GB3EDN 1296MHz Beacon - History and Current Developments

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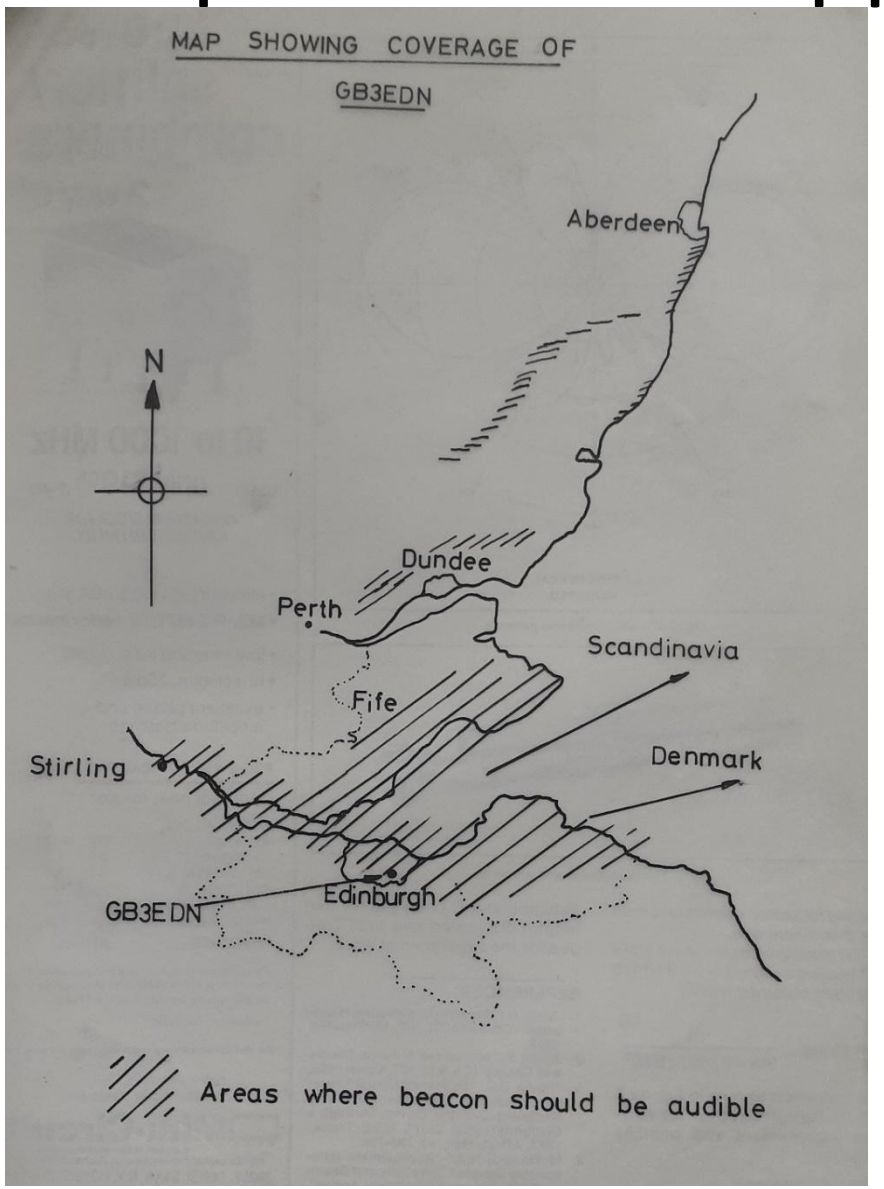
Origins

- Idea of beacon was conceived over a few beers in a public house in Corstorphine in 1977.
- Brian, GM4DIJ and I decided it would be a useful propagation monitoring tool and a useful signal on a lonely band!
- Then the activity on the band was pretty low as there was no commercially available gear.

