed against the latest orbital data. A few satellites that have re-entered the atmosphere were retired from tracking so the pass list stays accurate, and the AMSAT activity dots were corrected for several satellites whose live status was not matching before — they now light up correctly on the prediction cards when AMSAT shows them active.

Appendix - June 23, 2026 - Satellite Catalogue Update (v4.9.0+49)

Three New Satellites

Gemini-Pollux (NCKU, Taiwan; callsign BV2DQ) - NORAD 69000, IARU coordination #1095. A V/U data transponder and APRS / AX.25 digipeater with a 436.500 MHz downlink (BPSK 1k2 / 9k6). It is a data satellite, not an FM voice repeater. Its imagery is sent on an S-band link that is outside this app's scope. EMISAR (Romania) - NORAD 68427. A receive-only curiosity: store-and-forward digital messaging on 401.334 MHz (CW + 9k6 G3RUH). This is just below the 70 cm amateur band, in the Space Research band, so it is listen-only with an SDR - there is no uplink and no QSO, the same as the music-broadcast satellites. OPTISAT (Greece) - NORAD 68418. A receive-only curiosity: a 400.360 MHz GMSK telemetry beacon (the satellite's main mission is a laser-comms demonstration). Like EMISAR it transmits in the Space Operations band just below 70 cm, so it is an SDR listen-only object.

LAPAN-A3 Frequency Correction

LAPAN-A3 (LAPAN-IPB) auto-fill was corrected. Its frequencies had been mistakenly copied from its sister satellite LAPAN-A2 (IO-86). LAPAN-A3 has no amateur voice repeater - its only signal is a 437.425 MHz telemetry beacon (receive-only) - and the auto-fill now reflects that.

Grid Locator Map - Info Panel

The Grid Locator map info panel now shows a single tidy line with your saved QTH, the distance to your live position, and your current grid (You are here), matching the Ham Logging companion app. Any field that is not set yet shows a dash. The panel text now also grows and shrinks with your Font Scale accessibility setting.

Rig Control (CAT)

Ham Satting can keep your radio tuned for you throughout a satellite pass. This is one-way Doppler rig tuning: as the satellite rises, passes overhead and sets, the app continuously computes the Doppler-corrected uplink and downlink and writes those frequencies straight to your transceiver, so the received signal stays centred and your transmit frequency lands where the transponder expects it. You keep your hands on the operating, and the app keeps the numbers honest.

The link is one-way by design: Ham Satting sends corrected frequencies to the radio, it does not take over your radio's controls or read your logbook. It drives whichever VFO the pass needs (downlink on receive, uplink on transmit for a linear or FM bird), and it can work with the radio in split so you hear yourself in the passband while transmitting on the corrected uplink. If the app cannot reach a radio, nothing is lost: it simply falls back to showing the corrected frequencies on screen so you can dial them in by hand, exactly as earlier versions did.

Rig Control is a phone-only feature. It runs on your Android or iOS device and talks to the radio directly, or through a small bridge on your network. It does not require any cloud service, account or subscription anywhere.

What Rig Control Does

- Tracks Doppler through the whole pass and sets the corrected downlink on receive and the corrected uplink on transmit.
- Chooses the correction per mode, the same mode-aware logic the on-screen Doppler display already uses (SSB, CW, FM and data are each shifted correctly).
- Works with the radio in split where the mode calls for it, so you can listen in the transponder passband while transmitting on the corrected uplink.
- Updates the radio on the same cadence as the on-screen correction, so the tuning follows the bird smoothly rather than in large jumps.
- Falls back automatically to on-screen corrected frequencies whenever no radio is connected or a link drops mid-pass.
- Is strictly one-way: it writes frequency (and split where needed) to the radio and never alters your other rig settings.

Enabling Rig Control

Rig Control is OFF by default. Nothing connects to a radio until you turn it on and pick a rig, so the app behaves exactly as before if you never open this feature.

- Open Settings and find the Rig (CAT) and Rotator Controls panel.
- Turn on Control my Radio Rig (CAT). The rig picker and the connection fields appear.
- Choose your radio and the transport it is reachable on (network, USB, Bluetooth or a serial bridge), then fill in the connection details for that transport.
- Connect. A status chip shows whether the radio is linked; when it is, the corrected frequencies you see on the pass display are also being written to the rig.

On iOS, the first time the app reaches a radio over your local network the system asks for Local Network permission. Allow it, or the connection silently fails with no prompt. On Android, connecting over your local network or over USB may prompt for a permission the first time each session. USB permission in particular is requested again every time you reconnect the cable, which is normal Android behaviour.

Choosing Your Radio — The Rig Picker

Rig Control uses a searchable radio picker. Start typing your model (for example "9700", "K4" or "FT-991A") and the list narrows to matching rigs. Each entry is tagged honestly so you know how much to trust it:

- VERIFIED means the app's control of that radio has been checked against the real hardware or a faithful capture of it.
- IMPLEMENTED PER SPEC means the control was built precisely to the manufacturer's published CAT documentation but has not yet been confirmed on that exact model. It should work; if you meet a quirk, that is the label telling you it has not been bench-proven yet.

