



BevFlex-4X & BevFlex-4X/Q Quick Start Guide

Revision 1.02
November, 2020

Congratulations on purchasing the most versatile low band, low noise receive antenna system ever! The BevFlex-4X is an updated and lower priced version of the unique W8GNM BevFlex-4. With the BevFlex-4X you can build an above ground Beverage, Beverage on Ground (BOG), EWE, Flag, or a VE3DO type antenna. The BevFlex-4X also allows you to reverse the antenna direction by simply throwing a switch. The Beverage and BOG configurations permit placing the feed point at any point on the antenna while still using the entire length of the antenna. Conventional Beverage designs can only be fed from the ends.

This Quick Start Guide gives you the basic information needed to set up your BevFlex-4X system. A full manual is available online at www.unifiedmicro.com.

This guide also covers the BevFlex-4X/Q, which is a pair of BevFlex-4X systems combined with the RAS-4 remote antenna switch. Two BevFlex-4X antennas mounted at right angles will provide enhanced receive capability in all four quadrants. If you purchased a BevFlex-4X/Q, follow the first section on configuring and installing the individual antennas. A section near the end of this guide covers configuration with the RAS-4 switch.

System Components

The BevFlex-4X has four modules. There are two Terminator units, a Feed Unit, and a Switch/Control Unit. The Terminators and Feed Units are mounted outside as part of the antenna system, and the Switch Unit is installed inside the shack to control the receive direction.

Terminator Units

The terminators transform the impedance of the antenna to 75 ohms and couple the signals to the transmission feed lines. In the case of Beverage and BOG configurations, the antenna is made of RG-6 coax. The outer shield acts as the receive conductor element, and the internal conductor in conjunction with the shield form a transmission line which is part of the feed system.

Different antenna types have different impedances that must be matched to 75 ohms. The two stainless screw terminals have different purposes depending on the antenna type. Two jumpers inside the box select transformer taps to provide the correct impedance match. The default factory configuration is for Beverage/BOG/VE3DO. The jumpers need to be changed if you are building a Flag or EWE antenna. Details are covered in each antenna configuration section. Be sure the cover is replaced in the correct orientation if you change the jumpers. The bottom of the label should be on the side of the F connector.

The Terminators also contain a gas discharge tube to give added protection from voltage surges. No antenna will survive a direct or nearby lighting strike, but these devices do provide added protection. Always disconnect your antennas if there is a chance of lightning.

Feed Unit

The Feed Unit takes the signals brought back from the Terminator Units on the coax and separates the signals from the two directions. In the case of Beverage/BOG configurations, the Feed Unit couples the signals from the two directions of the RG-6 coax that act as both the antenna and part of the feed line. The outputs of the Feed Unit are two RG-6 coaxial cables to the shack and Switch Unit. It is important to keep track of which cable is which, and the correct connections to the Switch Unit will depend on the antenna type. The Feed Unit also provides Ohmic and common mode RF isolation of the antenna from the feed lines back to the shack.

There are no user options or other configuration actions needed inside the Feed Unit.

Switch/Control Unit

The Switch Unit has two purposes. The first is to select between the forward and reverse directions. All the antenna types supported have a single main lobe in the forward direction. That direction will be selected when the front panel switch is in the Forward position. Changing the switch to the Reverse position will select a lobe 180° from the forward lobe direction.

The second purpose of the Switch Unit is to terminate the unused direction. Proper BevFlex-4X operation requires a 75 ohm termination of the coax not selected by the switch. If you have a different receive antenna switch you wish to use, it will have to terminate the unused feed line with a 75-ohm resistor.

The Switch Unit has additional protection for the receiver. A diode array clamps the signal voltage to the receiver input. A 50ma fast blow fuse protects against over currents including accidental transmission power into the receiver connector. While these provide additional protection, they are not guaranteed to prevent damage to receivers. A third-party receiver input protection device is recommended, especially if your receive antenna is near a transmitting antenna.

There are two jumpers for selecting options on the Switch Unit circuit board. Most users will not need to change them.

G1: The Switch Unit has a transformer to provide DC and common mode RF isolation between the BevFlex-4X antenna and the receiver. Common mode currents on the feed lines create additional noise. Some users may prefer to connect the grounds from the two antenna feed lines to the ground of the coax going to the receiver input. Soldering a wire between the two solder pads of G1 will connect the shields. The factory default is for G1 not to be installed.

G2: This jumper position provides a method to bypass the 50ma fuse in the line to the receiver. Inserting and soldering a wire to the G2 pads shorts out the fuse. The factory default is for G2 not to be installed.