Coverage Map from 1976 Application



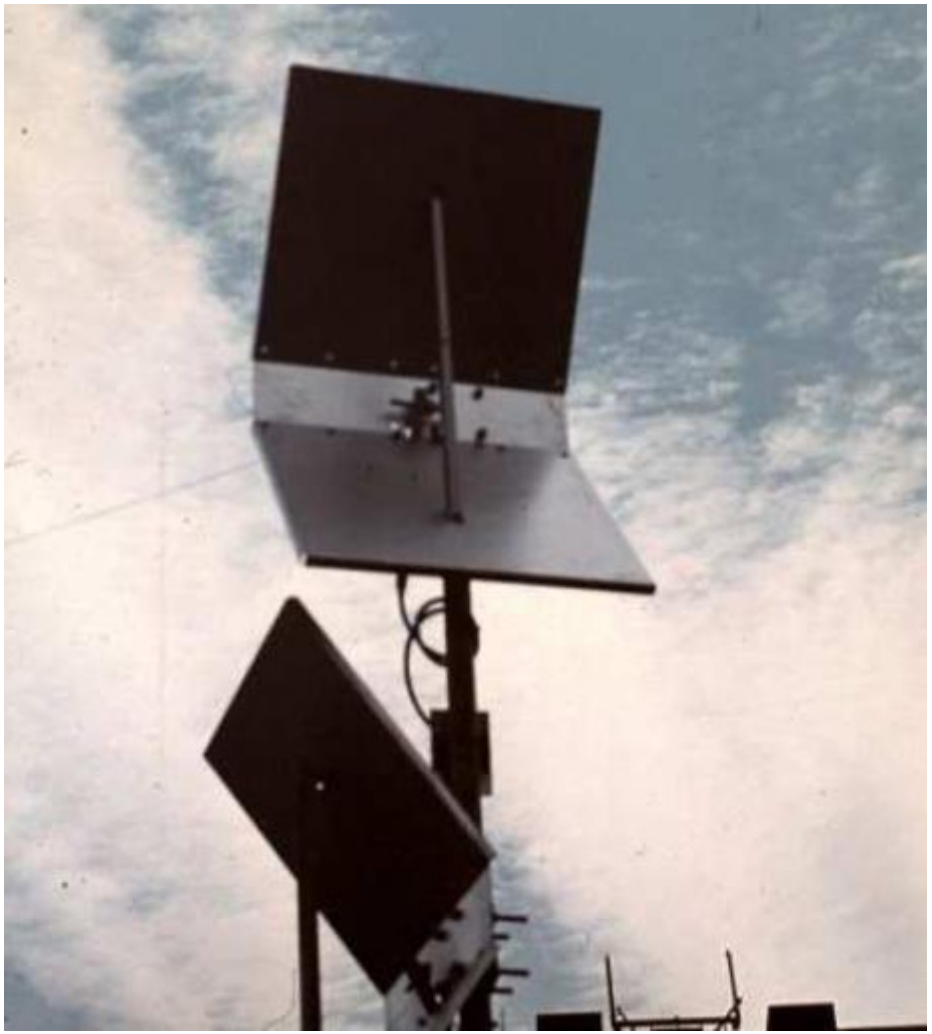
GB3EDN Location from 1978-2021

- University of Edinburgh
- Kings Buildings Campus
- Antenna on top of the Faraday Building
- (four storey block)
- IO85JW91

