DU3T 9cm EME in December 2023

Objective and Summary

- Building a 9cm EME station was prioritized above 13cm
- Dan HB9CRQ urged me to get QRV on 9cm before the end of 2023, prior to HB9 9cm license expiration
- Another incentive was the 9cm QSO Party on 28-Dec.
- Quickly an SG-labs 9cm XVTR was purchased in September 2023, which was modified for the DU3T station concept
- Hans, PE1CKK, donated a Stealth “20W” SSPA and he quickly fabricated a dual mode Feed from a spray-can body and brass sheet
- An LNA was build from an old PCB donated by Sam G4DDK 15 years ago.
- The XVTR is referenced to a GPSDO from BG7TBL via 40m of RG58.
- The goal was to insert the whole 9cm station inside the existing 23m IMU Feed. This worked out very well.
- The project was successful, with many more logged QSOs than I hoped for … (and counting)

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Station Specifications

- Antenna — 4.6m prime focus non-shaped parabolic, 6mm mesh, f/D = 0.45, built together with my daughter Cristine
- AzEl Motion — heavy duty Chinese slew drives, 12” for Az, 9” for El
- AzEl Tracking — OE5JFL system with PA3FPQ GPS time/location reference; HH-12 sensors from Georg
- Feed — circular dual-mode radiator with step-septum polarizer, DU3T/PE1CKK design
- LNA — G4DDK based, FHX76 in 1st stage, with mods, NF ~ 0.6 dB @ 25 °C
- XVRT — SG-labs, modified, external 10 MHz REF from BG7TBL GPSDO
- PA — Stealth, un-modified, Pout ~ 30W at 13V5
- Backend — good old TS-2000X on 432 MHz with non-galvanic audio interface
- Noise Meter — RTL-SDR BLOG v3 on 432 MHz, at 2.5 MS/s
- SW
  1. TotalPower (I0NAA) for Sun/Moon to cold sky Y-factor (…love this app)
  2. VK3UM Planner to determine CW Doppler
  3. eloranta.info to determine common moon window
  4. WSJT-X, for digital mode operation and echo testing
  5. logger.HB9Q.ch for comms and QSO scheduling

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- Building the antenna in 2020
- Location is in our rice field at the back of the house
- 40m cable runs into shack