We label this way deliberately rather than claiming blanket support. A radio family may share one command set, so a close sibling of a VERIFIED rig is usually safe even when it still reads PER SPEC.

Not every radio has a CAT interface. In particular, the Yaesu FTM family of C4FM mobiles has no computer-aided-transceiver control at all, so those radios cannot be tuned by any app; they are not in the picker as controllable rigs. If your radio genuinely has no CAT port, use the on-screen corrected frequencies and tune by hand.

Connecting Over the Network

Network transports need only your phone and the radio (or a small bridge) on the same local Wi-Fi or LAN. You enter a host address and a port. Keep everything on your own WPA2 network and never port-forward a rig to the public internet.

rigctld (Hamlib Daemon)

rigctld is the Hamlib network daemon that fronts almost any radio Hamlib supports. Run it on a PC, Mac or Raspberry Pi that is cabled to your radio, then point Ham Satting at that machine's address on port 4532 (the Hamlib default). This is the most universal path and the right choice when several programs must share one radio, because rigctld arbitrates between them.

- Host: the address of the computer running rigctld. Port: 4532.
- wfview can emulate rigctld for USB-attached Icoms: enable its rigctld option and use port 4533. Note that the emulation lives in the wfview GUI, not the headless server build.
- Tools such as a RigPi image also expose rigctld on 4532 and are a tidy always-on option on a Pi.

Icom WLAN Direct (RS-BA1)

Network-capable Icom radios speak the RS-BA1 protocol directly over Wi-Fi or LAN, with no PC in between. This covers rigs such as the IC-705, IC-9700, IC-7610, IC-905 and the IC-7300MK2, among others. On the radio, set a user name and password, turn Network Control on, and connect the radio to your network (the IC-705 uses 2.4 GHz Wi-Fi).

- Enter the radio's IP address and the user name and password you set on the rig.
- The original IC-7300 (Mk I) has no network port; reach it through wfview or rigctld instead.
- The app keeps the RS-BA1 session alive for you (it re-authenticates periodically as the protocol requires); you only supply the credentials.

Kenwood KNS

Kenwood's network CAT (KNS) lets a TS-890S or TS-990S be controlled directly over the LAN on TCP port 60000. On the radio, enable KNS and set an admin (or user) account, then enter that host, port and login in the app.

- TS-890S is VERIFIED. TS-990S is IMPLEMENTED PER SPEC; the login differs slightly in credential length but is otherwise the same path.
- The app keeps the socket busy so the radio does not drop it during quiet moments in a pass.
- The TS-590S/SG are not direct-network radios; reach them through their host software and rigctld instead.

Elecraft K4

The Elecraft K4 offers CAT straight over Ethernet on TCP port 9200 — no serial cable and no PC. Put the K4 on your network, then enter its address and port 9200. The K4 accepts several clients at once, so the app can share it with your desktop logger. This path is IMPLEMENTED PER SPEC pending a bench check.

Network Serial Bridge (Serial-over-TCP)

Because Ham Satting carries the CAT protocols itself, any transparent bridge that turns a TCP connection into a plain serial stream will drive your radio — no Hamlib needed. You give the app the bridge's host and port and pick your rig model so it knows which CAT language and baud rate to use; the baud rate itself is set in the bridge's own configuration.

- ser2net (version 4) on a Pi, Linux box, Mac or Windows: a short YAML config of an acceptor (for example tcp,4000), a connector to the serial device with a baud string like 38400n81, and kickolduser: true. Use the version 4 YAML form, not the old version 3 colon syntax.
- wfview's raw CI-V TCP port passes transparent CI-V bytes for a USB-attached Icom, which the app's Icom codec drives directly.

- Commercial Wi-Fi-to-serial dongles: the USR-W610 (RS232, a solid first choice) and the Elfin EW10/EW10A (RS232); the EW12 is the TTL variant. Never use the EW11 — it is RS485 and wrong for CAT.
- Only one controller may hold the bridge at a time; if another program grabs it, the app reports that another controller took over. To share a radio between the app and, say, WSJT-X, use rigctld instead of a raw bridge.

Wiring matters, and getting it wrong can damage a radio. A few facts worth knowing before you build or buy: an Icom CI-V jack is a single-wire, open-collector bus at about 5 V that supplies no power and hears its own echo, so an RS232 dongle needs a proper level converter (the CT-17 pattern). A Yaesu FT-817/818/857/897 CAT port is 5 V TTL and uses 8N2 framing (two stop bits) at 4800/9600/38400, so the bridge must be set for two stop bits and RS232 levels will damage it. DB9 RS232 rigs — Kenwood TS-480/570/590/2000 and Elecraft K3/K3S among them — are the zero-soldering sweet spot, needing only a null-modem check; the bare Elecraft K2 AUX jack, however, is not RS232-tolerant and needs the KIO2 module. Finally, PTT keying by RTS or DTR does not cross a transparent bridge, so where PTT is needed it must be a CAT command. Full recipes for these bridges live in the project's bridge notes and are worth reading before you wire anything.

