

Antenna comparison: Par EndFedz EF-30 and Miracle Antenna MMD 30

by Charles Preston KL7OA Version 1.0 2010-10-17

<http://www.charlespreston.net/antenna/Compare-EndFedz-EF-30.pdf>

Update June 25, 2017 by Charles Preston, now K7TAA

Controlled experiments with WSPR have validated the use of WSPR to make accurate and reliable measurements of comparative antenna performance with ionospheric or local, non-ionospheric propagation. Experimental results can be found in "Antenna Comparisons Using Simultaneous WSPR Measurements", by Charles Preston, K7TAA, QEX July/August 2017, p. 8-14.

Summary

I compared a Par EndFedz EF-30 and a Miracle Antenna MMD 30 as they might often be set up in the field, with the same configuration at the same time and same place. Simultaneous transmissions were made on each antenna and were likely received simultaneously at each reporting station on the same antenna and receiver at the same time, using WSPR. The EndFedz antenna, in each compared transmission, had a higher reported signal to noise ratio at the receiving station. Approximately twice as many stations reported hearing the EndFedz antenna but not the MMD 30 at the same time, so no numeric comparison can be made in those cases.

Purpose for comparing antennas

My purpose in comparing these and other antennas as reliably as possible is to make better choices for my fixed and portable operations. One aspect of portable or emergency operating is antenna efficiency. Even if an antenna has other good features, such as broadband operation without a tuner, if the required transmitter power is 4-10 times higher for antenna 2 than antenna 1 for the same communication path, that input power has to be generated somehow. Antenna efficiency was a factor in amateur HF operations associated with Hurricane Katrina, when more efficient antennas had to be deployed in order to carry on communications. It is also a big factor if your transmitter/battery package has weight and space limitations. As a result, I buy, or build, and compare antennas with the most accurate method I can easily use.

<http://www.charlespreston.net/antenna/WSPR-Antenna-Prop-Exp-PR.pdf>

Disclaimer

I have no financial or business ties with any company associated with the compared antennas, and no personal reason to favor one antenna over the other. Each antenna was purchased directly from the companies for the regular retail price.

Antennas compared

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Par EndFedz EF-30, approx 45', using KL7JES, 18' RG 58 as feed line

Miracle Antenna MMD 30, 45', using KL7OA, 16' attached RG-174 as feed line (as shipped)

| Timestamp UTC | Call | MHz | SNR | Reporter | RGrid | Higher SNR (dB) EndFedz |
|-------------------|--------|-----------|-----|----------|--------|--------------------------|
| 10/17/10 01:38 AM | KL7JES | 10.140121 | -6 | W6HW | CM97ce | |
| 10/17/10 01:38 AM | KL7OA | 10.140281 | -13 | W6HW | CM97ce | 7 |
| | | | | | | |
| 10/17/10 01:38 AM | KL7JES | 10.140125 | 10 | KL7OA/H | BP51bp | |
| 10/17/10 01:38 AM | KL7OA | 10.140285 | 5 | KL7OA/H | BP51bp | 5 |
| | | | | | | |
| 10/17/10 01:28 AM | KL7JES | 10.140137 | -17 | VE6PDQ | DO33fl | |
| 10/17/10 01:28 AM | KL7OA | 10.140297 | -24 | VE6PDQ | DO33fl | 7 |
| | | | | | | |
| 10/17/10 01:28 AM | KL7JES | 10.140125 | 10 | KL7OA/H | BP51bp | |
| 10/17/10 01:28 AM | KL7OA | 10.140284 | 4 | KL7OA/H | BP51bp | 6 |
| | | | | | | |
| 10/17/10 01:14 AM | KL7JES | 10.140122 | -5 | W6HW | CM97ce | |
| 10/17/10 01:14 AM | KL7OA | 10.140281 | -14 | W6HW | CM97ce | 9 |
| | | | | | | |
| 10/17/10 01:14 AM | KL7JES | 10.140125 | 10 | KL7OA/H | BP51bp | |
| 10/17/10 01:14 AM | KL7OA | 10.140285 | 4 | KL7OA/H | BP51bp | 6 |
| | | | | | | |

