BevFlex-4 Low Noise Receiving Antenna

Frequently Asked Questions

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Frequently Asked Questions (BevFlex-4)

1. What is unique about the BevFlex-4 product?

The JK BevFlex-4 is actually a kit that allows you to construct the best possible, reversible, low frequency, receiving antenna system for your particular situation. By simply changing jumpers on the termination boxes you can create a classic, above ground, Beverage; Beverage on ground (BOG); Flag; or inverted EWE antenna. No other product on the market offers the ability to create all four configurations and CHANGE them if and when your installation situation changes. Although the classic Beverage antenna configuration should yield the best results, the BevFlex-4 kit allows you to experiment and find what works best for you within the limitations of your location.

2. With four possible configurations, which one is the best?

That all depends on the real estate you have available and which directions are most important to you for low noise, low frequency, receiving. All (4) configurations have been and still are successfully used by world class DX'ers. As a general rule, the performance rating order would be:

Beverage - The longer the better (200 to 1000ft), Installed above ground

BOG - Same concept as Beverage, but placed on the ground—can be much shorter, but has reduced gain, particularly at higher frequencies.

FLAG - A balanced antenna with two parallel above ground conductors—requires considerable planning with regard to the supporting structure.

Inverted EWE – Unbalanced, short, above ground, antenna with simple support requirements.

(Both the FLAG and inverted EWE require MUCH less physical space than either the Beverage or the BOG.)

3. What is the main difference between a Beverage and a BOG configuration?

The Beverage antenna is installed ABOVE ground—typically 7-10 ft. above the surface while the BOG is installed at or just below (less than 1") the surface of the ground or it can be installed in sod as a BIS (Beverage In Sod). A BOG can generally be made much shorter than the above ground, Beverage, due to its lower velocity of propagation factor. The BOG can provide similar results to an above ground Beverage twice the physical length of the BOG, but with a reduction in overall gain.

4. What is the main difference between a FLAG and an inverted EWE antenna configuration?

The FLAG antenna is a balanced antenna configuration while the inverted EWE is unbalanced. In simple terms, the inverted EWE looks much like half of a FLAG antenna. The FLAG requires a slightly more complex installation due to having two parallel wire elements above ground while the inverted EWE only requires one. Several users of the inverted EWE claim enhanced results in poor conductivity soil, by placing a small ground radial field at each end of the antenna or by connecting the two ground rods with a wire that is buried in the ground between them. This is not required for the FLAG configuration.

5. What is special or new about this Beverage antenna kit vs. others that are available?

The BevFlex-4 has the unique ability to be fed from any point along its entire length and the ability to adjust the end terminations from inside the shack at the operator's position. Plus, it utilizes inexpensive RG-6 coax cable vs. more expensive ladder line that is required for other reversible direction systems.

6. What bands does this antenna cover?

The BevFlex-4 antenna is capable of receiving all HF bands as well as the AM and LW broadcast bands. The most dramatic reception improvements are usually in the 1.8, 3.5, 7.0, and 10 MHz. amateur bands. It is still usable on 20m through 10m bands and down to 100kHz.

7. How does the overall system cost of this antenna compare with other Beverage antennas available?
Overall cost of the BevFlex-4 system is lower than any other commercial available system on the market due to the use of low cost CATV type RG-6 coaxial cable for all portions of the antenna and feed system. The system is entirely passive which reduces cost (no pre-amp required) and increases reliability.

8. Which is better, a shielded loop or a Beverage antenna? Both are advertised as low noise receiving antennas.
Both antennas have advantages and disadvantages. Although there will be few cases where the loop may nearly equal the performance of the BevFlex-4, the main advantage of the loop it that it requires no significant space. The loop can be rotated to null out specific, local, noise sources. If you are receiving signals from the directions favored by the Beverage polar pattern, the BevFlex-4 will always outperform the loop. A combination of the loop and the BevFlex-4 as a phased array using a two input antenna noise cancelling device is a very powerful noise suppression tool.

9. What is the optimum height above ground where I should position the Beverage antenna cable?
7 to 10 feet above ground is ideal in that it maintains the correct impedance as well as allowing for mowing under the antenna and minimum interaction with wandering people and animals.