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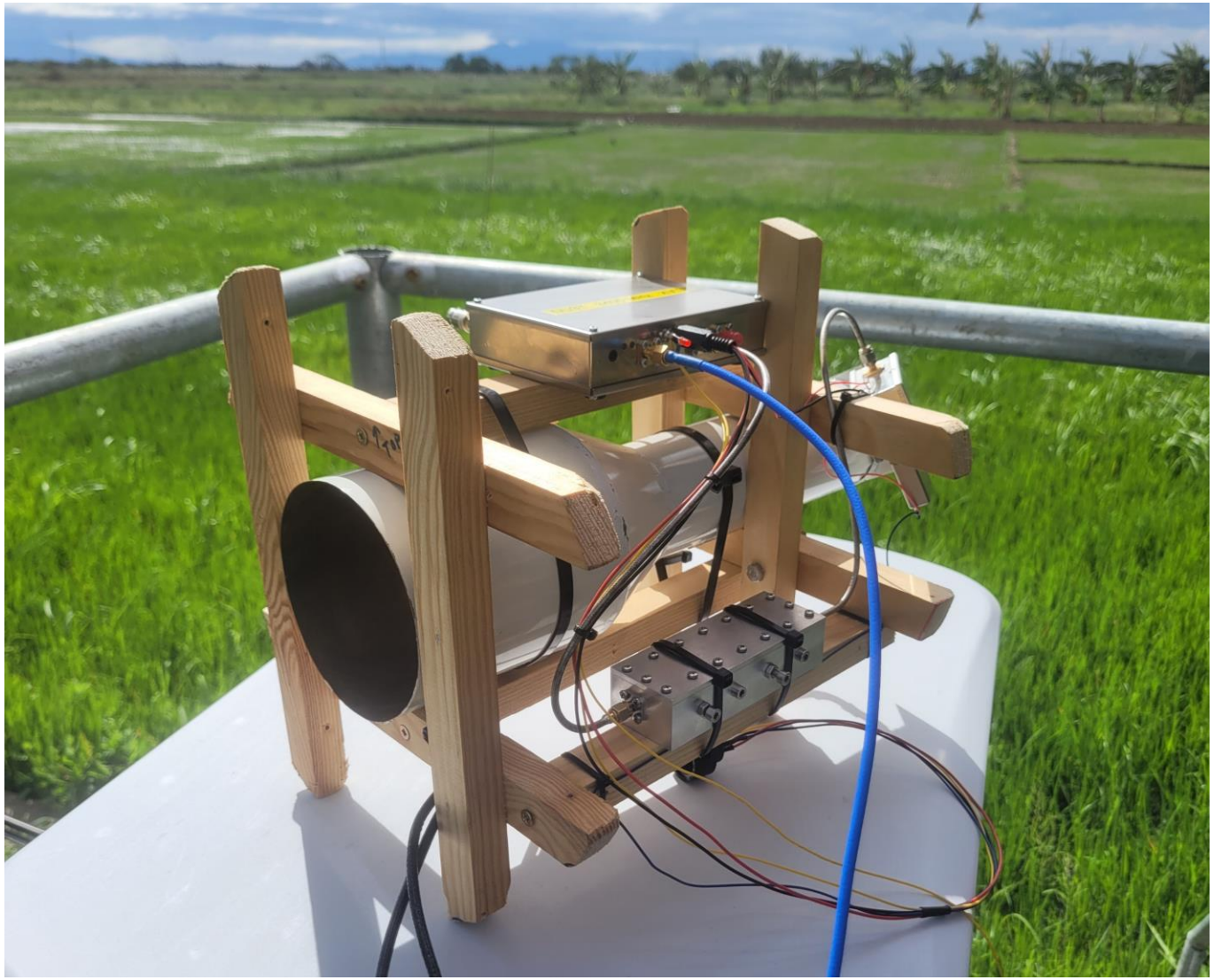
- 9cm frontend
- Not intended as a permanent solution



