NOAA Satellite Receiver

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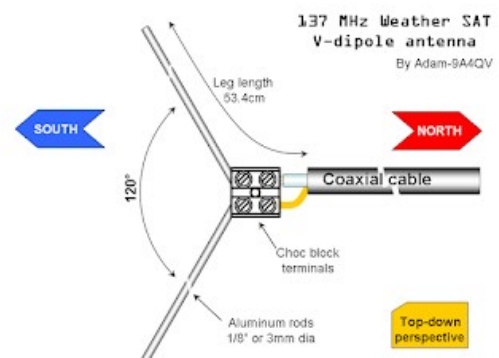
1   Receiver / Antenna

At the moment there are three NOAA satellites available transmitting the APT weather pictures in LRPT format. They are operating in the frequency range of 137 MHz till 138MHz. The satellites are transmitting the RHCP (Right Hand Circular Polarized) signal on the following frequencies.

NOAA-15   137.620 MHz
NOAA-18   137.9125 MHz
NOAA-19   137.100 MHz

V-Pole Antenna ([Link](#))

Most antenna designs for polar orbiting weather spacecraft are based on circularly polarized turnstile or QFH designs. However, Adams antenna is based on a very simple linearly polarized dipole, which makes construction almost trivial. ([More Informations](#))
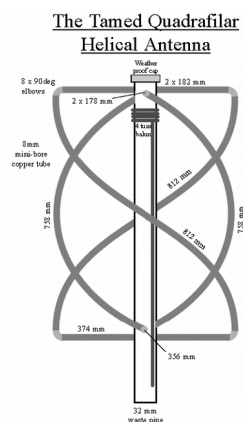
[Online Parameter Calculator](#)

QFH Antenna ([Link](#))

TODO
[Online Parameter Calculator](#)

Receiver / SDR Hardware

TODO

2   Modulation / Transmission

NOAA Direct Sounder Broadcast (DSB[1])

The telemetry signal itself is a Dual side band-modulated PSK signal spanning about 33.5 kHz.

- The DSB uses PSK with -67/+67 degree modulation index.
- Transmitter Power (EOL) 1.0 watts (30dBm)
- Radiated Power (dBm) .5 (over 90% of sphere)
- Signal is Right-Circular Polarized (RCP)

Automatic Picture Transmission (APT[2])

Automatic Picture Transmission (APT), also known as **NOAA-GEOSAT**, is an analog image transmission mode used to by the NOAA weather satellites and formerly some Russian weather satellites to transmit satellite weather photos. Currently only 3 active NOAA satellites transmit APT images.

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1 https://www.sigidwiki.com/wiki/NOAA_Direct_Sounder_Broadcast_(DSB)
2 https://www.sigidwiki.com/wiki/Automatic_Picture_Transmission_(APT)

3   Decoding

DSB

[Example](#)

The DSB telemetry sends scientific and debugging data from the onboard TIROS Information Processor onboard NOAA weather satellites. The telemetry data contains information and measurements from the following onboard devices:

- The HIRS/3 and HIRS/4 instruments which is a high resolution infrared sounder which can be used to create a low resolution multi-spectral scan of the earth. (more info)
- The Space Environment Monitor (SEM-2) which has a Medium Energy Proton and Electron Detector (MEPED), and a Total Energy Detector (TED). This experiment is used to measure the effect of the sun on satellite communications. (more info)
- The experimental DCS/2 transmitter which retransmits signals from 401.65 MHz sea buoys, arctic fox collars, sea ice monitors, weather balloons and more. (more info pdf)
- The ARGOS Advanced Data Collection System (ADCS) which amongst other uses is used in research for tracking animal GPS collars around the world.

NASA Characteristics of a Split-Phase Telecommunications (page 58)

APT

TODO

4   Additional Information / Links

- [RTL-SDR Tutorial: Receiving NOAA Weather Satellite Images](#)

- OFCOM - Technical interface regulation [RIR0808- 13](#)