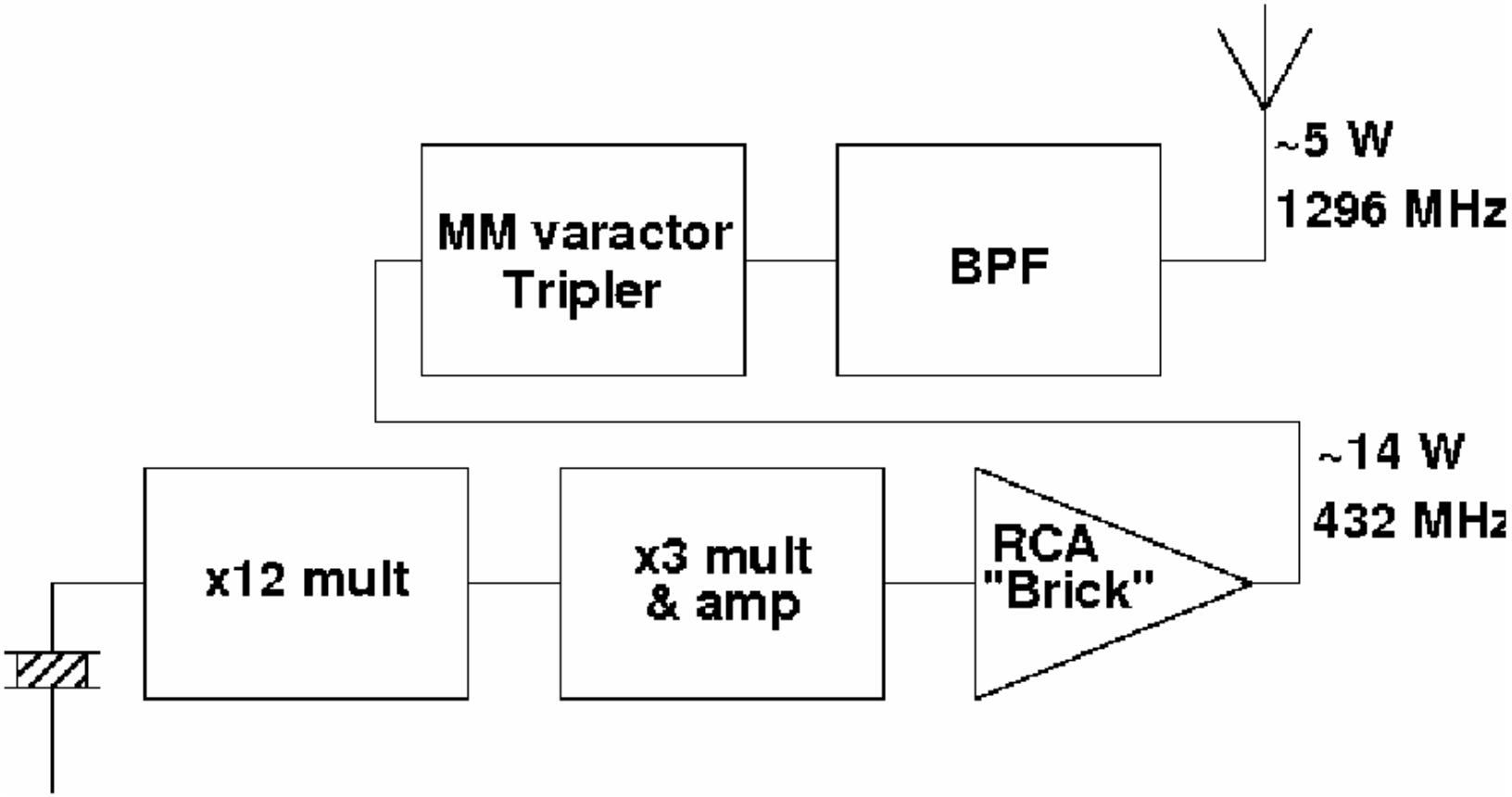
GB3EDN History

- Original hardware
- Installed in 1977
- Licence received and turned on in 1978
- Run continuously with 2 short outages since then
- Hardware simple – reliable
- ~42 years in virtually continuous operation!

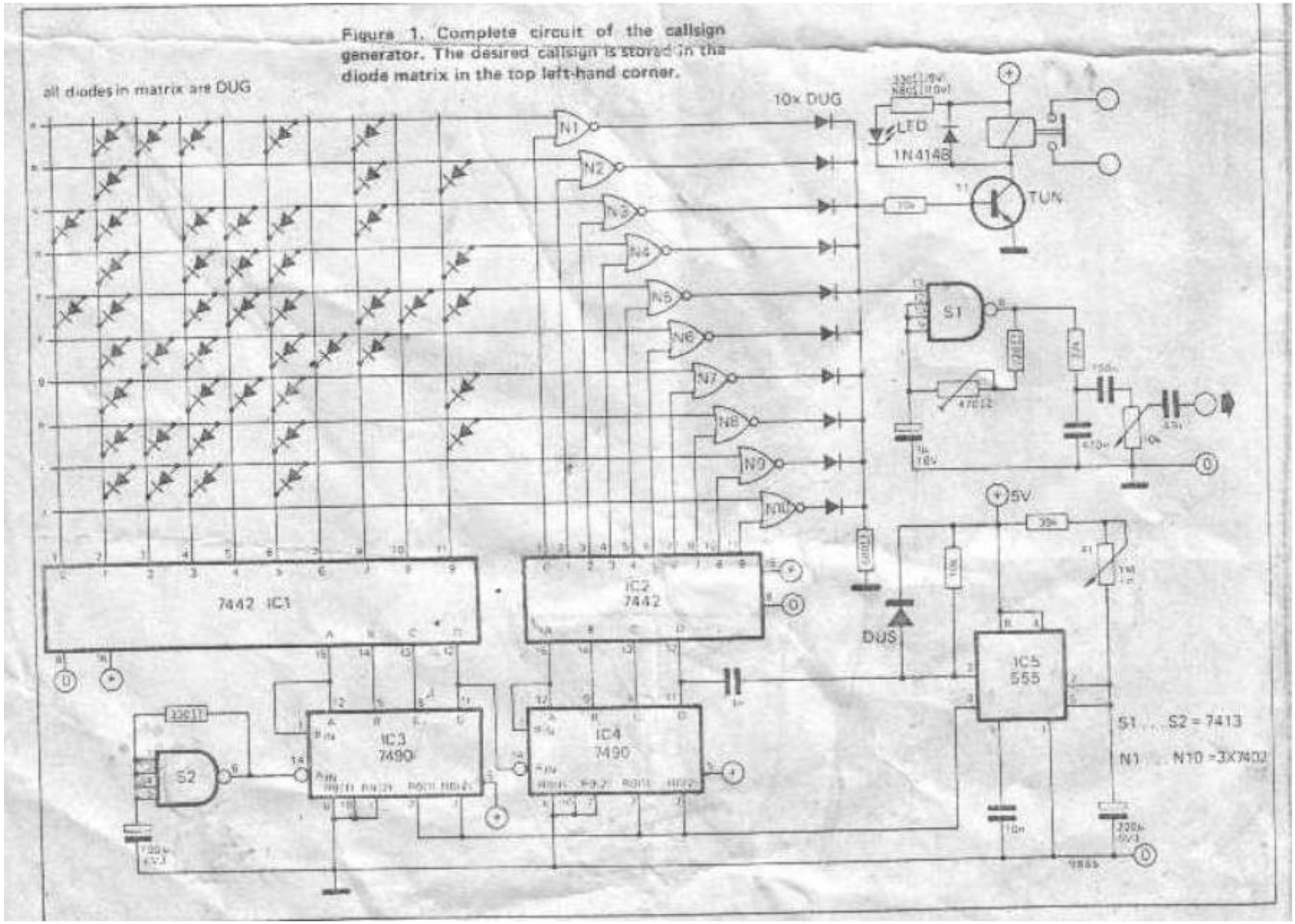
Original Antennas - Corner Reflectors: 1978 -1986