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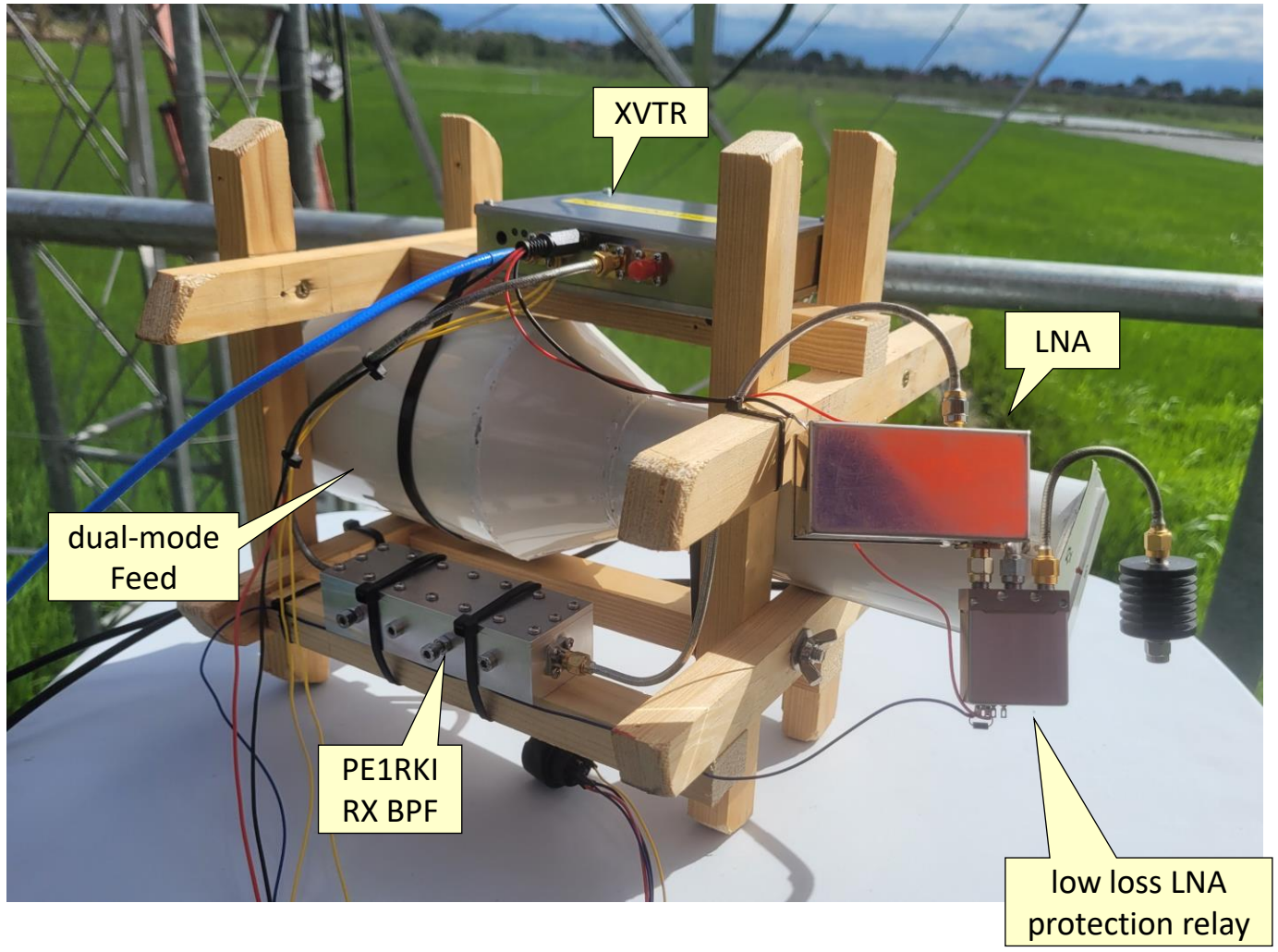
- 9cm frontend
- LNA is followed by a high selectivity BPF
- Minimized RX connector losses



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- 9cm frontend installed
- No issues here with the weather in December, no rain, ~ 30 °C
- These high temperatures are not good for the RX NF …

