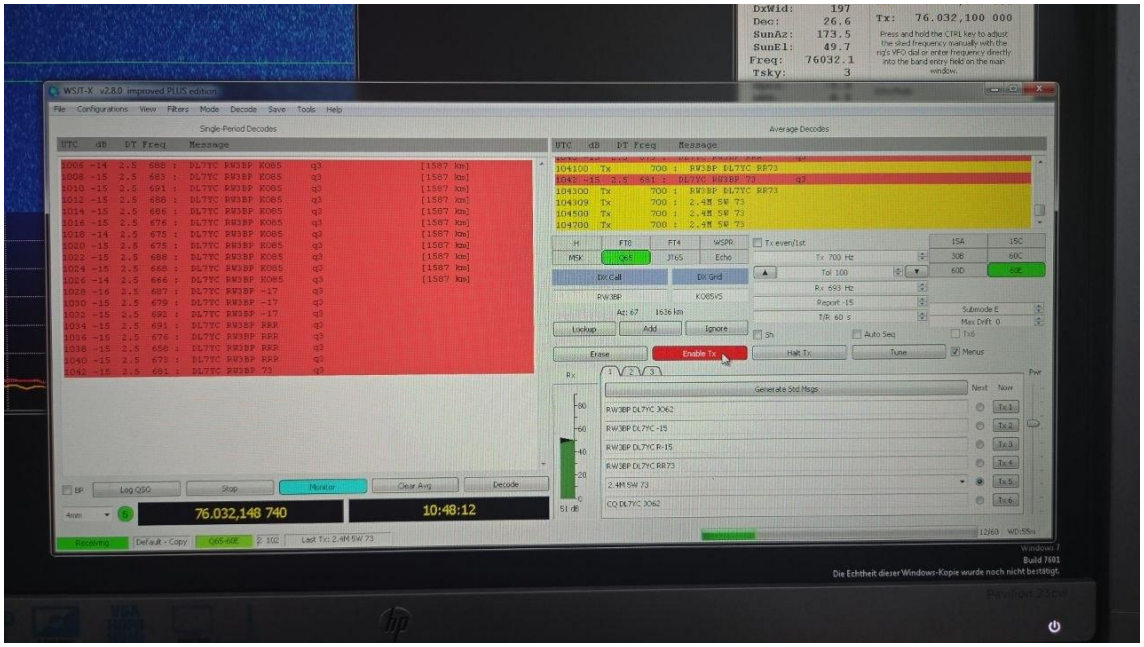
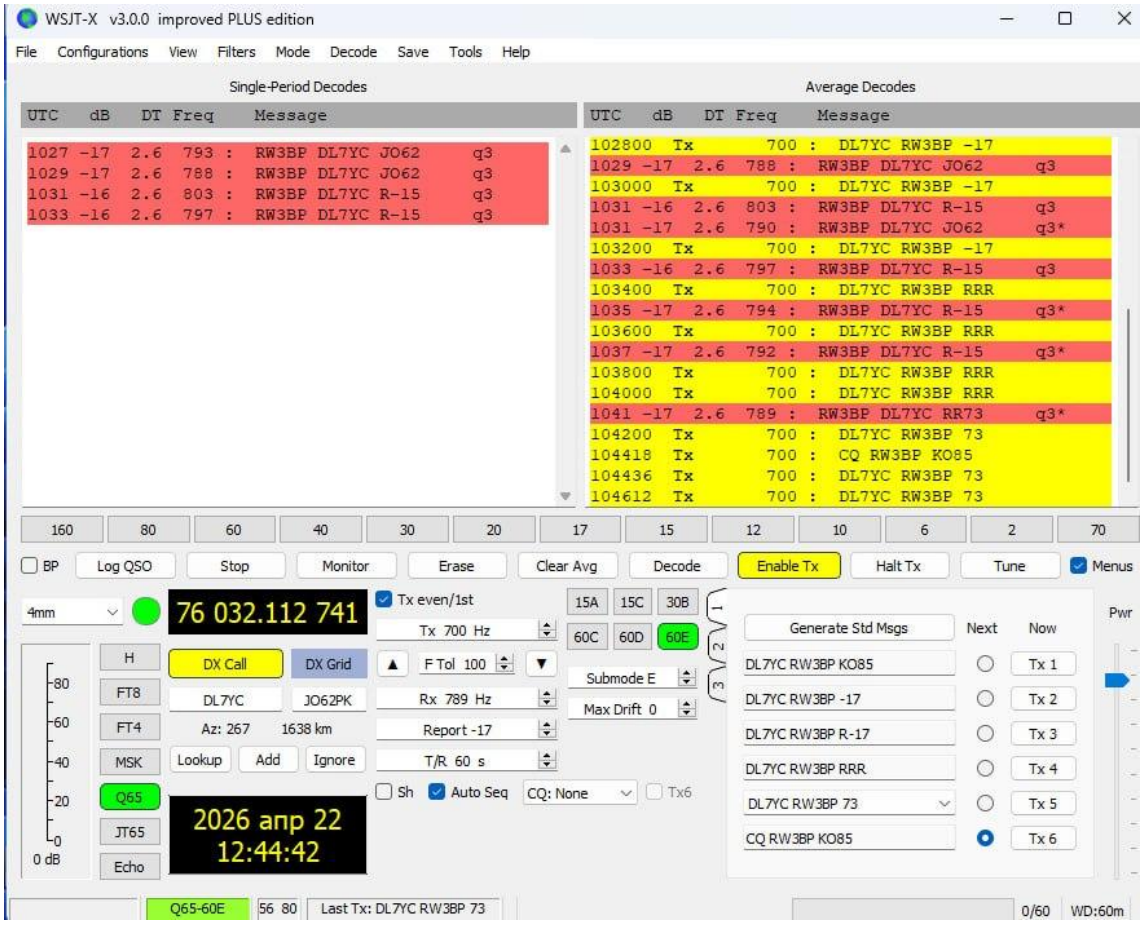
The First Lunar Reflection Communication at 76 GHz

