

## Day 3 - Antenna Rebuild & Hardware Refinement

RTL-SDR Signal Processing & Antenna Systems Project

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### Objective

Refine antenna mechanical integrity and electrical reliability prior to SDR system bring-up; correct workmanship issues identified in initial antenna build.

### Activities performed

#### 1. Antenna Rebuild

- Rebuilt the FM dipole antenna after identifying poor solder joints in the initial build that compromised electrical continuity of the dipole elements.
- Initial antenna build was deemed electrically unreliable due to insufficient solder wetting and mechanical instability at the feedpoint (excess strain on solder joint at Element B and the coax shield braid); the decision was made to reconstruct rather than attempt to rework.

#### 2. Mechanical Securing Improvements

- Replaced electrical tape-based mechanical securing with plastic zip ties to rigidly secure dipole elements along the dowel support.
- Zip ties were spaced along the dowel to provide strain relief and alignment while leaving the feedpoint unobstructed.

#### 3. Dipole Geometry Adjustment

- Dipole leg lengths were intentionally cut  $\sim 1$  inch



longer than calculated to allow for future trimming during tuning.

- This approach reduces the risk of under-length elements and avoids the need for reconstruction during later tuning/optimization.

#### 4. Coax Integration

- RG-59 coax cable (impedance slightly high, but suitable for RF receiving) soldered directly to antenna feedpoint
  - Center conductor  $\rightarrow$  Dipole Element A
  - Shield Braid  $\rightarrow$  Dipole Element B
- Electrical tape applied to insulate exposed solder joints (suitable for nature of project, possible heat shrink or connected termination in later iterations)

#### Current Hardware Status

- Antenna geometry finalized (with trim margin preserved)
- Feedpoint electrically sound with clear conductor separation
- Mechanical integrity significantly improved over initial build
- Electrical tape-based insulation suitable for system requirements
- RTL-SDR v4 delivery pending  $\rightarrow$  expected for tomorrow's activities.

#### Notes/Observations

- Rebuild decision prioritized electrical reliability and repeatability over preserving initial construction
- Decision to use electrical tape as an insulator is intentional and documented; not expected to impact system performance.
- Antenna configuration is now suitable for SDR bring-up, FFT verification, and orientation sensitivity testing.



### Open Items / Next Steps

- Connect antenna to RTL-SDR v4 upon arrival.
- Verify SDR device enumeration.
- Perform initial RF spectral analysis (FM band)
- Document first evidence of signal reception.

### Day 3 Exit Criteria

- Reconstructed antenna manufactured
- Coax integrated, secure and sustainable electrical connection established
- Clear path for initial system testing & verification lined up upon RTL-SDR arrival

Day 3 objectives met.

End of Day 3 log.