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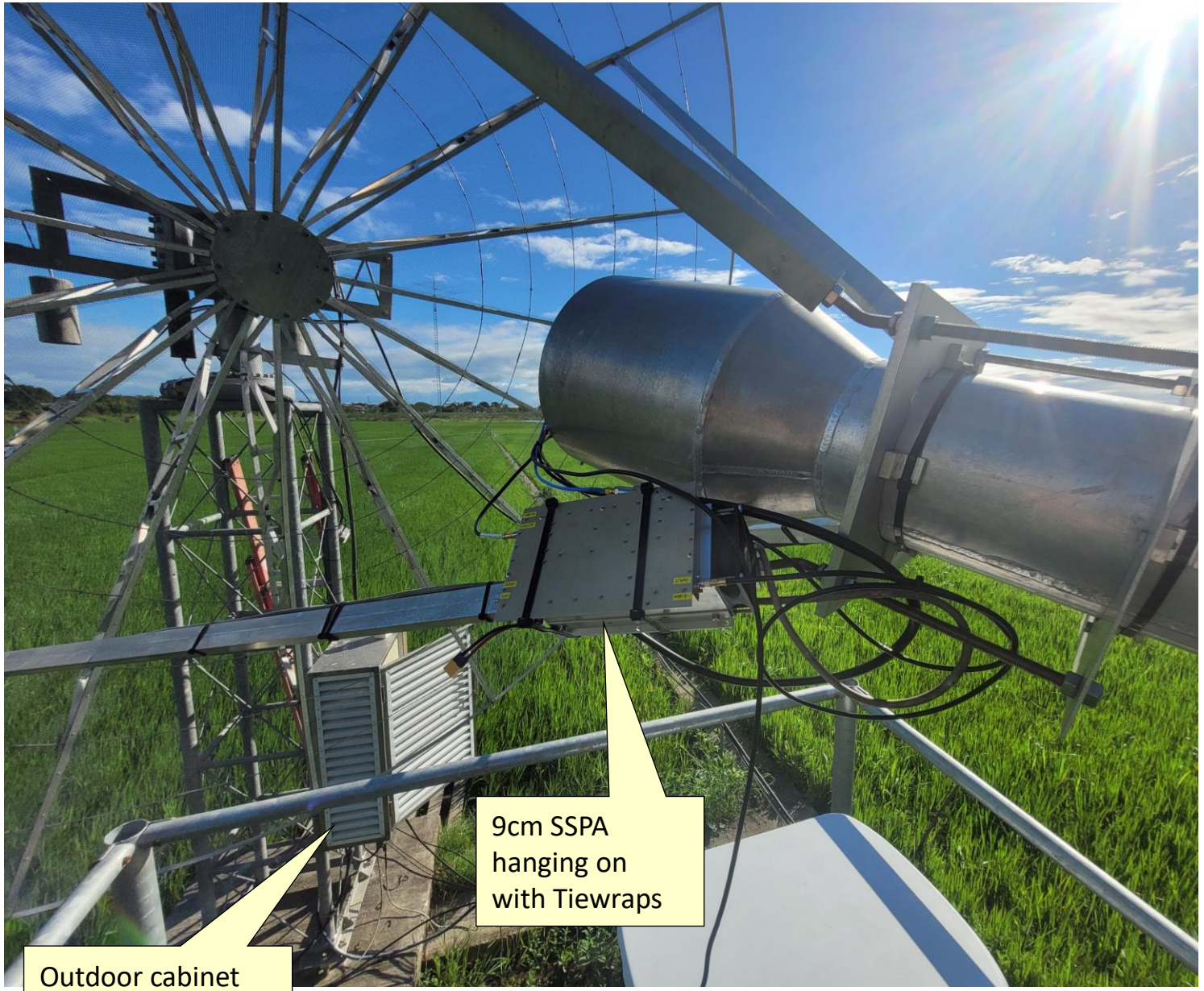
- 9cm frontend installed



DU3T 9cm EME in December 2023

- 9cm antenna complete
- Note the beautiful Philippine sky
- Picture is used for the dedicated 9cm QSL card
- Note one of my shortwave towers in the background

