Testing for Signal Purity

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But first, special announcement

New Automatic Packet Reporting System

- Our old APRS was destroyed in the lightning strike last year that took out the 444.900 repeater.
- Old Icom IC-2100 and TinyTrack4 dead.
- Replaced by Kenwood TM-201B, DigiRig and Raspberry Pi running DireWolf

What changed?

- Old system was a digipeater only
- New system is a digipeater PLUS and IGate

Direwolf

- Dire Wolf is a software "soundcard" modem/TNC and APRS encoder/decoder. It can be used stand-alone to observe APRS traffic, as a digital repeater ("digipeater"), APRStt gateway, or Internet Gateway (IGate). It can also be used as a virtual TNC for other applications such as APRSIS32 , UI-View32 , Xastir , APRS TW ,YAAC , UISS , Linux AX25 , SARTrack , RMS Express , and many others. Both KISS and AGWPE network protocols are supported for use by applications.

APRS Digipeater vs IGate

- <u>Digipeaters are just like normal voice repeaters in that when they hear traffic, they rebroadcast it with a little more antenna height and usually a little more power. Thus, they increase the range of the original transmission.</u> Unlike a voice repeater, though, APRS Digipeaters receive and send on the same frequency (144.39 in North America). As a result, too many Digipeaters, too close together can be an issue. This one frequency would quickly reach saturation if everyone setup digipeaters at their homes. For that reason, it's best to consult APRS Elmers in your area to confirm that there is a gap in coverage before digipeating.

- IGates, on the other hand, are a different story. <u>When an IGate, or Internet Gateway, hears traffic, it sends that data to the APRS-IS (Automatic Packet Reporting System – Internet Service). APRS-IS is a live stream of APRS traffic worldwide</u>. Without APRS-IS, websites like APRS.fi would not be possible. Setting up an IGate is an easy way to contribute to the strength and utility of the APRS network without overwhelming the RF side of things. Thanks to IGates, the following features of APRS are possible:
    1. Families can check in on the progress of loved ones who are driving long distances and well beyond radio range.
    2. Travelers can check for repeater and net info for a city they plan on visiting in the future.
    3. APRS users can troubleshoot their equipment and identify coverage gaps in their area.
    4. APRS users can send short emails from their radios or send/receive text messages from well outside of normal RF range.

And now, back to the main topic

- The TinySA – Spectrum Analyzer
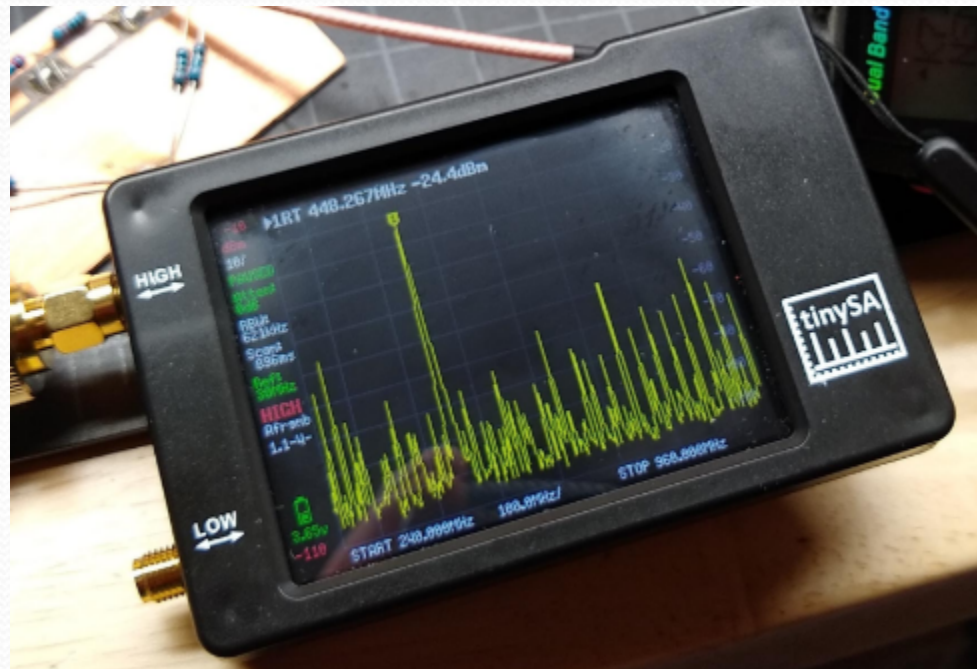
Tiny SA