Figure 1. The yellow lines show installation points of optional jumpers.

Note that the coax cables between the Switch and Feed Units must be connected correctly to be receiving in the indicated direction. If you get the coax cables reversed between the Feed and Switch Units, you will be receiving

in the opposite direction from what the switch indicates. If that happens, switch the two input cables on the back of the Switch Unit.

General Installation Guidelines

The BevFlex-4X was designed to give maximum weather protection to its outdoor units. They are encased in NEMA rated cases with gasketed lids. The F type coaxial connectors are sealed to the case. The terminal hardware on the Terminator Units is stainless steel. The internal circuitry is given a conformal coating to provide additional protection from corrosion. Ultimately, weather protection is difficult to maintain, and proper installation will go a long way in providing a long service life for your BevFlex-4X.

Mounting

The Terminator and Feed Units must be mounted with the F connectors pointing downward so water will drain away from these connectors.

Connections to the Terminator screw terminals must have the connecting wires either drop down or have a drip loop. Do not have the wires coming in horizontally or from above the case.

Similarly, if the coax cables must be routed at or above the Feed or Terminator unit level, allow several inches of a loop to prevent water from flowing to the F connectors. Always seal coax connections.



Figure 2. Proper Terminal Unit mounting. Wires and coax must come from below the Terminal so water runs away from the connections. Wires must have stress reliefs if they will put tension on the connectors. Wires coming from the side or from above must have a drip loop. Weather proof the connections. Coax connections to the Feed Unit must also drop down. Use drip loops where necessary on the RG-6 coax

While rugged, the BevFlex-4X outside units are not designed to handle the forces that attaching cables and wires might put on the connection points. Always provide strain relief before connection to the BevFlex-4X modules.

Antenna Configurations

This section shows how to configure your BevFlex-4X for the supported antenna types. It is assumed the reader is familiar with these antennas types and has decided which type of antenna they want to build and have selected the site to install the antenna. Each type of antenna has its advantages and disadvantages regarding performance, space needed, support structures, and other factors.

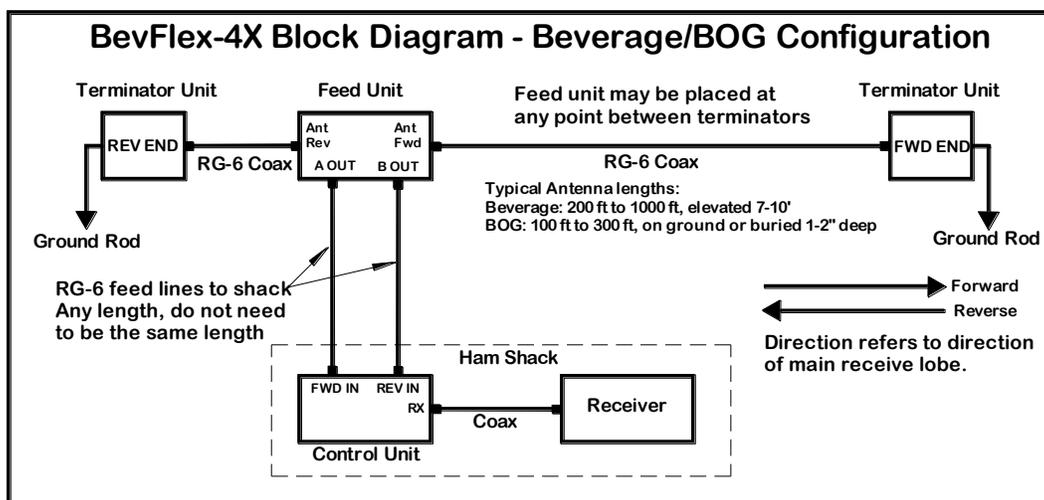
If you are not familiar with these antennas, more information is available in the ARRL *Antenna Book*, ON4UN's *Low Band DXing* book, and many online resources. Note that none of these sources covers the BevFlex-4X directly. If you build your BevFlex-4X version of an antenna with similar dimensions, you will get similar performance to the traditional design. You get two switchable directions with the BevFlex-4X antenna and more flexibility on feed point location with Beverage type antennas. These are features not available with most designs described elsewhere.

