Buildable Jovian Receivers. New balcony sized antennas for receiving Jupiter bursts.

Why you should build a Jovian Antenna

Jupiter Io interaction, cosmic radiation patterns (Sun, solar flares, Milky way), signal discovery from military radar to unexplained morse beacons all happen in the HF 3-30MHz range. We've set out to develop a 10-50MHz antenna to receive Jupiter bursts, a phenomenon in our solar system that emits radio waves with a pattern emerging due to its moon Io.
Whereas previous antenna designs to discover Jupiter bursts required an area of 10-by-14 meters, these new designs take of much less space. Our meander dipole design is one 3m wooden beam with in total 13cm of wire sticking out to the sides of the beam. Our small loop antenna has a diameter of only 1m. Both designs were developed and tested at ASTRON; The Netherlands institute for radio-astronomy. We hope you have as much fun building these as we had developing!

Budget

We have two setups to choose from, the meanderdipole and the small loop antenna. The meanderdipole antenna is cheaper but is not directional and receives less signal when passive, while the small loop antenna is more expensive but can be aimed towards signals.

Both setups have the following material requirements in common:

material	**check**
SDR-Dongle	[ ]
Computer/raspberry pi	[ ]
Coax cables	[ ]
Balun	[ ]
Amplifier(recommended)	[ ]

General Precautions

First off, you're going to need an SDR-Dongle. This is a radio scanner used to receive the signals from the antennas we're going to build. When buying an SDR, make sure that you get it from official sources. Many cheap SDRs available are fakes with issues. The cheapest setup that we recommend is the RTL-SDR V4. This dongle can receive signals from 500kHz-2.766GHz, meaning that we don't need upconverters to receive the HF 10-50MHz signals we're interested in. The SDR can be bought from the below QR code. Look for the RTL-SDR V4. If you want to use other SDR receivers, make sure your setup can receive in the 10-50MHz range.

https://rtl-sdr.com

Meander dipole

This antenna consists of one wooden beam, through which copper wire weaves.

1. Drill 37 holes (ø:3mm) through the beam spaced 8cm apart.
2. Cut the copper wire exactly in the center to get two 3.75m wires.
3. Weave the two strands of wire from the ends of the beam. Both wires should meet at the middle hole, where no wire goes through.
4. Connect both wires in the middle to the Balun.
5. (optional) Connect the balun to the amplifier.
6. Connect the amplifier to a voltage source (Be sure to not go over the rated voltage).
7. Connect the balun/amplifier with a coax to the SDR-Dongle.
8. Connect the SDR-Dongle to a computer and setup our WebSDR software for long time measurements, or look at real-time data through SDR++.

Materials required (+in common):

material	**check**
copper wire (l:7.5m, ø:1mm)	[ ]
wooden beam (l:3m, ø:>5cm)	[ ]

Small loop

This antenna consists of a small thick coax cable loop.

1. Cut approx. 3.2 meter of coax cable.
2. Solder balun to the 2 parts of the external copper housing.
3. 3D print the provided T-pieces to hold the PVC pipe to the coax cable.
4. Join the 2 PVC pipes with *PVC T-piece* using 4 M5x40mm screws + 2 M5x75mm for each 3D printed part (check 3D print sketch).
5. Attach the coax cable to the PVC pipe using *Port T-Piece + Holder T-Piece*.
6. Connect the balun to the amplifier.
7. Connect the amplifier to a voltage source (Watch rated voltage).
8. Connect the balun/amplifier with a coax to the SDR-Dongle.
9. Connect the SDR-Dongle to a computer and setup our WebSDR software for long time measurements, or look at real-time data through SDR++.

Materials required (+in common):

material	**check**
cellflex coax (l:3.5m ø:27.5mm)	[ ]
pvc pipe (l:2m ø:>40mm)	[ ]

Software & Links

We've developed a WebSDR to read incoming signals available through the QR-code below. Furthermore, SDR++ is also recommended for real-time data viewing.

https://github.com/olistrik/numa-sdr