Connecting Over USB (Android USB-OTG)

On Android you can cable the phone straight to the radio with a USB On-The-Go adapter and the rig's own CAT cable — a CI-V, Kenwood, Elecraft or Yaesu cable as appropriate. This path is Android only; iOS does not allow USB serial and never will, so on an iPhone or iPad use a network, Bluetooth or bridge transport instead.

The app recognises the common USB-serial chips (FTDI, CP210x including the dual-port CP2105, CH34x, PL2303 and CDC-ACM). Some radios expose two serial ports over one cable; when so, the app lets you pick which port carries CAT. A few per-rig notes save a lot of grief:

- Icom (IC-705/IC-905 and the desktop rigs): on the radio's set menu, Unlink CI-V USB from REMOTE, set the CI-V baud to 115200, and turn CI-V USB Echo Back ON. The IC-705 and IC-905 present as CDC-ACM (not CP210x); the IC-7300 is a single CP2102 port; the IC-9700 and IC-7610 are dual CP210x with CAT on the first port.
- Yaesu FT-817/818/857/897: 5 V TTL at 8N2 framing (two stop bits). The default is 4800 baud; set the radio's DIG mode sub-mode to USER-U for FT8-style work. These older Yaesus have no identify command, so you must select the exact model in the picker yourself.
- Yaesu FT-891: the CAT port is the Standard (not Enhanced) port on its dual-port cable, so choose the other port index and note there is no USB audio on it.
- Xiegu X6200: CAT is on the SERIAL-B port at 19200 baud (a CH342 dual-port chip). This is the one row still awaiting a hardware check, so treat it as PER SPEC and bench it first.
- A USB-OTG adapter cannot charge the phone at the same time without a powered (PD) splitter, and Android asks for USB permission again each session — both are normal.

Connecting Over Bluetooth

Bluetooth frees you from cables. Two Bluetooth Low Energy paths work on both Android and iOS; a third, classic Bluetooth SPP, is Android only.

IC-705 Native Bluetooth LE

The Icom IC-705 has a built-in Bluetooth LE CAT interface, so the phone talks to it wirelessly with no extra hardware. The first time, put the radio into Bluetooth Pairing Reception from its set menu; after that the app reconnects on its own. Once paired, the radio speaks ordinary CI-V over the link, so control is identical to every other Icom transport.

Generic BLE-UART Bridge

For any TTL-CAT radio you can add a small Bluetooth LE UART module wired to the radio's CAT port and reach it from either platform. The app supports the two common module profiles (Nordic UART Service and the HM-1x profile) and lets you override the service and characteristic UUIDs by hand for anything unusual.

- Recommended modules: the DSD TECH HM-19 (genuine TI CC2640R2F, BLE 5, 9600-8-N-1 by default, powered at 3.6–6 V — never from the 13.8 V rail) and the Adafruit Bluefruit LE UART Friend.

- Avoid unbranded HM-10 modules. Many are CC41-A clones with scan and pairing bugs and missing crystals; they are a well-known source of intermittent, unexplained failures.
- Wiring in brief: to an Icom CI-V jack, tie the module's TX and RX to the tip; to a Yaesu FT-8x7, connect direct TTL and set the radio's CAT to match; to a Kenwood or Elecraft RS232 port, add a MAX3232-class level converter. At the one-per-second rate CAT needs, throughput is never an issue.

Android Bluetooth SPP

On Android, radios and adapters that use classic Bluetooth Serial Port Profile (SPP) can also be used. This path is Android only — Apple does not permit classic-SPP serial to third-party apps — so on iOS use the IC-705's native BLE or a BLE-UART module instead.

When No Radio Is Connected — On-Screen Fallback

Rig Control never gets in your way. If you leave it off, if no radio is reachable, or if a link drops in the middle of a pass, Ham Satting simply shows the Doppler-corrected uplink and downlink on screen and you tune them by hand — the same reliable display the app has always had. The correction keeps updating for the whole pass whether or not a radio is listening, so you can operate manually at any time and connect a rig later without changing anything else.

Rotator Control

Ham Satting can point your antenna for you throughout a satellite pass. With an az/el antenna rotator connected, the app steers it to follow the satellite across the sky — azimuth and elevation — and keeps it there hands-free as the bird moves, so you can work the pass instead of cranking a controller by hand. The link is one-way in spirit: Ham Satting sends target bearings to the rotator and reads its position back to confirm it is getting there. It never transmits, and it is entirely separate from Rig Control — you can use either on its own or both together.

Rotator Control is a phone-only feature. It runs on your Android or iOS device and talks to the rotator either through a Hamlib rotctld on your local network, or directly to the rotator's own controller over TCP.