Transmitter



TTL Keyer – GM4DIJ

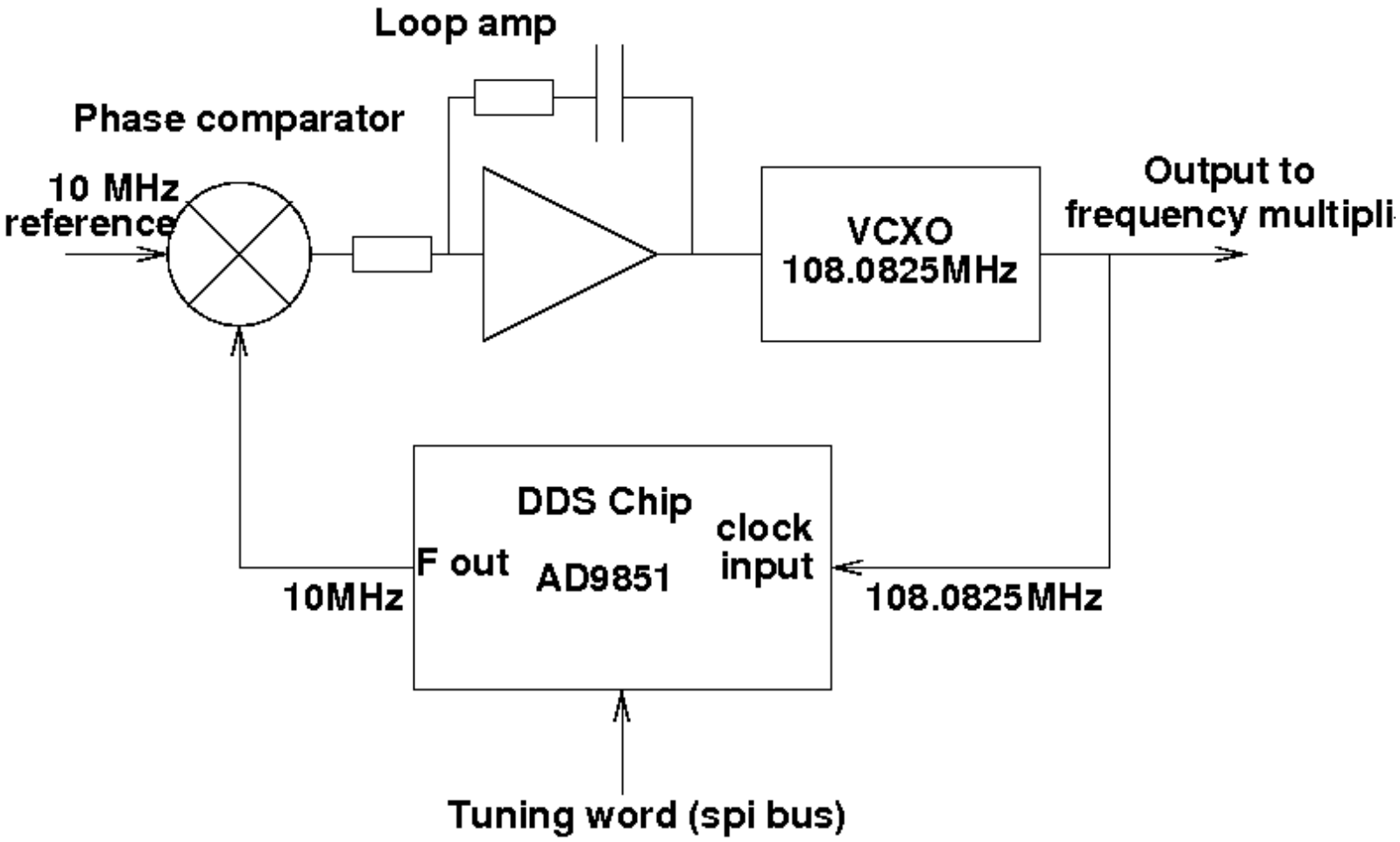


Original Beacon

Antenna Upgrade - 1987

Antenna maintenance – Circa 2014

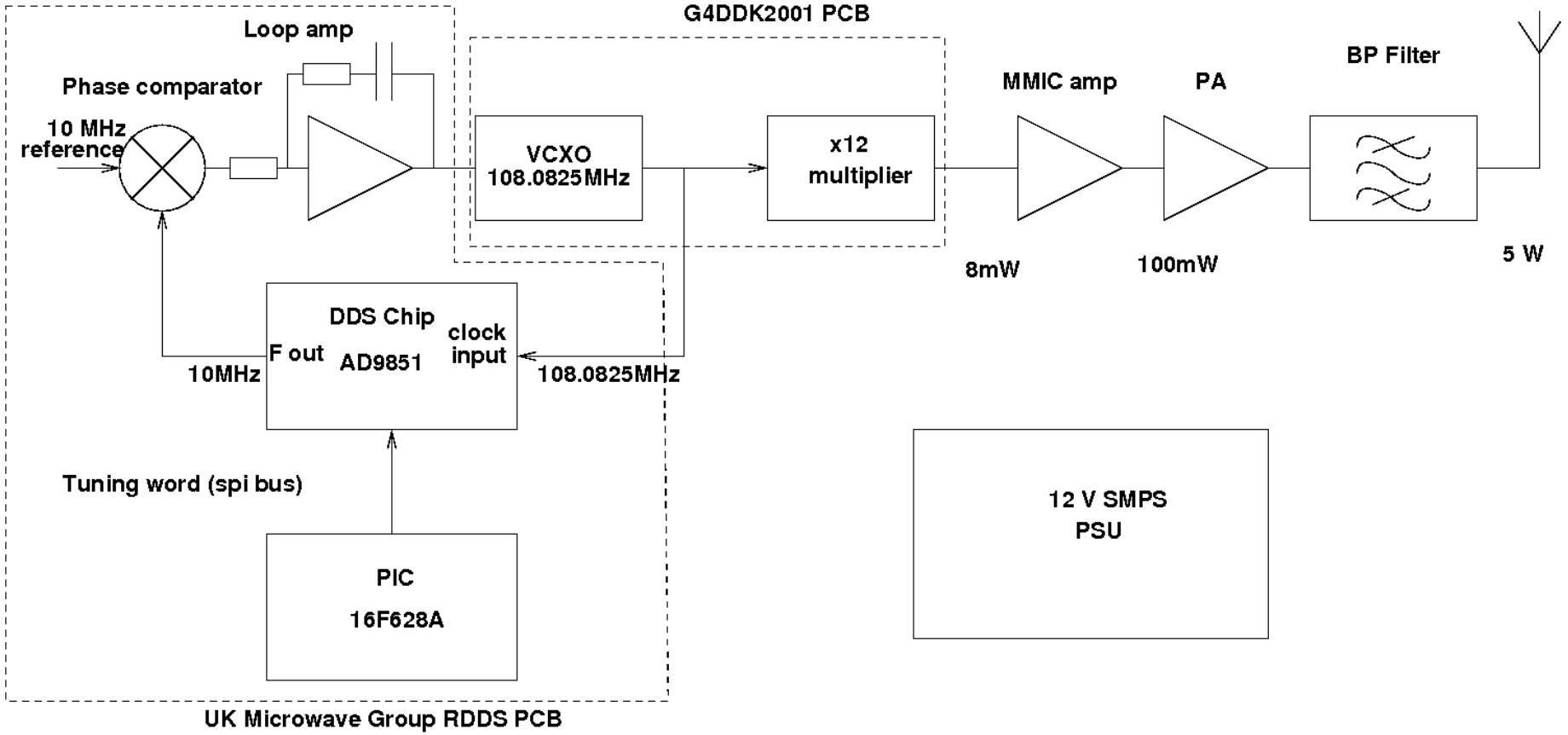
2012 – Update to transmitter RDDS



Motivation for Move to RDDS

- Potential for improved frequency stability
- Allow MGM weak signal modes such at JT4 or PI4
- Allow cleaner keying (Remove chirp !!)

Full Block Diagram of RDDS Tx



Problems with RDDS

- RDDS was relatively complex
- Required periodic re-alignment at the PLL tended to drift out of lock
- General degradation of reliability

2021 – Move to New Location

- In April 2021 I left the University of Edinburgh so a new site for GB3EDN was needed.
- Colin GM4HWO very kindly offered to house it at his QTH.
- This required that the NoV to my licence was re-issued and meant a full new beacon licence application.
- This went through remarkably quickly and the NoV was received within two weeks of submission!
- The RSGB beacon co-ordinator Murray Neiman was very helpful with this.

