The Pixel Technologies RF PRO-1A and Wellbrook Communications ALA1530 Active Loop Antennas Compared

By Guy Atkins KE7MAV

Introduced last year, the RF PRO-1A antenna from Pixel Technologies (a manufacturer and supplier to the satellite radio, cellular phone, and HD radio industries) is a direct competitor to Wellbrook Communications’ ALA1530 broadband active loop antenna. Wellbrook is a vendor well known to SWLs and DXers, and their popular ALA1530 antenna has been used for over 10 years in commercial and government monitoring posts in addition to the hobbyist market.

How does the newcomer antenna from the USA stack up against one of the UK’s best active loops? Over the last six months I’ve been medium wave and shortwave DXing with both of these antennas and have used a systematic, objective approach to compare them. This review presents summary diagrams generated from MS Excel spreadsheet data to clearly show each antenna’s performance per-band.

MP3 Audio Files of Reception
After the comparison charts you will find a link to a ZIP file containing “A-B” MP3 audio recordings of actual reception with the two loops, plus the original XLS spreadsheet file to review if you are interested.

I won’t comment much on the physical aspects of the antennas, as this information is found in-depth on the manufacturers’ web sites. However, the RF PRO-1A and ALA1530 both use high quality materials and construction and are designed to last many years. The DXer and SWL will need to use “F” connectors or “F” adapters with the Pixel Technologies antenna, rather than the BNC variety on the Wellbrook product. BNCs are considered standard fare for professional HF equipment. Quad shielded RG-6 (CS-6) 75 ohm coaxial cable is recommended for the RF PRO-1A; it is an excellent choice for RFI rejection and a good value but harkens from the cable/satellite TV world rather than HF usage.

I used 125 feet of the quad shielded RG-6 feed-line with the RF PRO-1A, and 125 feet of 50 ohm, RG-58/U for the ALA1530, which is recommended by Wellbrook Communications for their antennas. The loops were oriented north-south, separated by 18 feet, and each loop was three feet off the ground on non-metallic masts. Both antennas were equally distant from the nearest building (my house) about 35 feet away. The nearest power lines were one half
mile away from the antennas, since my neighbor- 
hood has a below ground AC mains supply. 
Indoors, the output of each antenna’s interface 
box was fed into an Alpha-Delta antenna 
switch, with the switch’s output sent directly to 
a Perseus Software Defined Receiver (SDR).

Evaluating Antennas with the 
Perseus SDR Receiver

Microtelecom’s highly regarded Perseus is an excellent tool for examining antenna 
performance. The receiver is in many respects 
a very affordable spectrum analyzer, with two 
key benefits useful for comparing antennas:

• Highly linear and accurate signal strength mea-
surement at the receiver’s antenna input, unaf-
fected by AGC, gain settings, or other circuits
• Automatic calculation of signal-to-noise (S/N) 
  ratio for received stations, using the “Mark-
ers” and “Delta” (difference) functions (signal + 
  noise, minus noise only)

What makes one antenna “better” than another, 
when compared using the same station heard 
with the same receiver settings and adjust-
ments? It is simply a better S/N ratio. 
Both loops are designed with very high IP2 
and IP3 performance in mind, so they are es-
sentially bullet-proof in high RF environments 
such as near transmitter sites. So, overload 
resistance is typically not a concern with either 
antenna; the bottom line is: which antenna can 
give clearer, more intelligible, and more noise-
free signals?

Before receivers like Perseus became available 
to the hobbyist, antenna “A-B” comparisons 
have always been a matter of subjective listen-
ing for best reception (S/N) as determined by 
ear. The exacting S/N measurements made 
with the Perseus receiver make it possible to 
accumulate results for numerous individual 
frequencies in a Microsoft Excel spreadsheet 
(XLS) and output charts and diagrams to illus-
trate the antennas’ performance.