What Rotator Control Does

Points the rotator at the satellite for the whole pass — azimuth and elevation — and keeps tracking hands-free as it crosses the sky.

Parks the rotator at a position you choose when the pass ends (LOS), so it is never left aimed at the sky.

Reads the rotator's position back and watches it converge on each target — a safety check that stops it driving blind if the controller stops answering.

Honours the travel limits and azimuth zero you declare, and never commands the rotator past them.

Falls back automatically to the on-screen compass and elevation for manual pointing whenever no rotator is connected.

Is off by default and changes nothing until you turn it on and connect a rotator.

Enabling Rotator Control

Rotator Control is OFF by default. Nothing moves until you turn it on and connect a rotator, so the app behaves exactly as before until you choose otherwise.

Open Settings and find the Rig (CAT) and Rotator Controls panel.

Turn on Automatic Pointing Antenna Control. The controller picker, the protocol choice and the connection fields appear.

Choose your controller and the protocol it speaks, then enter its network address (or the address of the serial bridge in front of it).

Declare your rotator's travel limits and where azimuth zero sits, then connect. A status dot shows whether the rotator is linked.

On iOS, the first time the app reaches a rotator over your local network the system asks for Local Network permission; allow it so the app can find the controller.

Choosing Your Controller — Protocols

Ham Satting can speak to a rotator in two ways: through Hamlib's rotctld daemon, or directly to the controller in its own protocol over TCP. Pick whichever matches the hardware you have.

rotctld (Hamlib Daemon)

rotctld is the Hamlib network daemon for rotators — the rotator counterpart of rigctld. Run it on a PC, Mac or Raspberry Pi wired to your rotator controller, and point Ham Satting at it.

Host: the address of the computer running rotctld. Port: 4533 (the rotctld default — the same port wfview uses for its built-in rigctld emulation).

rotctld fronts almost any controller Hamlib supports, so it is the easiest path if you already run Hamlib for your station.

Direct Controller Protocols (over TCP)

If you would rather skip the daemon, Ham Satting carries the common rotator protocols itself and talks straight to the controller over a TCP connection — either a controller with its own network port, or a serial-only controller reached through a serial-over-TCP bridge (ser2net or a Wi-Fi-to-serial dongle), exactly as for Rig Control. Choose the protocol your controller speaks:

GS-232 (A and B) — the Yaesu / classic command set and the many controllers and clones that speak it.

Easycomm (I, II and III) — the open command set used by home-brew and satellite-station controllers.

SPID (Rot1, Rot2Prog and the MD-01 / MD-02 / MD-03 controllers).

DCU-1 / Rotor-EZ / Green Heron RT-21 — the Hy-Gain DCU-1 command set and the controllers that share it.

Prosistel — the Prosistel D-series controllers.

M2 RC2800 — the M2 azimuth / elevation controller.

Azimuth-Only Rotators

Many stations have only an azimuth rotator, and Ham Satting supports that directly. Choose your controller as usual and the app tracks the satellite in azimuth while simply ignoring the elevation command. The on-screen elevation figure stays on the AR page, so you can raise the antenna by hand — or leave it fixed — while the rotator handles the bearing.

Travel Limits and Azimuth Zero

Only you can see your mast, so the travel limits are yours to declare. Tell the app how far your rotator can turn and where its azimuth zero sits — North (0° = north, the common case) or South (0° = south, as some European controllers are wired). Left on Automatic, the app reads what the controller reports where it can and otherwise falls back to a safe 0–360° azimuth / 0–90° elevation box. Ham Satting never commands the rotator past the limits you set, and because it reads the position back it can tell when the rotator has actually reached the target rather than assuming it. If your rotator turns continuously with no end stop, you can say so, and the app will take the shortest way round.

When No Rotator Is Connected — On-Screen Fallback

Rotator Control never gets in your way. If you leave it off, if no controller is reachable, or if a link drops mid-pass, nothing is lost: the AR page's compass and elevation guide you to point the antenna by hand, exactly as they always have. Rotator Control simply automates that pointing when a rotator is there to do it.

Appendix - July 22, 2026 - Satellite Catalogue Update (v5.0.0+50)

Two New Satellites (Transporter-17, July 7, 2026)

MARINA (Technical University of Kosice, Slovakia; callsign OM9MAR) - NORAD 69920, IARU coordination #1080. Two packet digipeaters you can actually use: VHF 145.925 MHz simplex and UHF 436.680 MHz simplex, both GFSK 9600 AX.25. The UHF channel also carries a CW beacon and SSDV images (640x480 JPEG). Both digipeaters were verified on the air within days of launch. The app tracks the VHF pair as its Digital service and the UHF channel through the SSDV row.

KOSTKA (Brno University of Technology; callsign OK0KST) - NORAD 69935, IARU coordination #1089. The first Czech student-built satellite. A user digipeater, CW beacon and telemetry all share 436.870 MHz simplex (GFSK 9600 AX.25). The team also runs scheduled CW events over Europe. SSDV is planned but not yet active - it will be added when it opens.