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| | | | | | | |
|----------------------|--------|-----------|-----|---------|--------|----|
| 10/17/10 01:14 AM | KL7JES | 10.140125 | -19 | AF6ZO | CM97gr | |
| 10/17/10 01:14 AM | KL7OA | 10.140285 | -31 | AF6ZO | CM97gr | 12 |
| | | | | | | |
| 10/17/10 01:08 AM | KL7JES | 10.140122 | -10 | W6HW | CM97ce | |
| 10/17/10 01:08 AM | KL7OA | 10.140283 | -16 | W6HW | CM97ce | 6 |
| | | | | | | |
| 10/17/10 01:08 AM | KL7JES | 10.140125 | 11 | KL7OA/H | BP51bp | |
| 10/17/10 01:08 AM | KL7OA | 10.140286 | 4 | KL7OA/H | BP51bp | 7 |
| | | | | | | |
| 10/17/10 01:08 AM | KL7JES | 10.140125 | -14 | AF6ZO | CM97gr | |
| 10/17/10 01:08 AM | KL7OA | 10.140285 | -33 | AF6ZO | CM97gr | 19 |
| | | | | | | |
| 10/17/10 01:06 AM | KL7JES | 10.140122 | -14 | W6HW | CM97ce | |
| 10/17/10 01:06 AM | KL7OA | 10.140282 | -22 | W6HW | CM97ce | 8 |
| | | | | | | |
| 10/17/10 01:06 AM | KL7JES | 10.140125 | 11 | KL7OA/H | BP51bp | |
| 10/17/10 01:06 AM | KL7OA | 10.140286 | 5 | KL7OA/H | BP51bp | 6 |
| | | | | | | |
| 10/17/10 12:56 AM | KL7JES | 10.140126 | 10 | KL7OA/H | BP51bp | |
| 10/17/10 12:56 AM | KL7OA | 10.140286 | 3 | KL7OA/H | BP51bp | 7 |
| | | | | | | |

| | | | | | | |
|----------------------|--------|-----------|-----|---------|--------|---|
| 10/17/10 12:54 AM | KL7JES | 10.140101 | -8 | NT7Y | CN87jd | |
| 10/17/10 12:54 AM | KL7OA | 10.140261 | -16 | NT7Y | CN87jd | 8 |
| | | | | | | |
| 10/17/10 12:54 AM | KL7JES | 10.140126 | 10 | KL7OA/H | BP51bp | |
| 10/17/10 12:54 AM | KL7OA | 10.140286 | 4 | KL7OA/H | BP51bp | 6 |

Additional station reports (spots) for the EndFedz antenna can be found at:

<http://www.charlespreston.net/antenna/Transmitted-spots-all.pdf>

Reasons why these results may not be completely accurate and trustworthy

1. Only one sample of each antenna was tested. Each could be representative of that model, or better, or worse.
2. Metal or something else below the ground surface that could make one antenna's environment different from the other.
3. Some factor about this method of measurement that makes it less accurate than it seems.
4. Measurements were not taken on an HF antenna range with calibrated lab instruments.
5. Too few data points. One antenna (KL7OA) simply wasn't reported nearly as many times by as many stations, and the total number of measurements is still low for statistically significant results.

Precautions intended to make these results accurate and trustworthy

1. Each antenna high end was at 25', +/- 1 foot.
2. Each antenna low end was at 4', 6", +/- 3".
3. The antennas were parallel, with each antenna oriented within 3 degrees of the other. KL7JES had the high end pointing 188 degrees true. KL7OA had the high end pointing 191 degrees true.
4. The antennas were slightly over 1 wavelength apart on flat, level ground without any obvious major sources of metal within 1 wavelength.
5. Each FT-817ND transmitter fed a QRP power meter (WM-2, calibrated according to manufacturer instructions, with a listed accuracy of 5%.) and read very close to 2 Watts during transmission.

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6. Each netbook computer was using the same version of Windows XP SP3 and the same version of WSPR WSPR2_r1718.
7. Another EndFedz EF-30, sloping antenna, was used as a further comparison (KL7OA/H) in receiving mode only, with an FT-857D. Because it was over 10 wavelengths from the comparison antennas, comparative SNR results from the two test antennas may be valid.

Equipment used

Each transceiver package was located near its antenna to avoid possible errors from long feed line radiation.

FT-817ND with TCXO
Buddipole 4S2P battery pack
Oak Hills Research WM-2 QRP power meter
West Mountain Radio RigBlaster Data Jack P&P
Acer netbook computer
WSPR software
Equipment containers were plastic Pelican cases.

Each antenna had been previously checked to detect shorts or high SWR or defects that would prevent transmitting or receiving.

Location for compared antennas

Transmitting site - Anchorage, Alaska
Google Earth coordinates
61.200407 north lat.
-149.863906 longitude

This is in a city park with cleared ground and no obvious large metal pipes, wires, or fencing within at least 1 wavelength of the antennas being compared. The high end of each antenna was at 25' in a tree, along the southern park boundary, and at the edge of a greenbelt. The antenna sloped over cleared ground down to the north.

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One of the two stations



The other operator, KL7JES

Anomalies noted

1. Although each netbook setup had BP51BE as the grid location, the KL7JES grid is shown only as BP51, while KL7OA grid is BP51BE, causing spot data to have slightly different distances and azimuths, even though they were about 32 meters apart.
2. The grid location for KL7OA/H, receive only location, was set for BP51BP instead of BP51BE, and was calculated as further away from the antennas being compared. Actual distance was about 450 meters. This calculation has nothing to do with the reported SNR.

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