- **TinySA Basic**
  - Screen size 2.8 inch
  - Spectrum Analyzer with two inputs, high quality MF/HF/VHF input for 0.1MHZ-350MHz, lesser quality UHF input for 240MHz-960MHz or
  - Signal Generator with two output, sine wave output for 0.1MHz - 350MHz and square wave output for 240MHz-960MHz when not used as Spectrum Analyzer.
  - Switchable resolution bandpass filters for both ranges between 2.6kHz and 640kHz
  - Color display showing max 290 scan points providing gapless covering up to the full low or high frequency range.
- **tinySA Ultra ZS405**
  - Screen size 4 inch
  - Spectrum Analyzer for 0.1-800MHz or, with Ultra mode enabled up to 5.3 GHz, level calibrated up to 6GHz. Can observe signals up to 12GHz
  - Signal Generator with sine wave output between 0.1-800MHz or square wave up to 4.4GHz or rf test signal output up to 5.3GHz when not used as Spectrum Analyzer.
  - Switchable resolution bandpass filters from 200Hz to 850kHz
  - Built-in 20dB optional LNA
  - Color display showing max 450 points providing gapless covering up to the full frequency range.
  - MicroSD card slot for storing measurements, settings and screen captures.

Issues (skip if you hate math)

- TinySA takes a maximum input of 10 dbM

Watt To dBm Conversion Table

Power (watt)	Power (dBm)
1.00 W	30 dBm
1.26 W	31 dBm
1.58 W	32 dBm
2.00 W	33 dBm
2.51 W	34 dBm
3.16 W	35 dBm
3.98 W	36 dBm
5.01 W	37 dBm
6.31 W	38 dBm
7.94 W	39 dBm

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Issues. So Attenuators

- 2W = 33dbM

- 5W = 37dbM

- So lets add 35 db of attenuation to keep the TinySA safe.