The first ever EME QSO at 76 GHz took place on April 22, 2026, between RW3BP (KO85) and DL7YC (JO62).

The transmission mode used was Q65-60E, during which “single decode” reports of -14/-15 and -17 were exchanged, respectively.





DL7YC, Manfred, uses a 2.4 m prime-focus parabolic dish with an f/D ratio of 0.385, equipped with an optimized feed for 76 GHz, designed to minimize spillover and maximize efficiency.

The low-noise amplifier (LNA) is located directly behind the feed, avoiding waveguide losses ahead of the preamplifier.

Noise figure: 2.4–2.5 dB

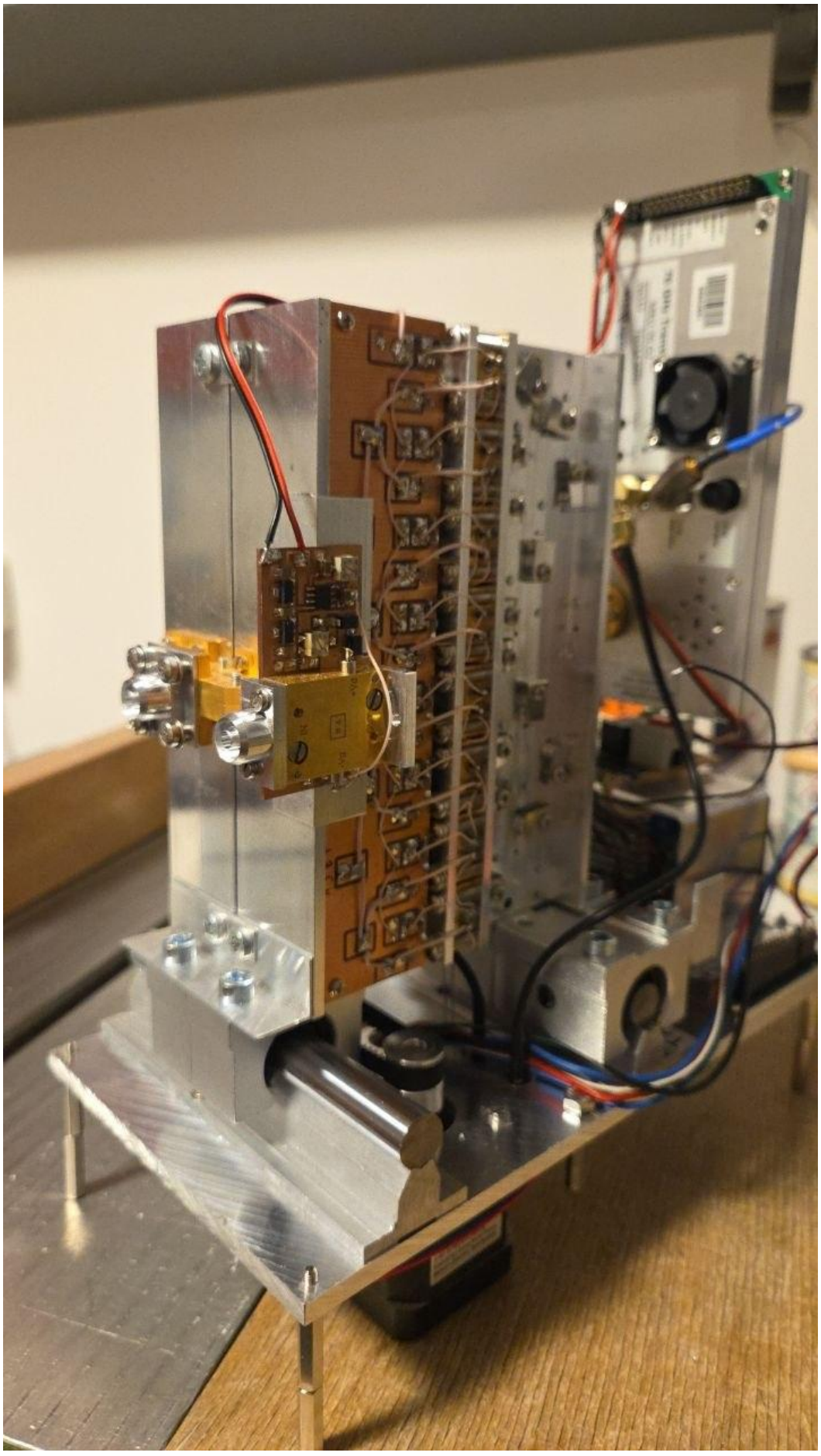
Highly stable frequency reference (GPS-disciplined OCXO)

Temperature stabilization of the entire RF input stage

The resulting system sensitivity is sufficient to detect signals in the range of only a few dB signal-to-noise ratio.

A 5.0 W solid-state power amplifier (SSPA) is used. The amplifier contains 16 single amplifier with MMIC from gotMic / Sweden.