10. Can I install the Beverage antenna on the slopes of hills on my property without the need for the terrain to be flat in elevation for best results?
Absolutely! Simply follow the contour of the land whether it is flat or hilly. Crossing a creek or depression in the ground will have little impact on the antenna's performance. The ground under the BevFlex-4 does not need to be flat. You can even install it on a moderate hill side.

11. How much can I deviate from a straight line in azimuth and still get good results as I layout the cable?
Although the ideal situation is to have a long antenna run in a perfectly straight line, deviations of 20 to 30 degrees from the desired direction are acceptable. Try to keep the average direction correct as you install the antenna, but do not worry too much about necessary variations to accommodate your situation. Symmetrical, horizontal, zig-zags in the direction of the BevFlex-4 antenna wire where space is limited, can actually be helpful by providing some loading of the antenna which effectively increases the antenna's electrical length versus its physical length.

12. Can I attach the RG-6 antenna cable to metal fence posts with wire ties or do I need to use some kind of insulator to standoff the cable from the metal post?
Insulated supporting posts or trees have the least impact on the BevFlex-4 performance. Metal posts can be used if the antenna element is supported with an insulator at least 18" away from the metal post. The antenna performance will be significantly degraded if there are any nearby wires running parallel to the antenna element.

13. What is the best kind of RG-6 cable to use? Quad-shield, standard single-shield RG-6 or 75 Ohm coax with a carrier support wire?
Quad shield is ideal, but not necessary. The better the shielding, the less likely you will pick up unwanted interference. We recommend using good quality cable with a UV resistant jacket and weatherproof connectors. Any type of 75 Ohm characteristic impedance coaxial cable can be used, including coaxial cables that incorporate a supporting, steel, messenger/carrier wire. If long spans are required between supporting posts or trees, the use of coax with a supporting messenger/carrier wire is desirable. Much of the surplus coaxial cable from CATV companies has an integrated carrier wire and can often be obtained for free. The messenger/carrier wire should be connected to terminal #5 on each of the end termination units.

14. What effect does my local ground conductivity have on antenna performance and should I make any adjustments to height above ground to compensate for this?
When mounted at least 7ft above ground level, electromagnetic modeling of the BevFlex-4 antenna shows little effect on the antenna's performance over a range of soil conductivities between 0.1 mS/m and 50 mS/m which are typically found in most locations.

15. How will weather conditions affect the performance of my antenna?

No more so than with any other wire antenna installation. The reversible Beverage allows you to switch directions to reduce interference from atmospheric storms coming from predominantly one direction. In such cases, it is better than other antennas for receiving under high noise conditions.

16. Why are there ground connections on each of the end terminating units?

The ground rods provide a connection between the custom reflection transformers at each end of the antenna and the ground under the antenna which completes the circuit between the two ends of the antenna.

17. Will I need to use an external preamp with this antenna?

Generally, no external pre-amplifier is required or desired as signal levels from the BevFlex-4 are well above the noise floor of your receiver on frequencies below 10 MHz. Received signals from the BevFlex-4 will almost always be LOWER in "S" meter readings than on your transmit antenna, but the overall signal to noise ratio will be higher. An antenna pre-amplifier may be helpful for a BevFlex-4 configured as a Beverage-On-Ground (BOG) or EWE at frequencies above 7.0 MHz.

18. How often will I need to adjust the terminating resistors?

The terminating resistors do not need to be adjusted frequently, if at all. They are set at the factory for 75 Ohms. In some situations, it will be possible to increase F/B ratio by adjusting the termination resistance, but this is not normally necessary.

19. What kind of connector is required to interface with my radio?

The output from the switching and termination unit is via a standard "F" connector matched to the 50 Ohm input impedance found on most receivers. You will need to provide a 50 Ohm cable and the adapters required to connect to your particular radio. ("F" to BNC, PL-259, RCA phono, etc.)

20. Do I need to use 50 ohm cable between the switching unit and my radio?

With the short lengths of cable involved in most installations, either 50 Ohm or 75 Ohm coaxial cable can be used.

21. What is the minimum distance that I need to maintain between my transmit antenna and the closest point of the Beverage?