Music Broadcast Additions

The Music Broadcast listening list grows from four satellites to eight. T.MicroSat-2 (NORAD 68433) joins its sister transmitting Beethoven's "Ode to Joy" on 401.025 MHz, and "Out of the Box" (NORAD 68428) plays the same melody on 402.360 MHz. Two satellites already in the app also turn out to sing: UmKA-1 broadcasts "The Polar Bear's Lullaby" on its 437.625 MHz SSTV channel - inside the 70 cm amateur band, so a normal ham receiver hears it - and EMISAR plays "Ode to Joy" on 401.334 MHz. Both now show a Music service row.

Scheduled events now cover Music as well. If a music satellite is advertised on a different frequency than the app carries, add a dated override in Settings with the Add Scheduled Event button - exactly as for SSTV, SSDV, Digital and Weather events.

ISS APRS Frequency Change

The ISS APRS packet digipeater currently operates on 437.825 MHz (UHF) instead of the traditional 145.825 MHz. The VHF packet radio in the Zvezda module is down for troubleshooting per ARISS, so the app now follows the working UHF frequency. The FM voice repeater (145.990 up with 67.0 Hz tone / 437.800 down) is unchanged. ISS SSTV, however, has moved to UHF with the APRS digipeater: both 2026 image series were transmitted on 437.550 MHz using Robot 36, so that is the frequency the app now shows for an SSTV event. When ARISS restores the VHF radio, a Digital scheduled event puts you back on 145.825 instantly - no app update needed.

Corrections and Retirements

FSI-SAT2 is corrected to 437.175 MHz (SatNOGS, Libre Space and JE9PEL all agree; the earlier 437.176 reading was wrong). Its DTMF-triggered SSTV is announced by the operator but not switched on yet. Two silent satellites were retired from the active list. PARUS-T2 never activated its digipeater or FM repeater on orbit and AMSAT now lists it as apparently dead. HO-113 (XW-3) had its amateur service ended - AMSAT moved it to the inoperative list - although the satellite itself is still in orbit. Back-dated QSO entries for both continue to auto-fill their frequencies as before.

Appendix - August 7, 2026 - Catalogue Corrections (v5.0.0+50)

The August 2026 audit re-checked every satellite and service in the app against AMSAT, SatNOGS, IARU coordination records and the operators' own pages. No satellite was added or removed, but four entries carried frequencies or services that were simply wrong. Those are corrected below. Entries for satellites that have gone silent are always kept, so that a QSO logged years ago still fills in its frequencies.

GRBBeta - Now Correctly Listed as Workable

GRBBeta was listed as receive-only, which meant the QSO entry form left the transmit fields blank and the satellite looked like something you could only listen to. It is in fact perfectly workable. GRBBeta carries two separate packet digipeaters, and each one transmits and receives on a single frequency: 145.935 MHz simplex, and 436.785 MHz simplex, both GFSK 9600 AX.25 with the digipeater path "via HA2GRB". Set both your transmit and receive frequency to the same channel to use either one. The QSO form now fills in the 436.785 MHz pair; retune both radios to 145.935 MHz if you prefer the VHF digipeater.

AO-27 - No CTCSS Tone, and a Word of Caution

AO-27 was listed as needing a 67.0 Hz CTCSS tone. It never has. AMSAT's own page gives the uplink as 145.850 MHz FM with no CTCSS at all; the 67.0 Hz had been carried across from SO-50 and AO-123, which do use that tone on the very same uplink frequency. The tone is now cleared.

AO-27 is also worth treating as a long shot rather than a reliable pass. No confirmed reception has been reported since 2023, AMSAT has dropped it from its live satellite status list, and the control operators' own site has not been updated substantively since April 2023. There is no formal end-of-life announcement, so the satellite is deliberately left in the list - if it comes back, you will be ready for it.

CatSat - A Microwave Transponder, Not an FM Repeater

CatSat was listed as an FM repeater on 145.900 MHz up and 437.350 MHz down with a 67.0 Hz tone. None of that exists. CatSat (University of Arizona, NORAD 60246) has one two-way service: a linear transponder in the microwave bands, 5.663 GHz up and 10.47 GHz down, about 200 kHz wide and non-inverting. It needs 5.6 GHz transmit and 10 GHz receive equipment, and it is only switched on during scheduled or requested activation windows published by the university. Its 437.185 MHz signal is telemetry, not a contact channel.

FSI-SAT2 - Receive Frequency Now Consistent

FSI-SAT2 is 437.175 MHz. The July audit established this, but one place in the app was missed, so the QSO entry form disagreed with the rest of the app by one kilohertz. Both now read 437.175 MHz.