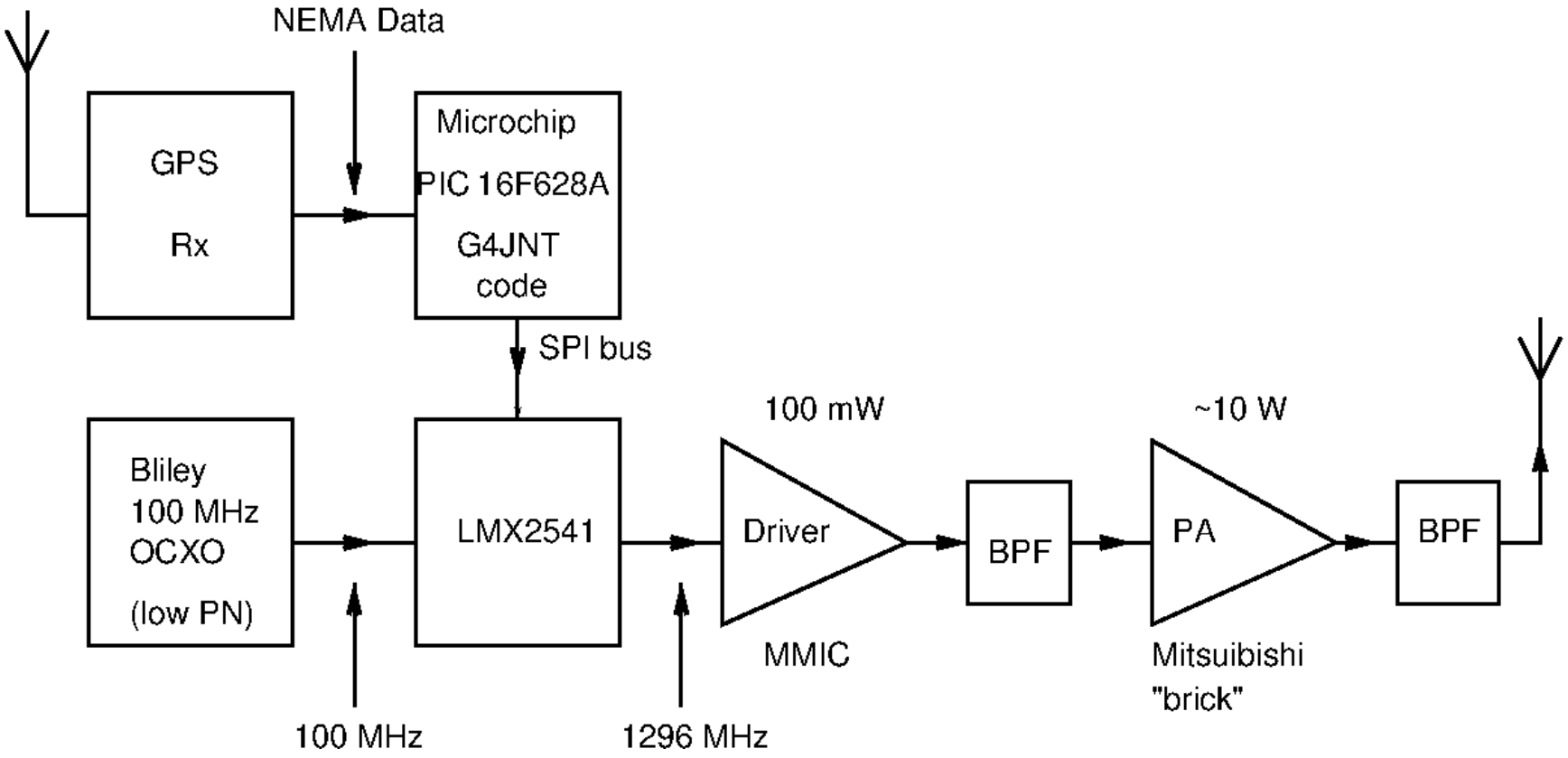
The New Beacon

- A new smaller antenna was required as it was to be in a domestic setting rather than the previous tower block location.
- The requirement was for a compact, horizontally polarised, omni-directional antenna.
- Clover leaf “Big Wheel” type was chosen.
- The opportunity to reconfigure the Tx was also taken.