The further, the better, as noise can be re-radiated from the transmit antenna into the BevFlex-4. Typically, 50 ft. spacing is sufficient. It is important to locate the BevFlex-4 away from vertical transmit antenna systems including the ground or elevated radial wires. If possible, route the BevFlex-4 antenna wire perpendicular to any other nearby antenna wires to minimize the coupling between the antennas. If it is not possible to provide this spacing, a relay can be used to open the connection (float) the transmit antenna while receiving. If high power is applied to a nearby transmit antenna, it is possible that the receiver protection, voltage limiting devices, in the switching and termination unit could be damaged.

22. When I adjust the terminating resistors I see no difference in performance. Is something wrong or defective?

This is normal. Many factors affect the optimum terminating resistance including the angle of incidence of the received signal. On stable signals with no fading, it may be possible to see increased F/B ratios by carefully adjusting the termination resistor, but in most cases you will see little if any variation in performance over the limited range of the variable resistance. If in doubt, set it to 75 Ohms and enjoy the performance.

23. Are the outdoor units weather proof?

YES, but it is the installer's responsibility to use properly installed, weatherproof, connectors and seal the connections with appropriate over tape.

24. Do you have any weather proofing and installation tips?

- Use plastic electrical tape to tape over the seams where the box and lid come together on the various units
- Be sure to allow a generous amount of coax center conductor protruding from the F connectors when you install them. This will allow for contraction of the center conductor during cold weather
- Coat the center conductor with WD-40 or contact cleaner to maintain a good connection and prevent corrosion
- Use Vaseline or silicon grease on the threads of the F connectors when you put them together
- Place a bead of RTV silicon rubber around where each F connector penetrates the various unit boxes. You can also use "liquid tape" for this purpose.
- Use copper clad steel ground rods You can also use scrap, copper, water pipe if the ground is soft.
- Use bronze or stainless steel clamps to make connections to the ground rods
- If you hang an above ground Beverage hung from trees, etc., use plastic electric fence insulators with loose ty-raps to hang the RG-6 coax, but also let it slide as the supports move in the wind

25. What kind of lightning protection is provided?

Each end termination unit is protected by gas discharge tubes to reduce the possibility of damage from nearby static discharges.

26. What is minimum length needed for the Beverage antenna?

Please review the chart in the application information for each antenna configuration. In general, the longer the better, with a practical minimum length being approximately 150 ft. While lengths greater than 1000 ft. can improve the gain of the antenna, the F/B ratio may suffer when the antenna is longer than (2) wavelengths at the desired reception frequency. There are many on-line references that discuss this trade-off in length.

27. I only have 270 ft. to work with. Should I configure the BevFlex-4 as an above ground Beverage antenna or as a Beverage-On-Ground (BOG)?

We have experience with a 270 ft. above ground, Beverage, antenna and were pleasantly surprised by how well it worked even on 160m. We also have experience with a175 ft. BOG on rocky soil and were impressed by how well it worked on 160m and 80m. This short BOG was able to achieve a 20dB front to back ratio on an AM broadcast station 40 mi away on 1600 kHz. If you want high front to back ratio on 160m with a short antenna, we would recommend the BOG configuration. We were frequently able to receive DX stations on either of these antennas that could not be copied on the transmitting antenna. Even with the BOG configuration, you will generally not need a pre-amplifier on 160m and 80m since the atmospheric noise level is still higher than the noise figure of a modern receiver.

28. I have less than 50 ft. to work with. Can I still build an effective, receiving antenna with the BevFlex-4?

Yes, we have experience with EWE and FLAG antenna configurations as short as 25 ft. Although the gain is lower than a Beverage or BOG antenna, the EWE or FLAG antennas can still provide a low noise receiving capability with good front to back directivity. We have experience working stations than could not be heard on a dipole transmitting antenna using a 25 ft. EWE antenna for receiving.

29. Can I have two BevFlex-4 antennas installed at right angles to each other in order to get optimum reception from (4) different directions?

Yes, you can install multiple BevFlex-4 antennas that cross each other as long as the antenna wires cross at close to a 90 degree angle to each other and are separated by at least 12 inches. This will minimize the coupling and interaction between the two antennas.