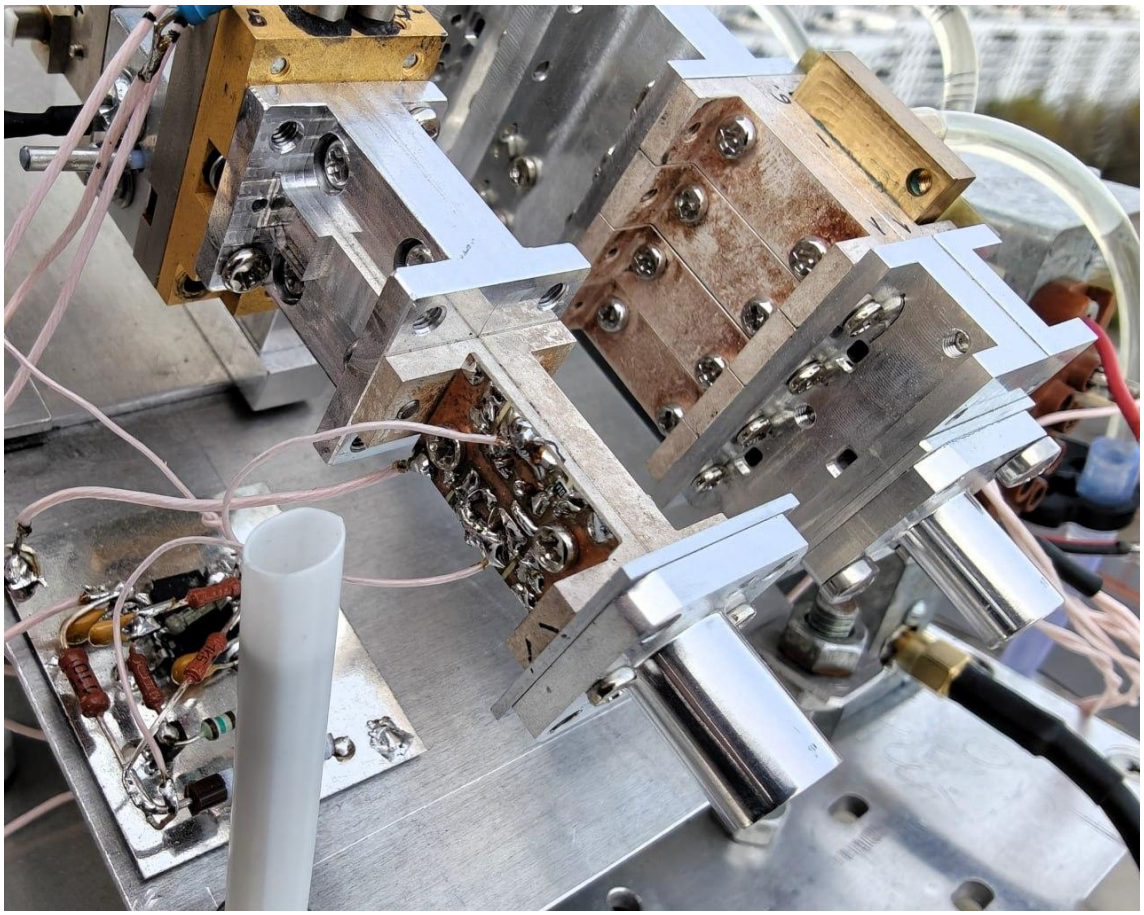
A unique feature of this operation was that, due to the high losses at 76,032.1 MHz, no waveguide relays were used; instead, separate feeds were employed for receive and transmit, each “slid” into the focal point with a precision of 0.1 mm.



The Rx feed return-wave protection is “automatic” by the “out of focus position” of the RX-feed at TX times. (prime-focus configuration)

RW3BP, Sergei, uses a 2.4 m offset Gregorian dish, driven by a high-efficiency 76 GHz SSPA with an RF output power of 8.1 W.

The LNA is slightly better (2.2dB NF) than the one currently used by Manfred, but very similar in design using OMMIC (now MACOM) MMICs.



Both SSPAs and both LNAs were built by Sergei, who, immediately after the contact, commented:

“Today the weather was excellent for EME. Clear sky and light wind, with a temperature of +12 °C. Most importantly, the humidity was low at 25%. This is very rare in Moscow. It only happens when Arctic air arrives quickly. The 76 GHz band is not 24 GHz, but humidity still has an impact.”

In Berlin, the sky was clear and blue, +13 °C, 1021 hPa.

Further adjustments to the highly precise positioning of DL7YC`s Tx feed will be required for upcoming tests. The two-way contact take place after a certain time, when Sergei tried to shift his antenna left and right by 0.1deg at DL7YC`s transmissions.

A first shift to the left side by 0.1 deg / than another 0.1 deg results in NOTHING !! Than a 0.1 deg antenna shift to the right (from its original steadily tracked moon position) immediately results in a -17 decode of DL7YC`s signal.

What does this mean? The beam from DL7YC at TX times generated a 0.1deg spot, 0.1deg apart from RW3BP original 0.1deg wide spot. Both of them looked at the moon, but at a point differing by 0.1 degrees.

What does it mean technically spoken? When DL7YC`s TX feed “travel” into its TX position, there is a 1mm combined position error. This error will be part of further investigations, because laser control before dont show this. Probably due to the mass and the high travel speed of the SSPA/LNA combination (1.7kG) the security end stops will “back bounce” them a bit ??

These and additional technical details are available at:

https://pa0ehg.com/76ghzperformance.htm

73 Sergei, RW3BP und Manfred, DL7YC