It’s important to remember that the Perseus 
receiver can accurately measure signal 
strength—or band noise (non-signal) measure-
ment—at the antenna input, like a spectrum analyzer. The receiver’s software compen-
states for any changes in receiver gain (pre-
amp / attenuation), AGC, etc. to consistently 
show the actual tuned signal strength at the 
antenna input. The “markers” function lets the 
user measure the strength of a chosen signal 
AND a nearby (out of passband) sampling of 
band noise. The “delta” (difference) button 
of Perseus subtracts the noise level from the 
signal+noise, and the S/N of the received sta-
tion is shown.
I used the method below to record reception 
data over a number of weeks and listening 
sessions. However, my hands-on use of the 
antennas spanned over six months so I could 
compare my subjective impressions of the 
loops to the measurable data collected.

The Test Procedure

These were the steps taken to measure the 
S/N of every signal tuned:

• Configure the Perseus SDR for general 
  reception of broadcast stations: dBm units for 
signal strength and markers, 6.0 kHz max. BW 
button (adjust for 4.0 kHz bandwidth to start), 
AM mode, Slow AGC, 2000 kS/s sampling, 
400 kHz span, PeakSrc (Peak Source) button, 
and maximum averaging of the primary 
spectrum display window. If any parameters are 
changed for the best reception of a station, the 
adjustments are kept constant for each loop’s 
test on that station.

• After tuning a signal, place a signal marker 
  #1 in the primary spectrum window at center 
carrier of the station. The “PeakSrc” button 
  snaps the marker to the carrier’s peak and 
  follows it throughout any fades or variations. 
Place a signal marker #2 in a non-signal (band 
noise only) area, outside of the passband (I 
gen generally tried for 10-20 kHz away from the 
signal).

• Click the “Delta” button to display the difference 
  between the (signal + noise) and noise values. 
A higher Delta result corresponds to a better 
sounding signal.

• Allow time for the averaged spectrum display to 
  settle before determining the average reading, 
or turn the main display’s AVG (Averaging) 
button off and back on to speed up the settling 
process.

• Record the value in the XLS spreadsheet for 
  the tuned frequency, and repeat the above 
  process for the other loop antenna. Press MKR 
Clr (Marker Clear) button to erase the signal 
markers before testing a new signal.
RF PRO-1A vs. ALA1530: Performance per Band

- Longwave - 20 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band

- Medium Wave - 23 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band

- 120 Meter Band - 4 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band

- 90 Meter Band - 11 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band

- 60 Meter Band - 6 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band

- 49 Meter Band - 16 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band

- 41 Meter Band - 20 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band

- 31 Meter Band - 17 Total Signals
  - Best antenna on a signal, how many times per band
  - S/N ratio total of all tested signals, per antenna, per band
RF PRO-1A vs. ALA1530: Performance per Band

25 Meter Band - 17 Total Signals
Best antenna on a signal, how many times per band
S/N ratio total of all tested signals, per antenna, per band
Best antenna on a signal, how many times per band
S/N ratio total of all tested signals, per antenna, per band
Best antenna on a signal, how many times per band
S/N ratio total of all tested signals, per antenna, per band

22 Meter Band - 6 Total Signals

19 Meter Band - 19 Total Signals

16 Meter Band - 9 Total Signals

Overall: Best Antenna per Frequency, LW–13 meters
169 total frequencies, longwave through 13mb. Ties count as a win for each antenna (i.e., +1)

81% of the time
ALA1530

19% of the time
RF PRO-1A

Best antenna per frequency = the antenna which provided the highest signal-to-noise (S/N) ratio (as measured with the very linear Perseus SDR’s signal meter (dBm units)). See text for measurement method.
I made an effort to identify all broadcast stations used for loop antenna testing, except on long wave where I am unfamiliar with DXing that band. Medium wave tests were done approximately 3-1/2 hours before local sunset to receive steady ground wave signals. At the top of HF, only one lonely broadcast signal was found in the 13m band, the Voice of America’s Northern Mariana Islands transmitter on 21580 kHz. Ample signals for loop testing were found in all other bands, and the grand total of stations used in the tests was 169.