30. Can I feed more than one receiver from my BevFlex-4 antenna system?

Yes, you can use any standard 50 or 75 Ohm, isolated port, signal splitter that works down to your frequency band of interest to feed multiple receivers. The splitter would normally be placed after the direction switching unit. You can also split the forward and reverse feedlines from the antenna coupling unit into multiple feeds ahead of the directional switching unit, but you will lose the ability to individually optimize the terminating resistance for each end of the antenna.

31. How long can the feedline cables be from my shack to the feed unit?

Insertion loss measurements of coaxial cable with either solid copper or copper plated steel center conductors confirm that the losses of RG-6 coaxial cable are very low at HF frequencies. Feed cables up to 1000 feet should not be an issue. Dual RG-6 "Siamese" pair type cable is very convenient for the feedlines from the antenna feed-point to the operating position. The feedline cables do not have to be equal in length.

32. Do the A/B feedline cable lengths need to be matched in length?

No, the cables do not have to be length or phase matched for any of the four configurations to work properly.

33. Why is coaxial cable better than "open wire", "window/ladder line", or "twisted pair wire" for the antenna?

The use of well shielded, RG-6, coaxial cable provides better isolation between the common mode received signal on the outer surface of the shield and the differential mode signal inside the coaxial transmission line. The characteristic impedance (Zo) of the coaxial transmission line is not affected by the external mounting environment as much as the (Zo) of unshielded, parallel conductor, transmission lines. Light weight, RG-6, coaxial cable is generally less expensive, easier to hang, and maintain than window/ladder line.

34. Why are the coaxial feedline connections reversed for the EWE and FLAG antenna system configurations?

The EWE and FLAG antenna configurations operate with the received signal transformer at the end of the antenna wire toward the direction of reception. The Beverage and BOG antenna configurations operate with the received signal transformer at the end of the antenna wire away from the direction of reception. The EWE and FLAG configurations operate as a pair of top coupled, phased, vertical antennas while the Beverage and BOG configurations operate as resistively terminated traveling wave antennas.

35. How do I measure the impedance or resistance of the various components of the system when troubleshooting?

The end termination units and the feed-point unit all utilize RF isolation transformers between the various segments of coaxial transmission lines. Resistive measurements with an Ohm meter are of little value other than determining if there is a broken connection. The DC resistance measured across either of the feedlines to the shack will be a low value equal to the DC resistance of the coaxial cable in series with the DC resistance of the transformer in the feed-point unit. The DC resistance measured across either end of the coax used as the antenna, will be a low value equal to the DC resistance of the coaxial cable in series with the DC resistance of the transformer in the end termination unit. You can use an Ohm meter to set the terminating resistor values in the control box. This is done by measuring the resistance across the A or B inputs to the control box. The A input should measure 75 Ohms with the switch in the Forward position. The B input should measure 75 Ohms with the switch in the Reverse position. The only way to accurately measure the rest of the components of the system is to use a RF antenna analyzer to determine the actual RF impedances of the parts of the system you are troubleshooting.

36. What can an RF antenna analyzer tell me about the operation of my BevFlex-4?

If all the connections are intact and the correct impedance taps are selected on the end termination units, you should see a VSWR of typically less than 2:1 (referenced to 50 Ohms) across a frequency band from 1.8MHz to 10.0MHz when you look into the "TO RX" connector of the control box with an antenna analyzer. As the frequency is swept across this range of frequencies, there should not be a large variation in the VSWR reading. The correct terminating resistor in the control box can be adjusted to minimize the VSWR variations as the frequency is changed. At this point the Beverage antenna performance should be maximized.

37. I want to avoid running multiple pairs of coaxial cables to my operating position. Can I control multiple BevFlex-4 antennas from a single control box?

Yes, if you want to switch between two or more BevFlex-4 antennas (in any configuration) pointed in different directions without running multiple pairs of coaxial cables back to the operating position, you can use a remote DPDT coaxial relay to switch between the antennas. If you don't have a DPDT coaxial relay, you can easily mount a small Double-Pole-Double-Throw (DPDT) relay in a shielded box with (6) chassis mount "F" connectors. An inexpensive multiple DPDT relay board that works well for this purpose is: **https://www.amazon.com/JBtek-Channel-Module-Arduino-Raspberry/dp/B00KTEN3TM/ref=sr_1_5?ie=UTF8&qid=1487614909&sr=8-5&keywords=relay+board.** This is a very low cost arrangement and works fine as long as you keep the wires carrying RF from the relay to the "F" connectors reasonably short.