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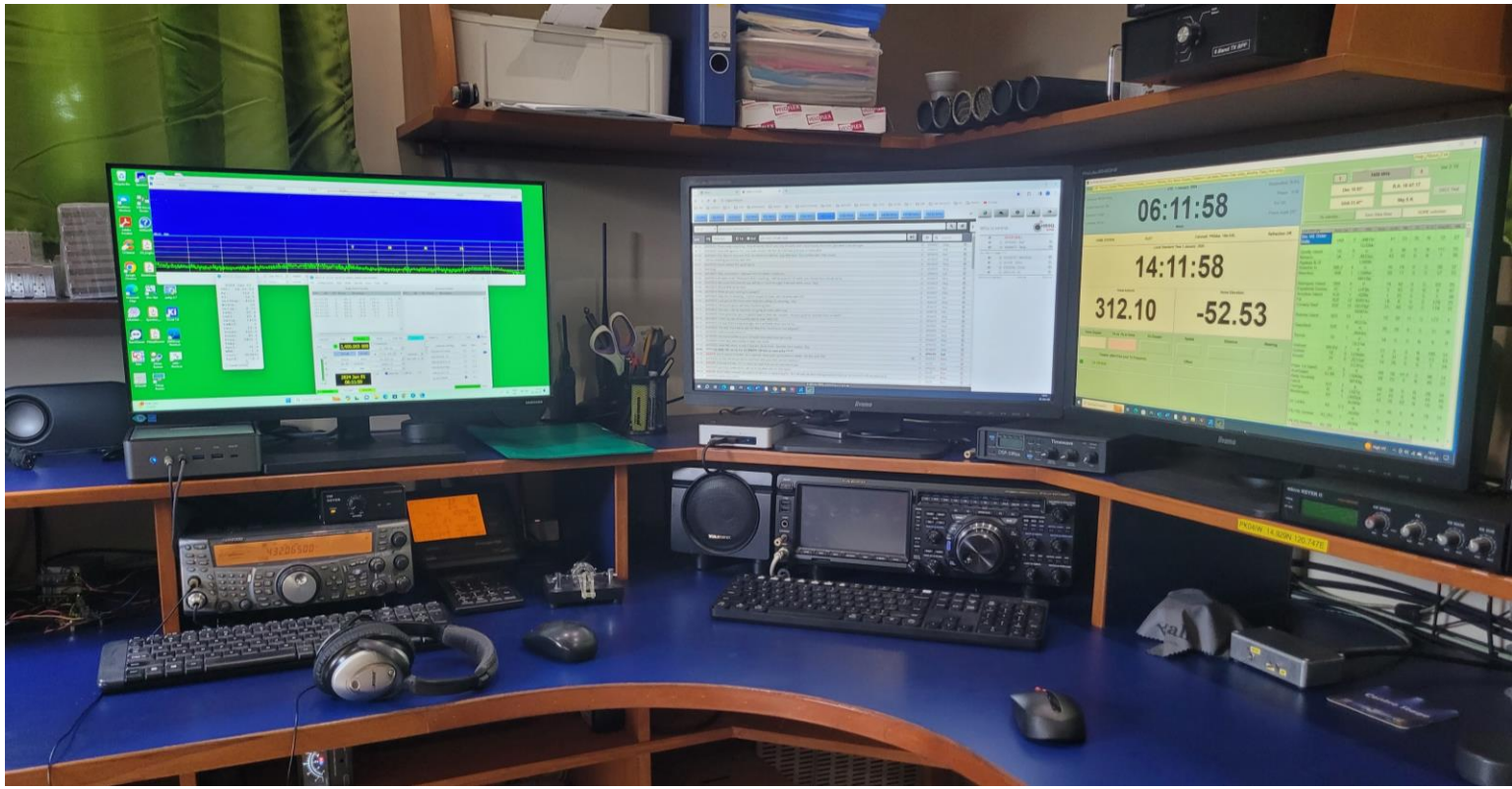
- Operating position
- Climatized shack, (ex-guest-house)
- 2 mini-PCs, 3 screens
- OE5JFL / PA3FPQ tracking controller



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Current Station Performance

- Sun Y 14.0 … 14.5 dB (Dec 2023)
- Moon Y 0.5 … 0.6 dB
- WSJT Echo ~ -26 dB (?), very well visible in waterfall
- CW echoes just audible in 200 Hz

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Achievements from 23-Dec to 31-Dec 2023

- 18 QSOs mixed Q65-60C -30B and CW
- 15 Initials
- 10 FIRST with DU = 10 DXCC

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Station Improvements (lessons learned)

- Antenna — need to find 1 … 1.5 dB gain …
  replace one broken dish rib
  replace all Tiewraps holding the mesh (fallen apart in the tropical climate) by stainless wire
  clean-up the mesh shape, overall surface should be accurate within 6 mm (for 6cm)
  optimize the axial feed position
  install Styropor foam Feed aperture protection (like Dan has)
- AzEl sensors — noticed non-linearity and even hysteresis with the HH-12 sensors, replace with something better ?
- LNA — get the NF closer to 0.4 dB at 25 °C , talk to Sam in “Heelweg”, and consider Peltier cooling
- PA — install the 200W LDMOS PA, this will yield 8 dB of EIRP improvement
- General — build a tropical-weather-proof enclosure with humidity control (= large pot of Silica gel)
  use mil-style control connectors (like Skip does)
  built a remote dish motion control (like Skip has)

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Acknowledgements

- PE1CKK Hans for 45 years of friendship, DU3T HW support and the crash course operating WSJT-X
- PA0PLY Jan for his constant support and enthusiasm and organizing the 9cm QSO Party
- HB9CRQ Dan for pushing me to get QRV on 9cm
- VE6BGT Skip for his inspiring YouTube videos
- DW3AXR Aileen my partner, enabling me to do all these crazy projects …
- YL Cristine always helping me with building stuff, getting QSLs printed, etc …
- and many others …..