QO-100 - Loggable, Deliberately Not Trackable

QO-100 (Es'hail-2) appears in the satellite list on the QSO entry page, so a contact through it can be logged with its frequencies filled in automatically: SSB, 2400.100 MHz up and 10489.550 MHz down, no tone. It is deliberately absent from pass prediction, Sat Match and AR tracking. QO-100 is geostationary - it never rises or sets - so a list of passes for it would be meaningless, and the tracking pages are built around a satellite that moves across the sky. Seen from Muscat it simply sits in the south-west at roughly 40 to 45 degrees elevation, all day, every day. Point a dish once and it stays pointed.

macOS - Calendar Files and the Manual Now Reach Your Downloads Folder

On macOS, "Add to calendar" saves a calendar (.ics) file and the User Manual page can save a copy of the manual. Both reported success and said the file had gone to your Downloads folder, but the file was actually written inside the application's own private storage, where Finder would never show it. Both now write to the real Downloads folder. This affected macOS only; on iPhone and Android "Add to calendar" hands the event straight to your calendar app and was never affected.

Stability Fixes

Exporting a pass timeline, or a scheduled-service-event table from Settings, and then leaving that page before the export finished would raise an error every time. Three separate places had the same fault; all are fixed.

Starting or stopping an audio recording on the AR tracking page and immediately leaving the page could also raise an error. This covered all five recording modes - SSTV, SSDV, Digital, Weather and Music - and is now handled cleanly.

Opening the "Enter grid location" box on the map repeatedly no longer leaves a small amount of memory behind each time it is closed.

GRBBeta - Two Digipeaters, Not One Cross-Band Link

GRBBeta was modelled as a single cross-band digipeater, taking your transmission on 145.935 MHz and repeating it on 436.785 MHz. That is not how it works. GRBBeta carries TWO separate digipeaters, and each one listens and transmits on a single frequency: 145.935 MHz, and 436.785 MHz. Both are 9600 bps GFSK AX.25 with the path "via HA2GRB". To use either, set your transmit and receive frequency to the same value. The satellite is listed twice on AMSAT's status page for exactly this reason - once as a VHF digipeater and once as a UHF one.

CroCube and LASARsat - Digipeaters That Were Never Listed

Both satellites were carried as image-downlink birds only, so the app showed no Digital service for either and there was nothing to work. Each in fact has an active single-frequency packet digipeater: CroCube on

436.775 MHz and LASARsat on 436.925 MHz, both 9600 bps GFSK AX.25. Each frequency is shared with a CW beacon and a telemetry downlink, and the SSDV images still come down on the same channel - the digipeater is an additional service, not a replacement. Both now appear with a Digital row.

SNUGLITE-3 HANA - No Uplink After All

SNUGLITE-3 HANA was listed with an uplink on 436.460 MHz. That figure had been assumed rather than verified - the app's own note said as much - and it turns out to be wrong. Its 436.460 MHz signal is a 9600 bps telemetry beacon, and neither it nor its companion DUR1 has any receiver for amateur use. The uplink has been cleared, so the QSO form no longer offers a transmit frequency that would never have been heard.

HYPERVIEW-1G Retired - Terminal Decay

HYPERVIEW-1G (RS66S) has been removed from the active satellite list. It is in terminal decay: its perigee is down to about 268 kilometres and it is losing roughly 3.5 kilometres of altitude per day, with the drag on it increasing by nearly 40 percent in a single day. Re-entry is expected within days to a couple of weeks of this release. It was still transmitting when it was removed - this is a decision about the satellite running out of orbit, not about its radio failing. The frequency entry is kept, so a QSO or SSTV reception logged with a date in the past still fills in 436.540 MHz as before. This follows the same approach used for ARCTICSAT-1 and Horizon.

Two Additions to the Music List

The Music list was checked satellite by satellite against AMSAT's own catalogue of music-transmitting satellites. AMSAT lists ten; the app carried eight. Both gaps are now filled, so the list matches. Replicator-2 is new to the app. It is an 8U spacecraft from Orbital Matter in Poland, launched on Transporter-17 in July 2026 to demonstrate 3D printing in orbit, and it transmits a simplified version of the "Crazy Frog" tune on 400.500 MHz roughly every three minutes. One thing to be aware of: OTP-2 uses that exact same frequency, so if you hear music on 400.500 the only way to know which satellite you are listening to is which one is overhead - check the pass times for both.

OPTISAT gains a Music row on 400.360 MHz. The satellite was already in the app and already had a data row on that frequency, but it had never been listed as a music transmitter even though AMSAT lists it as one. Note that AMSAT quotes 400.3575 MHz for it while the app uses 400.360: the app follows the frequency the satellite is actually being received on, and keeping the two rows in step matters more than matching a published figure that disagrees with the air.

A reminder about this category, since it surprises people: the music satellites are not amateur-radio satellites. Most of them transmit between 400 and 402 MHz, which is a space-operations band rather than a ham band, and none of them has an uplink - there is nothing to work and no contact to log. They are there to be listened to, usually with an SDR. The one exception is UmKA-1, which plays its lullaby inside the 70 cm amateur band on 437.625 MHz, so an ordinary handheld can hear it.