Test Categories and Charts of Results
After a lot of consideration on how to present the S/N numbers I decided upon these two criteria:

- Which antenna provides the best signals (S/N ratio) the most often, per band? (In case of a S/N ratio tie on a frequency, both antennas “win” and each receive one “vote” in the totals for that band.)
- What is the S/N ratio grand total of all tested signals per band, per antenna?

These two questions provide a basis to objectively compare the RF PRO-1A and ALA1530 antennas. The data in the MS Excel spreadsheet was automatically summed to provide totals to show overall antenna performance for long wave through 13 meters. The raw numbers from Excel were copied to the chart data entry tool in Adobe Illustrator software, to create nicer looking charts than is possible in Excel directly.

The Verdict
Well before I finished comparing these commercial broadband loop antennas on all bands, my ears told me what the numbers were showing: The RF PRO-1A loop cannot keep up with the ALA1530’s performance.

I was surprised at this outcome as I expected it to be a very close race. The antennas are serious products which sell for serious amounts of money, and both appear to target the same advanced DX hobbyist and commercial customer market.

Pixel Technologies claim their antenna “provides enhanced performance over standard loops”, and employs a “Moebius Strip Shielded Magnetic Loop” design, based on the work of Dr. Carl Baum who was a Sr. Scientist at the US Air Force’s Research Laboratory.

In contrast, Wellbrook Communications’ literature states that shielded Moebius and multi-turn loops have problems with too much capacitance or inductance, resulting in reduced HF bandwidth, sub-optimal current transfer to the amplifier, and subsequent lower loop/amplifier power transfer (gain). Wellbrook also says their own antennas solve these issues with a low inductance loop element, and with an amplifier which has input impedance that matches (tracks) the loop’s reactance over the design bandwidth.

Evidently Wellbrook’s approach works, as their loop gave cleaner sounding, better S/N ratio signals the majority of the time, as shown in the charts and spreadsheet data. I wondered if there was a problem with my feedline, the connectors, or placement of the RF PRO-1A, so I temporarily substituted a different feedline & connectors as well as swapped the positions of the two loops. Neither change improved the Pixel Technologies’ antenna.

MP3 Recordings of Signals
You can hear for yourself in a sampling of the loop comparisons. Download this ZIP file from my MediaFire.com account to access 12 MP3 audio files I recorded during testing of the RF PRO-1A and ALA1530:

http://www.mediafire.com/?edcn29ne31398sz

Each recording is 20 seconds long. The first 10 seconds is always the RF PRO-1A’s reception, and the second 10 seconds was made with the ALA1530.

The ZIP file also contains the raw S/N numbers from the antenna comparisons test in an Excel spreadsheet file.
Conclusion

I purchased the RF PRO-1A for $399.99 USD plus shipping directly from Pixel Technologies (www.pixelsatradio.com).

Wellbrook Communications’ ALA1530 is £200.00, which at the time of writing this review is $325.68 USD. You can order it from their web site at www.wellbrook.uk.com. Taking international shipping charges for the Wellbrook loop into consideration, the ALA1530 is still a less expensive antenna.

Based on results from my S/N ratio tests, signal comparison recordings, and the over 10 year history of continuous improvement Wellbrook has put into their loop antenna, I believe that DXers and SWLs will make a better choice with the ALA1530.

Active as a tropical bands and foreign medium wave DXer since 1980, Guy Atkins is best known for his efforts as an author and editor with the still-popular Fine Tuning’s “Proceedings” series of books for the advanced radio enthusiast. More recently, for three years Guy ran an active and widely read blog devoted to the Perseus SDR receiver. Guy’s in-depth technical articles and reviews have been published in Monitoring Times magazine and radio hobby resources DXing.info, Radiointel.com, DXer.ca, Hard-Core-DX.com, and elsewhere. He also enjoys antenna and receiver modifications along with trips to the well known coastal DXpedition sites in Grayland, Washington. Guy works as a graphic designer for the wireless firm T-Mobile USA.