Beverage/BOG

The classic Beverage antenna is an elevated, terminated wire placed 7'-10' above ground level. Typical lengths are 300'-1000' or even longer. The BOG or (Beverage on Ground) is similar except the wire is placed right on the ground or buried slightly below the surface of the ground. The typical lengths for a BOG are 100'-240' feet long. A BOG of a given length will have better characteristics than an elevated Beverage of the same physical length due to the velocity of the radio wave being lower in the ground, but the signal strength received by a BOG is about 10dB lower than from an elevated Beverage. The signal levels can be improved by mounting the BOG an inch or two above ground level when it can be protected from being a tripping hazard. BOG lengths between 100 feet and 240 feet generally work well with 225 feet being the optimum length for 160m operation over normal soil.

The BevFlex-4X replaces the Beverage wire with inexpensive RG-6 coax. Instead of a resistor termination end and a feed point end, the BevFlex-4 has identical Terminator Units on each end. You may install the Feed Unit at any point along the length of the antenna coax. Normally it is placed at the point nearest the shack to reduce the length of the feedlines. The entire length of the antenna coax is always active regardless of Feed Unit placement.

The Beverage/BOG block diagram shows the basic configuration of the BevFlex-4X system used as one of these antennas. Because of the different impedances of the two types, the Terminator wire connections points to the ground rods are different. Leave the other Wire Terminal unconnected.



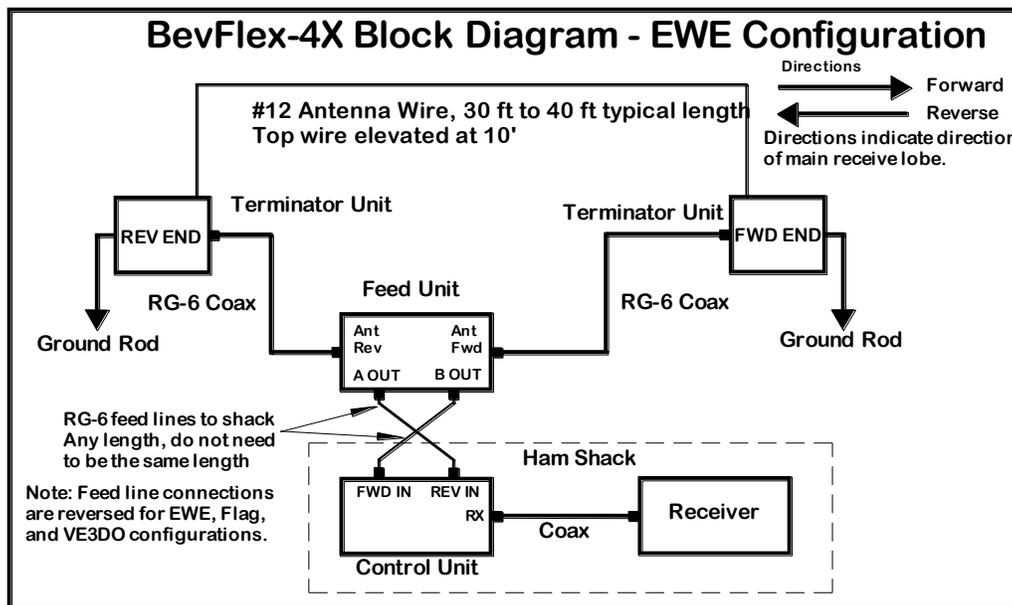
Antenna Type	Ground Rod connection
Elevated Beverage	Wire Terminal 1
BOG	Wire Terminal 2

The Terminator internal jumpers must be set to the Beverage/BOG settings. This is the factory default configuration. See the section on Terminator Configuration if you are not sure of the configuration of your Terminators.

EWE

The EWE is a wire antenna in the form of an inverted U. Its advantages are a fairly small space requirement and simple 10' supports. It is reported to work best over soil with poor conductivity. The standard EWE has a feed transformer at the end of one of the vertical sections and a terminator resistor at the end of the other vertical section. The BevFlex-4X version places a Terminator at the bottom end of each vertical section. This arrangement allows for instant direction switching.

The Terminators must be configured for the EWE/Flag settings. See the section on Terminator Configuration to set the jumpers. Also, note that the connections between the Feed Unit and Switch Unit are reversed compared to the Beverage/BOG connections.