Catalogue Frequency Clean-Up

A large group of older entries in the satellite list had frequencies that were never real. Fifty-six satellites all claimed the same uplink of 145.900 MHz with the same 67 Hz tone, which cannot be true - it was a placeholder that had been filled in across a whole batch of small university satellites. Most of their receive frequencies were wrong too: several by hundreds of kilohertz, and a few were in the wrong band altogether. Forty-six of them are now corrected against the satellite database. Where a satellite only transmits and has no receiver for us to talk to, the transmit fields are now blank rather than showing a frequency that would never have been heard - a blank field is better than a wrong one, because whatever the form fills in ends up in the log you upload. Where a satellite really does have a two-way service, it now carries its real pair: Duchifat 3, FloripaSat 1, GRBAAlpha, LEDSAT, VERONIKA, Z-Sat, ESEO and SONATE-2 among them. Four satellites kept 145.900 MHz because it genuinely is their uplink - FO-29, CAS-7B, FO-99 and Gemini-Pollux. Six others could not be identified with enough confidence and were deliberately left untouched rather than guessed at, so treat the uplink shown for Taurus 1, Horyu-4, CSIM, ISAT, Sparrow and SNUGLITE 2 as unconfirmed.

Twenty Historical Satellites Added

Twenty satellites that people genuinely worked, but which the app could not fill in, are now in the list. They include the whole CAMSAT XW-2 fleet (XW-2A through XW-2F), EO-88 (Nayif-1), FO-99 (NEXUS), LO-19 (LUSAT), NO-84 (PSAT), NO-103, NO-104 (PSAT-2), HO-68, HO-107 (HuskySat-1), LO-78, LO-87, LO-90, MO-112, CAS-7B, EO-79 and GREENCUBE.

Every one of them has re-entered the atmosphere or fallen silent, and that is precisely why they belong here: a logbook has to be able to fill in a contact you made in 2019. They are not tracked for passes - there would be nothing to track - but selecting one fills in the frequencies that were correct at the time.

Satellites That Were Confused With Each Other

CAS-10 and FO-118 are two different satellites, but both were carrying a third satellite's frequencies, and because their rows looked identical one of them had been hidden from the list as if it were just another name for the other. Both are now correct and both are selectable. AO-109 had its frequencies in the wrong fields - it is 145.860 MHz up and 435.760 MHz down. And TO-108 appeared twice with two different answers; it is CAS-6, an SSB linear transponder, and both entries now agree.

The Six Unidentified Entries, Resolved

The frequency clean-up left six entries that could not be identified with enough confidence to touch. Four have now been pinned down, and one of them turned out to be a genuine satellite rather than a bad entry. Taurus 1 is real. It is the satellite catalogued as Taurus-1 (also Jinniuzuo-1), and it has a working FM transponder on 145.820 MHz up and 436.760 MHz down. It is also the one satellite in that whole batch whose 67 Hz tone turned out to be genuine, so the tone was kept rather than cleared. The reason it was hard to identify is that a name search also finds a completely unrelated series called TAURUS 1 through TAURUS 4, which transmit outside the amateur bands.

Horyu-4, CSIM and SNUGLITE 2 are receive-only, so they no longer offer a transmit frequency, and their receive frequencies are corrected where they were wrong: Horyu-4 stays on 437.375 MHz, CSIM becomes 437.250 MHz, and SNUGLITE 2 becomes 436.490 MHz.

Two entries remain genuinely unidentified: the ones listed simply as "ISAT" and "Sparrow". No satellite in any database matches them at the frequencies they carry. Their invented uplink has been removed, but their receive frequency has been left exactly as it was and should be treated as unconfirmed - if you use either, verify the frequency yourself first.

Appendix - August 26, 2026 - Hams.at Announcing (v5.0.0+50)

Announce your own activation to Hams.at

The Hams.at page now has a "+" button in the top bar, between the API hit indicator and the share icon. It opens a form that posts your own planned activation to Hams.at, so other operators know to listen for you. Choose a satellite and tap Find passes. Ham Satting looks ahead seven days from your saved grid and lists the passes it finds. Pick one, and the satellite, your position and the time of maximum elevation are filled in together. You are never asked to type a time: Hams.at identifies a pass by its own prediction and matches yours to it, so choosing a pass from the list is what keeps the two in step.

Your callsign and grid are filled in from Settings, and you can change either before posting. Up to four grids are accepted, separated by commas, for a rove. Mode is optional — left on Automatic, Hams.at applies the satellite's own default, which is safer than choosing a mode that satellite cannot use. The comment is optional and limited to 50 characters, counted for you as you type.

Once it is posted, the page shows what Hams.at itself recorded — its own AOS, LOS and maximum elevation — together with a link to the activation on its website. If its prediction differs from the app's, you see that straight away rather than never.

Reading the activations list still needs no account and no key. Announcing needs your own Hams.at API key: sign in at hams.at, open its Settings page, copy the API key shown there, and paste it into Ham Satting's Settings, in the field directly under your N2YO key. Ham Satting cannot delete an announcement — use the link on the confirmation, or the Hams.at website, to change or remove one.