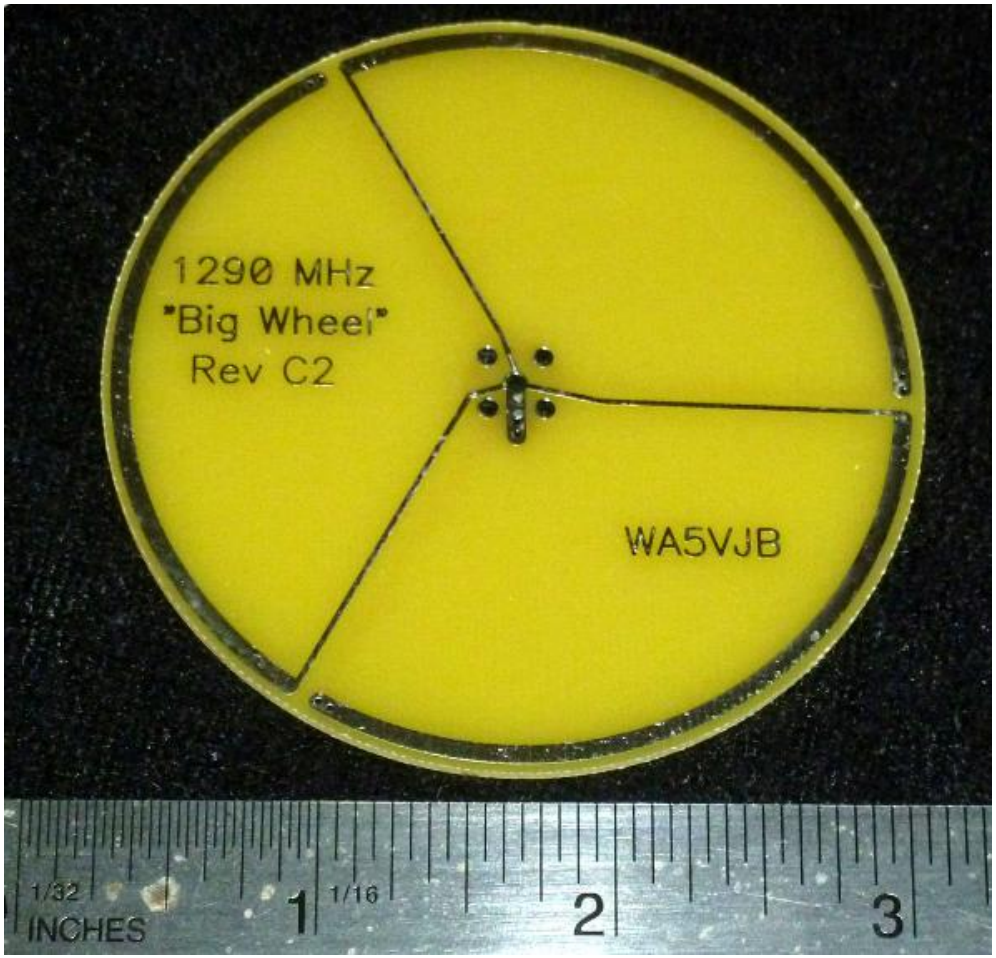
LMX2541 Fractional N Synthesiser

- In a conventional Synthesiser the frequency divider has to divide by an integer number.
- Means that to generate and arbitrary frequency necessitates dividing down to a low step frequency to do the phase detection
- In a frac-N synthesiser the divider can be programmed to divide by fractional numbers
- Allows use of much higher reference/phase detector frequencies and better phase noise.