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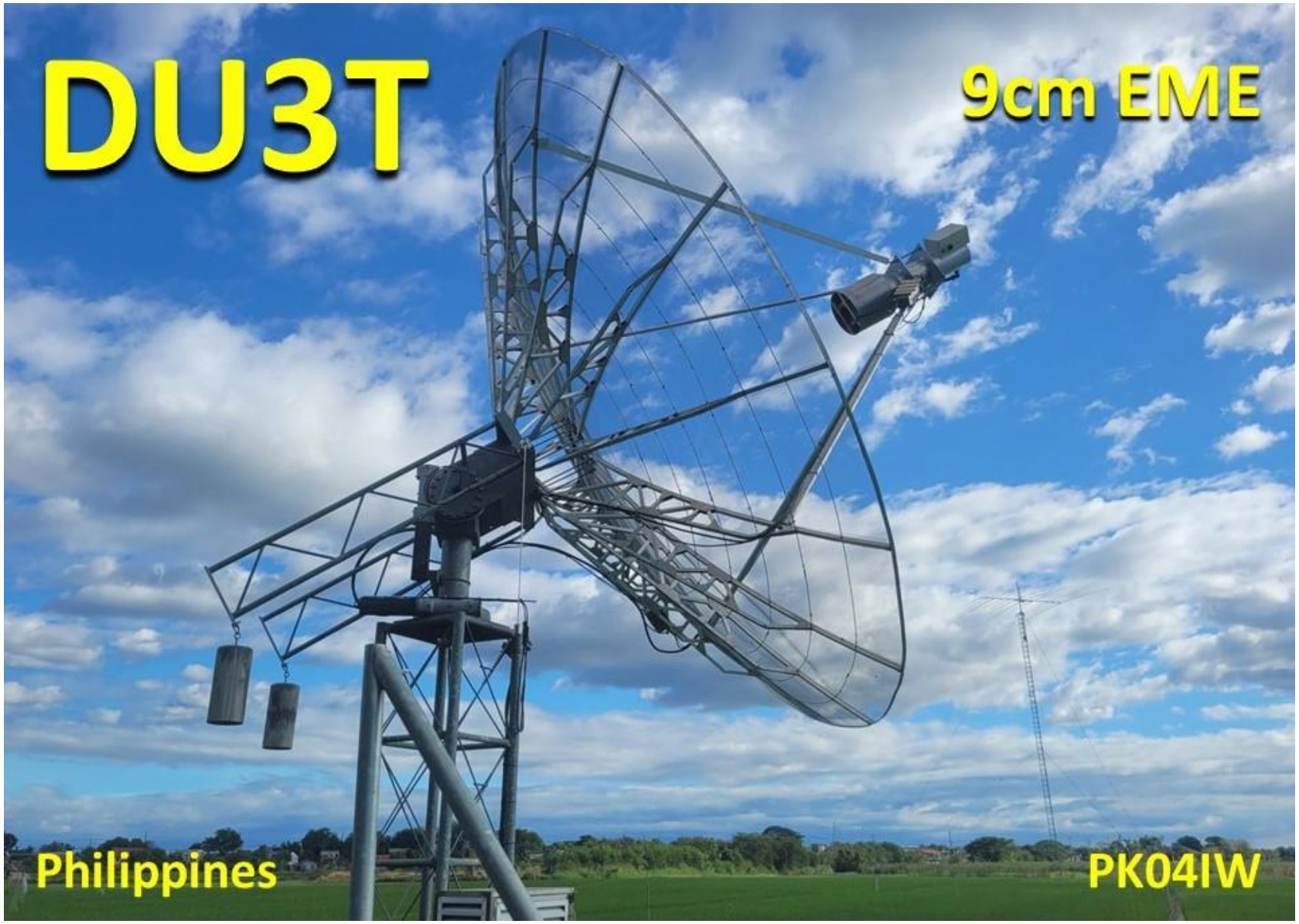
- Dedicated QSL card



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end-of-ppt