Dark map basemap

The dark map now draws its tiles from a different source. The provider it used before began stamping "API KEY REQUIRED" across every tile, which appeared over the map in dark mode. The light map was never affected and has not changed. Map credit is now shown in the bottom-left corner of every map, as the tile providers require.

Pass length on followed passes

Following a pass from the Sat Match page recorded it with a length of zero, so the Notifications page showed no duration for it. Following the same pass from a prediction page was correct. The two were measuring it differently; both now take the length from AOS to LOS.

Activation comments

Comments containing an apostrophe or an accented letter were showing stray characters on the Hams.at page. They now read as written.

Appendix - August 29, 2026 - Satellite Catalogue Update

Three New Satellites

Scorpion (RS89S) - NORAD 67293. A 16U science satellite from the Skobeltsyn Institute of Nuclear Physics at Moscow State University, studying space weather, gamma-ray bursts and charged-particle flux. It sends DOKA telemetry on 435.240 and 435.340 MHz at 1200 baud AFSK. It is the only satellite of the December 28, 2025 Vostochny launch that has been given a name in the public catalogue.

SamSat-Ionosphere (RS75S) - NORAD 61784. A 3U from Samara National Research University carrying a plasma sensor, a magnetometer and a navigation-signal receiver, with a 437.400 MHz telemetry beacon at 1200 baud AX.25. The university runs a standing QSL programme: send them a reception report and they send you a card.

CubeSX-HSE-3 (RS42S) - NORAD 57178. A 3U from HSE University in Moscow, three years into a mission that was meant to last one. It carries an AIS receiver for Northern Sea Route ship tracking, an ADS-B receiver and a camera, with telemetry on 436.570 MHz in GMSK USP. SatDump and gr-satellites can both decode it.

None of the three has an uplink, so none of them appears in the New QSO satellite list - they are receive-and-decode satellites, tracked so you know when to listen.

One New Receive-Only Curiosity

UVSQ-SAT-NG (NORAD 63251) joins EMISAR and OPTISAT in the small group of satellites the app tracks purely so you can hear them. It is a French 6U measuring the Earth radiation budget and monitoring CO2 and methane, and it transmits on 401.850 MHz - outside the amateur band, so it is an SDR curiosity rather than a contact. Do not confuse it with UVSQ-SAT, an earlier and now re-entered satellite.

Two Satellites Retired

D-STAR ONE Sparrow re-entered the atmosphere on August 17, 2026. Its twin, D-STAR ONE iSat, was still in orbit but in terminal decay - a 312 km perigee falling more than a kilometre a day, leaving roughly a month - so it has been retired at the same time rather than left to vanish part-way through a pass. Neither D-STAR repeater was ever confirmed working; both spacecraft spent 2026 in safe mode, and a deliberate D-STAR voice attempt on August 9 heard nothing at all.

Both remain in the New QSO satellite list. A logbook has to be able to record a contact you made while a satellite was alive, so retiring a satellite from tracking never removes it from the QSO catalogue.

ISS SSTV Has Moved to 437.550 MHz

The ISS sends its SSTV pictures on 70 cm now, not 2 m. Both 2026 series - Series 31 in April and Series 32 in May - were transmitted on 437.550 MHz using Robot 36. This is the same Zvezda VHF radio fault that moved the APRS digipeater to 437.825 MHz, so the two changes are one story. The ISS voice repeater is unaffected.

Two Historic Digipeaters for Back-Dated Contacts

CEVROSAT-1 (OK0CVR), a Czech satellite from CVC Electronic with CEVRO University, Mendel University Brno and Brno University of Technology, ran a 436.025 MHz simplex digipeater plus a delayed digipeater that stored your message and re-sent it minutes later. Operators on three continents worked it between November 2 and 8, 2025, and it fell silent on November 9.

FloripaSat-1 (PY0EFS), from UFSC in Brazil, offered three commands open to any amateur - ping, data request, and a message broadcast that relayed text between ground stations - on 436.100 MHz simplex. It was active from December 2019 until about April 2023.

Both are in the New QSO satellite list only. Neither is tracked, because neither is transmitting.

Exports That Logging Services Accept

An exported ADIF file now omits a field it cannot express rather than writing a value a logging service will reject. Receive-only satellites used to export a band and frequency of "N/A"; the weather satellites exported a band of "137MHZ", which is not an ADIF band because 137 MHz is not an amateur allocation; and their mode went out as "APT", which is not an ADIF mode. Any one of those can make a service refuse an entire upload. Band and frequency are now written as a pair or not at all, so a record can never carry a frequency that contradicts its band.

Rig and Rotator Controls Marked Experimental

The Rig (CAT) and Rotator Controls section in My Settings now carries an "Experimental" badge. Both features depend on your particular radio, cable and rotator, so if something does not behave on your setup, the badge tells you it is the feature that is still finding its feet and not a mistake in your settings.