Overall Block Diagram



The Antenna



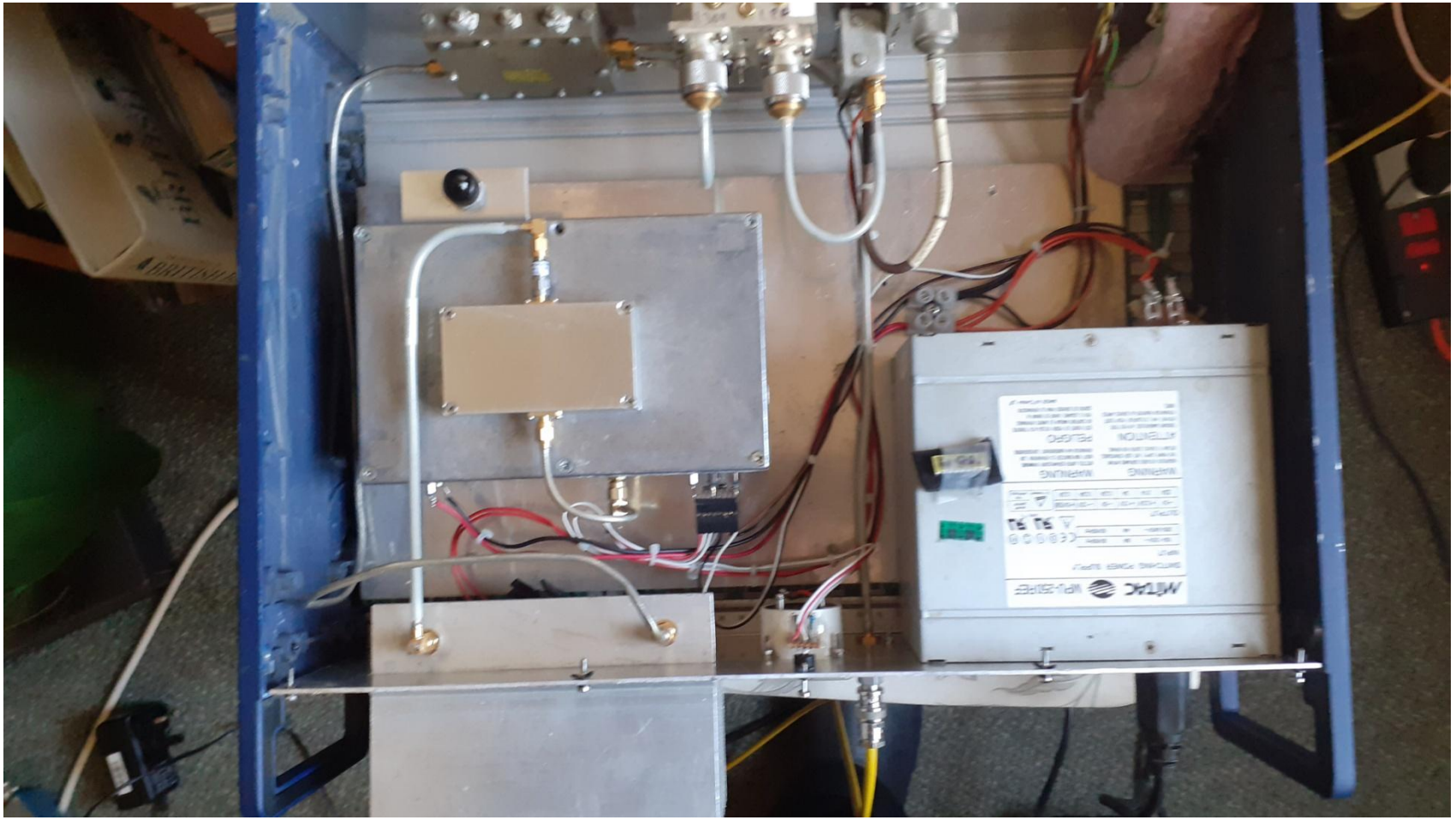
Antenna in Radome

Overall Antenna Installation

Aerial Medic

Tx Hardware Installed

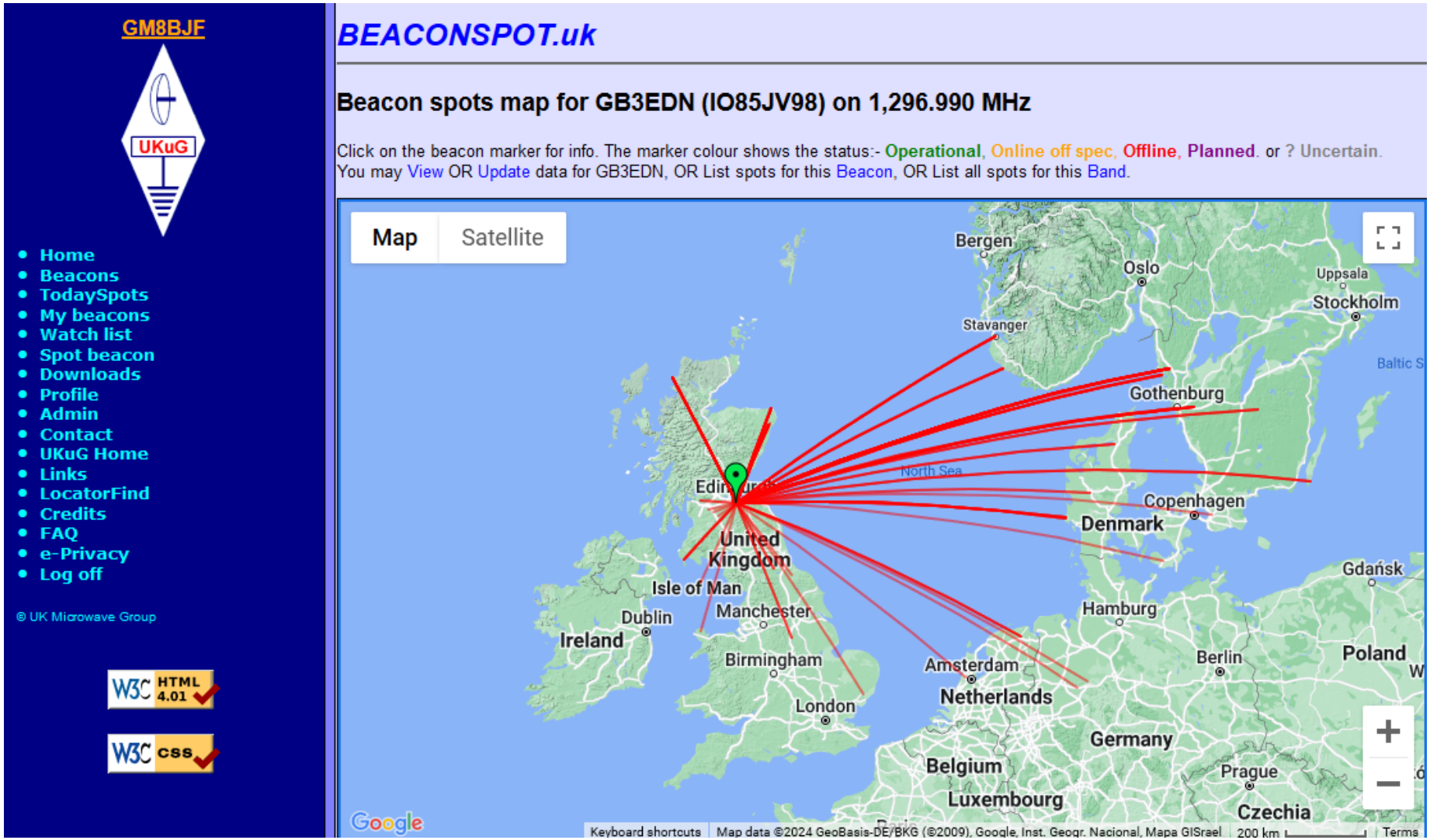
The “Internals”



Overall Specifications

• Frequency	1296.990 MHz
• Power output	~10 Watts
• Modulation	FSK and JT4G
• Message (JT4 + FSK)	GB3EDN IO85jv
• Timing	GPS
• Antenna	WA5VJB “Big wheel”

Is it all worth it ??



Any Questions ??