FCC Spurious Emissions 97.307

- The mean power of any spurious emission from a station transmitter or external RF power amplifier transmitting on a frequency between 30-225 MHz must be at least 60 dB below the mean power of the fundamental. **For a transmitter having a mean power of 25 W or less, the mean power of any spurious emission supplied to the antenna transmission line must not exceed 25 μW and must be at least 40 dB below the mean power of the fundamental emission,** but need not be reduced below the power of 10 μW. A transmitter built before April 15, 1977, or first marketed before January 1, 1978, is exempt from this requirement.
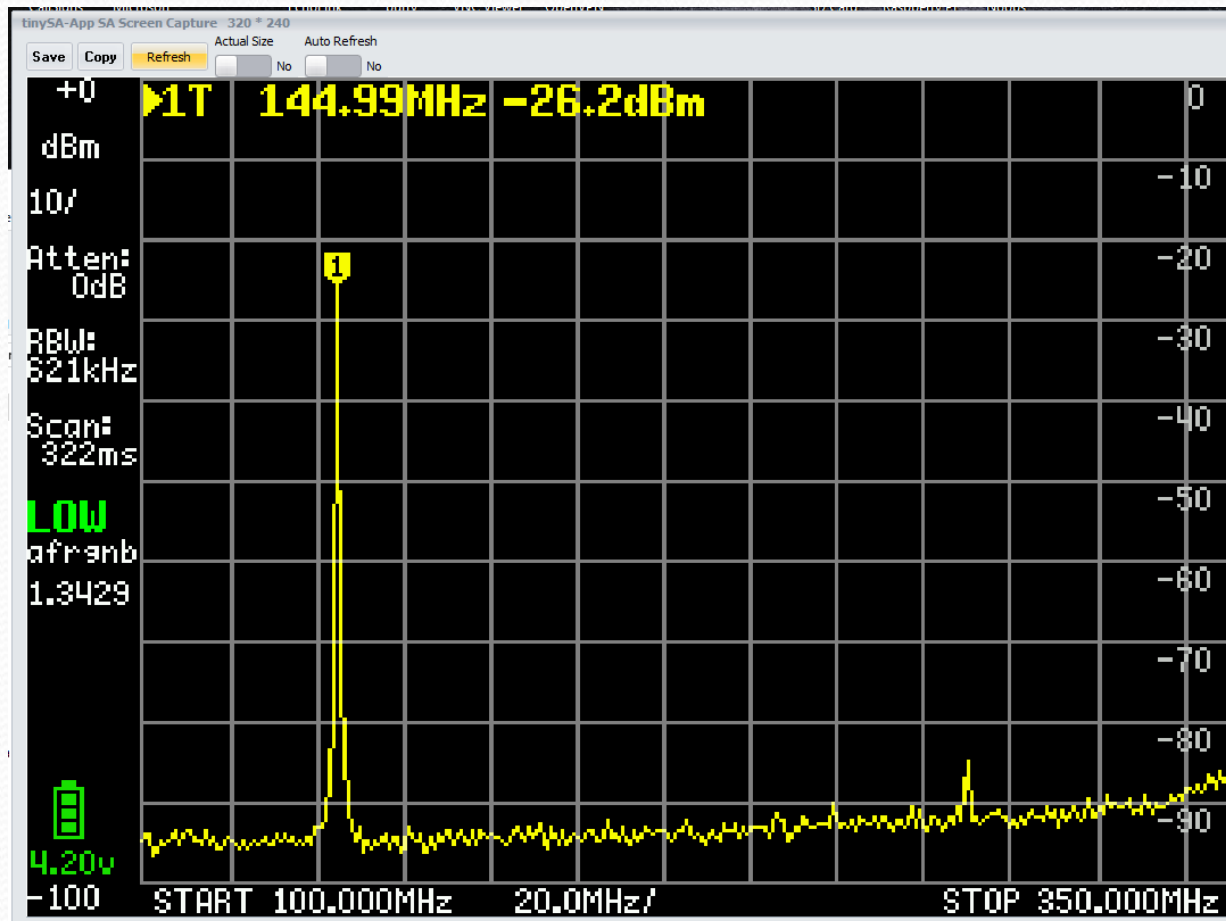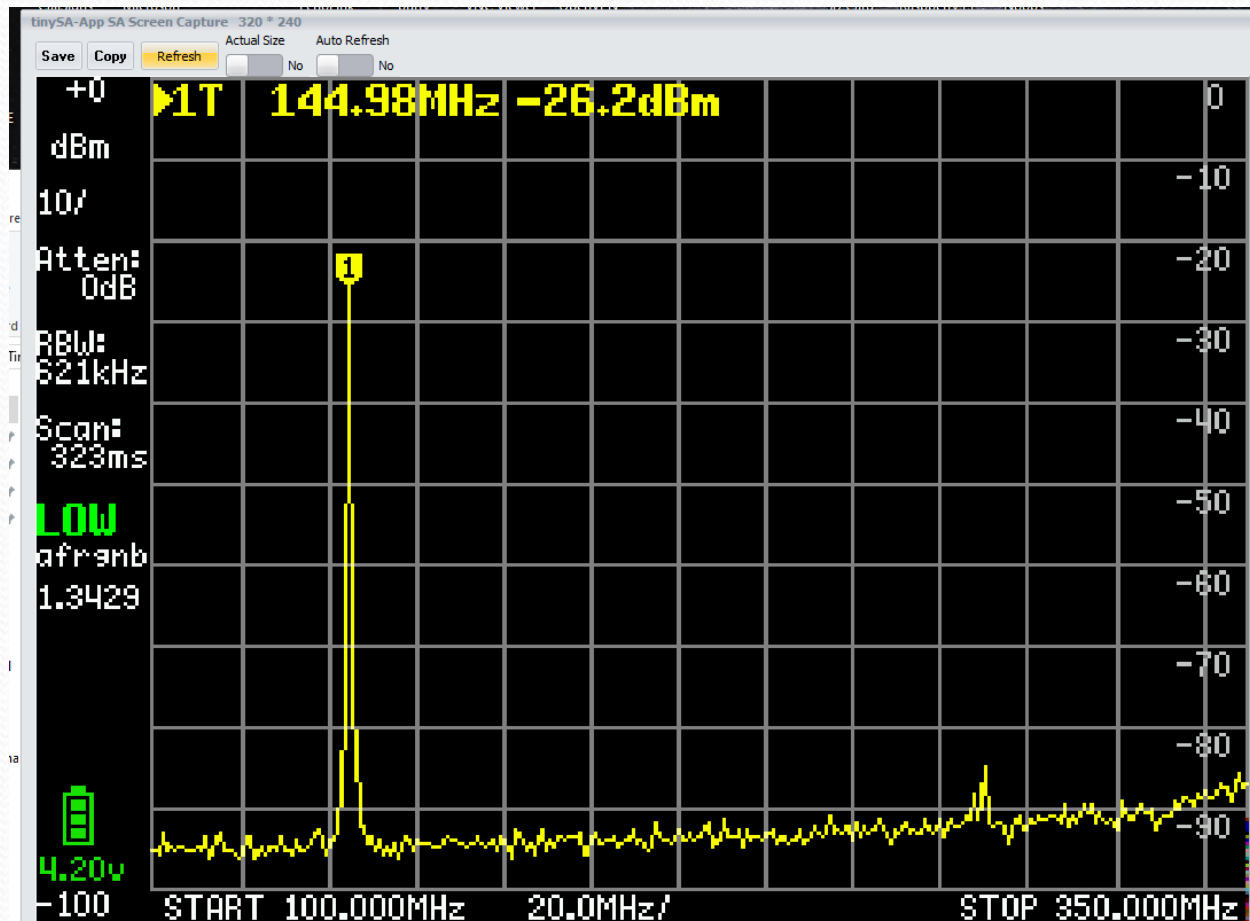
BaoFeng UV-5R
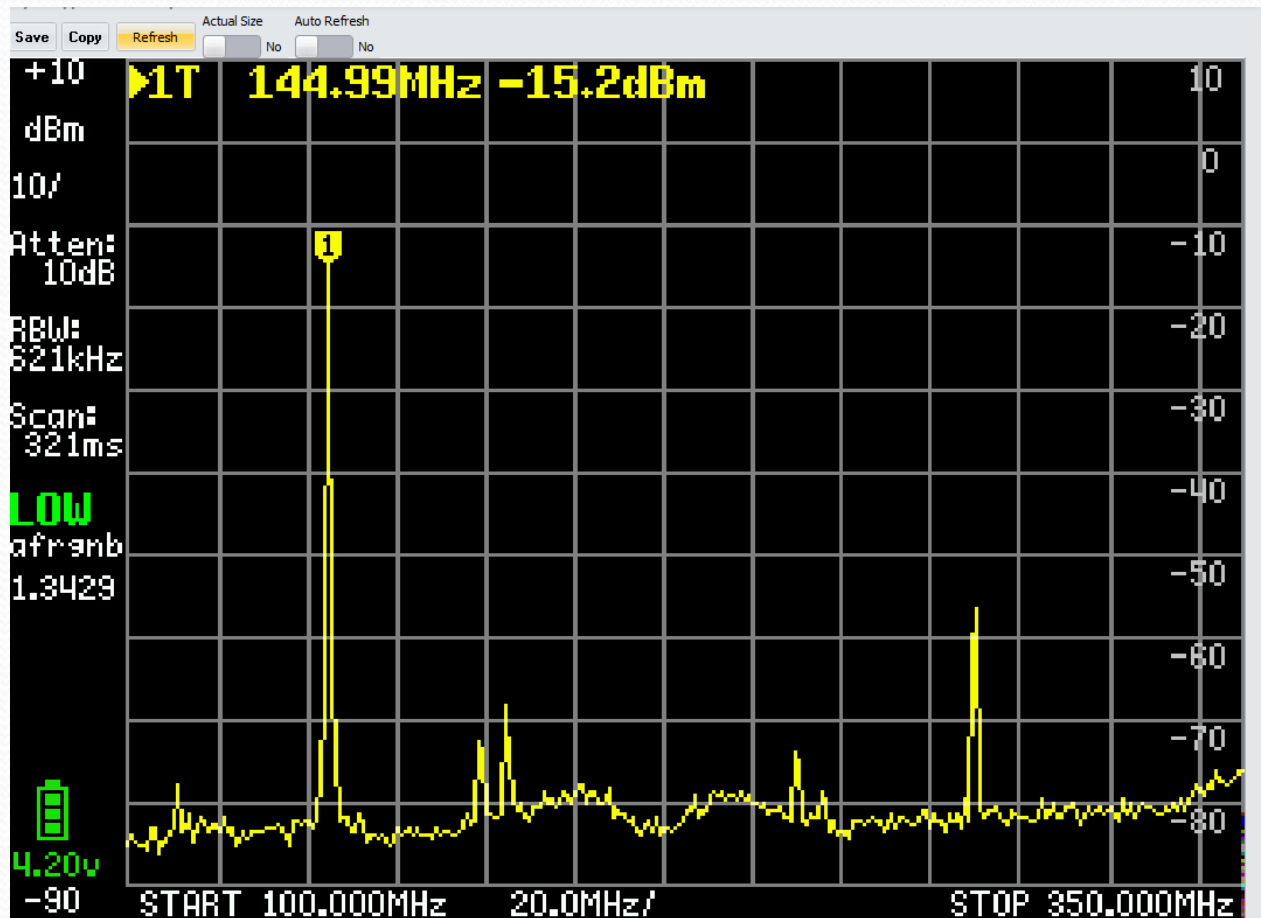
Yaesu FT-60
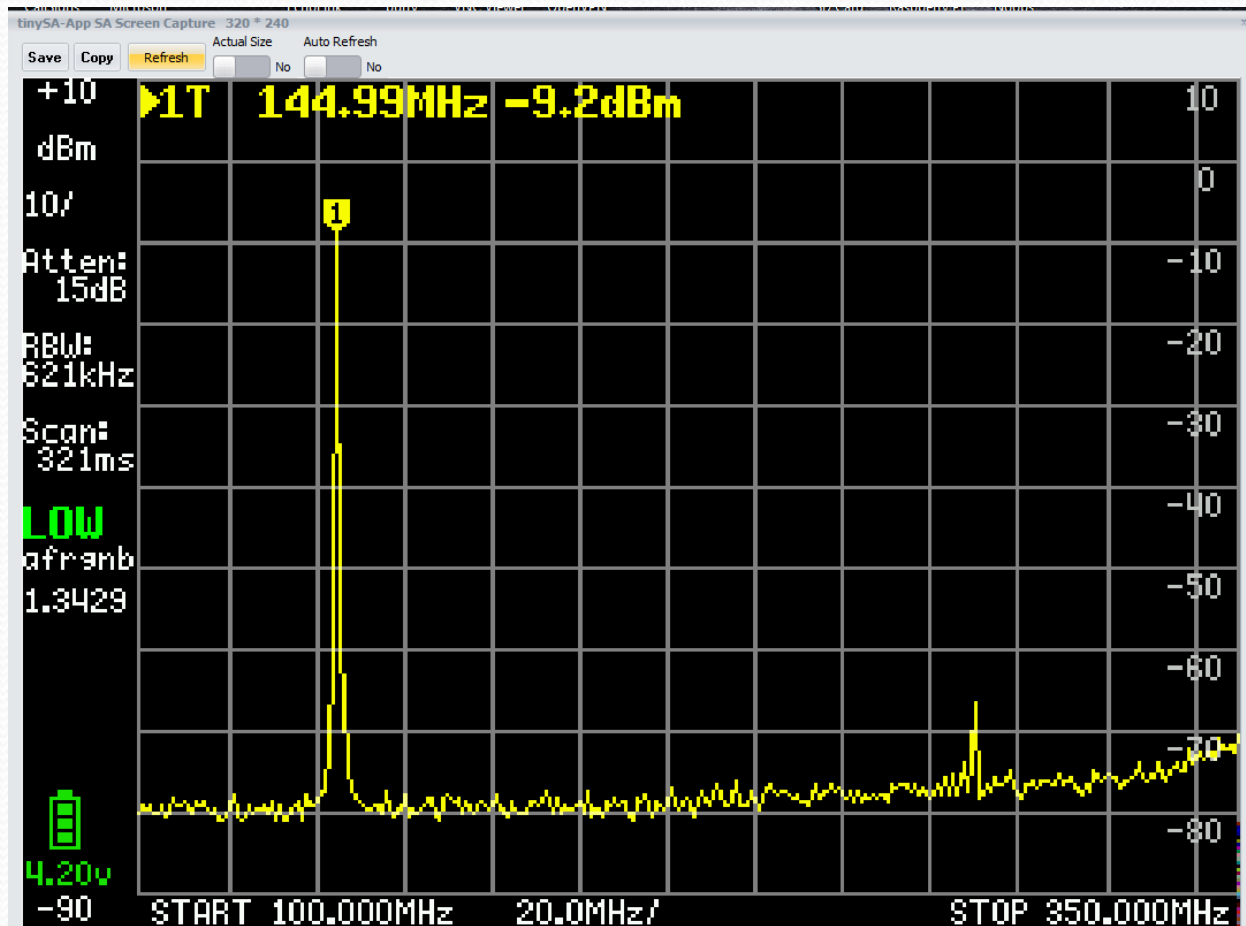
Yaesu FT-70

Yaesu FT-70 (Digital)

Icom T90A