You can also purchase remote coaxial relays from: **http://www.greenheronengineering.com/proddetail.php?prod=GHE_RX8-2,** This product is fully configurable in software and uses wireless connectivity for control.

Some other products that use a simple wired interface are:

http://www.mfjenterprises.com/Product.php?productid=MFJ-4712,
http://www.ameritron.com/Product.php?productid=RCS-8V,

You can use pairs of the MFJ and Ameritron remote coaxial relays to switch the multiple pairs of coaxial cables from the multiple antennas to the single control box at the operating position.

The only compromise in doing remote switching of the coaxial cable pairs, it that the termination resistances for all of the antennas will be the same. This limitation does not have a significant impact on the performance of the antennas. It is suggested that the terminating resistors in the control box be left at the factory setting of 75 Ohms. There is no requirement that all of the BevFlex-4 antenna configurations be Beverage or any other type of bi-directional antenna. Beverage antennas can be switched with BOG, EWE, or FLAG antennas as long as the correct antenna impedance taps are selected on the end termination units for each of the antennas.

Troubleshooting the BevFlex-4 System

To fully test all the components of the BevFlex-4 system, you will need an RF antenna analyzer in addition to an Ohmmeter. The RF analyzer is required because most of the connectors on the BevFlex-4 system components are terminated in transformers which will measure as very low resistance readings on an Ohmmeter. There are a few simple DC measurements that can be made using an Ohmmeter with the ability to measure low values of resistance to verify that the transformer windings are intact and the coaxial cables are correctly connected.

End termination unit DC resistance measurements:

- The resistance measured with an Ohmmeter from the center pin of the "F" connector to the outer shield on the end termination unit should measure less than 1 Ohm showing that the transformer winding is intact.

- The resistance measured with an Ohmmeter from terminal #1 to terminals #2, #3, and # 4 should be less than 1 Ohm.
- The resistance measured with an Ohmmeter from terminal #1 to terminals #5 should be on open circuit.
- The resistance measured with an Ohmmeter from terminal #5 to the shield of the “F” connector should be less than 1 Ohm.

Feed-point unit DC resistance measurements:

- The resistance measured with an Ohmmeter from the center pins of all four of the “F” connectors to their respective outer shields should measure less than 1 Ohm showing that all the transformer windings are intact.
- The resistance measured with an Ohmmeter from the antenna forward “F” connector to the antenna reverse “F” connector should measure less than 1 Ohm.
- The resistance measured with an Ohmmeter from either the antenna forward “F” connector or the antenna reverse “F” connector should measure as an open circuit to shield of either the A or B feedline “F” connectors.

Control unit DC resistance measurements:

Here are some simple tests with an Ohmmeter to check the functionality of the control box.

- If a transmitter or transceiver accidentally feeds RF power into the Rx port of the control box, a micro-fuse will open to protect the BevFlex-4 receiving antenna components. You can easily check the condition of this fuse by measuring the resistance from the center pin of the Rx connector to shield ground. The resistance should measure approximately 10 Ohms. If this port measures open, the fuse has blown. The fuse can be replaced by removing the back cover of the control box and soldering another fuse across the blown surface mount fuse. (The Manufacturer is: Schurter, p/n 3413.0002.11, Mouser Electronics p/n 693-3413.002.11) Alternatively, a 10 Ohm resistor can be soldered across the blown fuse, but future protection from accidental transmissions into the system will be compromised.
- With the direction switch in the “Forward” position, the resistance reading from the center pin of the A port to shield should be approximately 75 Ohms. This value is adjustable by the “Forward Trim” potentiometer and is limited to a range of 33 to 133 Ohms.
- With the direction switch in the “Forward” position, the resistance reading from the center pin of the B port to shield should be approximately 1 Ohm. This is the resistance of the transformer winding.
- With the direction switch in the “Reverse” position, the resistance reading from the center pin of the B port to shield should be approximately 75 Ohms. This value is adjustable by the “Reverse Trim” potentiometer and is limited to a range of 33 to 133 Ohms.
- With the direction switch in the “Reverse” position, the resistance reading from the center pin of the A port to shield should be approximately 1 Ohm. This is the resistance of the transformer winding.