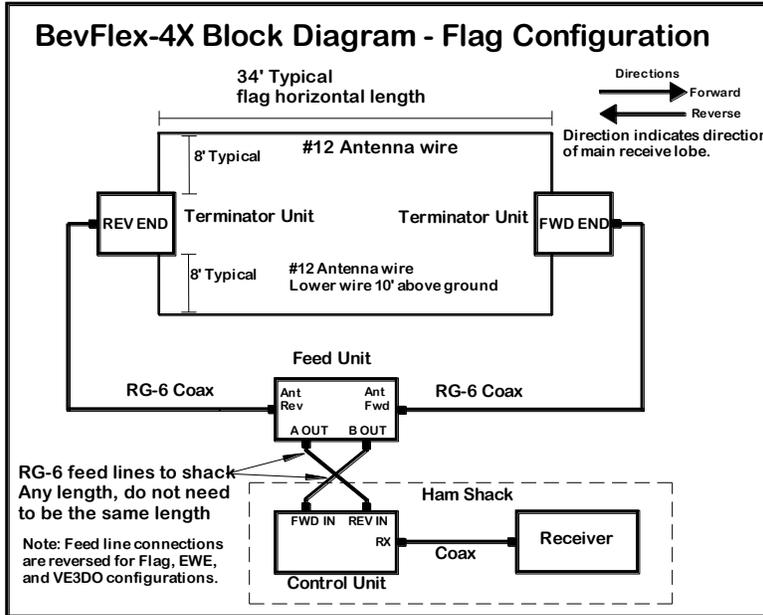


Terminator Connection	Connection Point
Wire Terminal 1	Ground rod
Wire Terminal 2	Antenna wire

Flag

The Flag antenna style is like the EWE except an elevated wire closes the loop instead of the ground as in the EWE. The Terminator mounting locations are in the center of the vertical wire sections.

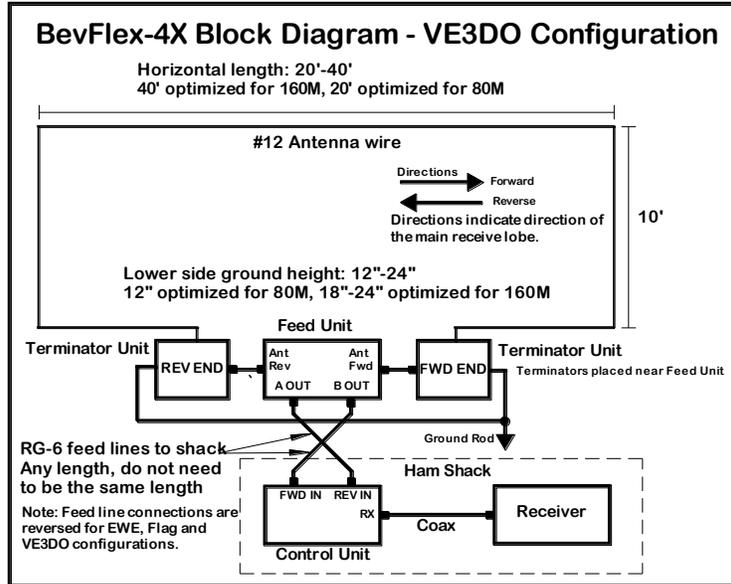
The Terminators must be configured for the EWE/Flag settings. See the section on Terminator Configuration to set the jumpers. Also, note that the connections between the Feed and Switch Units are reversed compared to the Beverage/BOG connections.



Terminator Connection	Connection Point
Wire Terminal 1	Ground rod
Wire Terminal 2	Antenna wire

VE3DO

The VE3DO is similar in form to a Flag antenna but uses shorter supports. The Terminators are placed at the center of the bottom wire element near the ground. The Terminator jumpers must be configured to the Beverage/BOG setting. This is the factory default setting. See the section on Terminator Configuration to set the jumpers.



Terminator Connection	Connection Point
Wire Terminal 1	Ground rod
Wire Terminal 2	Antenna wire

Terminator Configuration

The Terminator uses internal jumpers to select taps on the impedance transformer to match the impedance of the antenna type you are building. The factory default setting is for Beverage/BOG/VE3DO configurations. You will need to change them if you are building a Flag or EWE version.

Antenna Type	G1 Jumpers	G2 Jumpers
Beverage/BOG/VE3DO	2-3	1-2
EWE/Flag	1-2	2-3

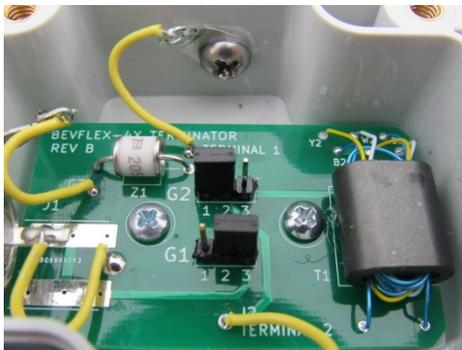


Figure 3. Bev/BOG/VE3DO Jumper Configuration



Figure 4. EWE/Flag Jumper Configuration

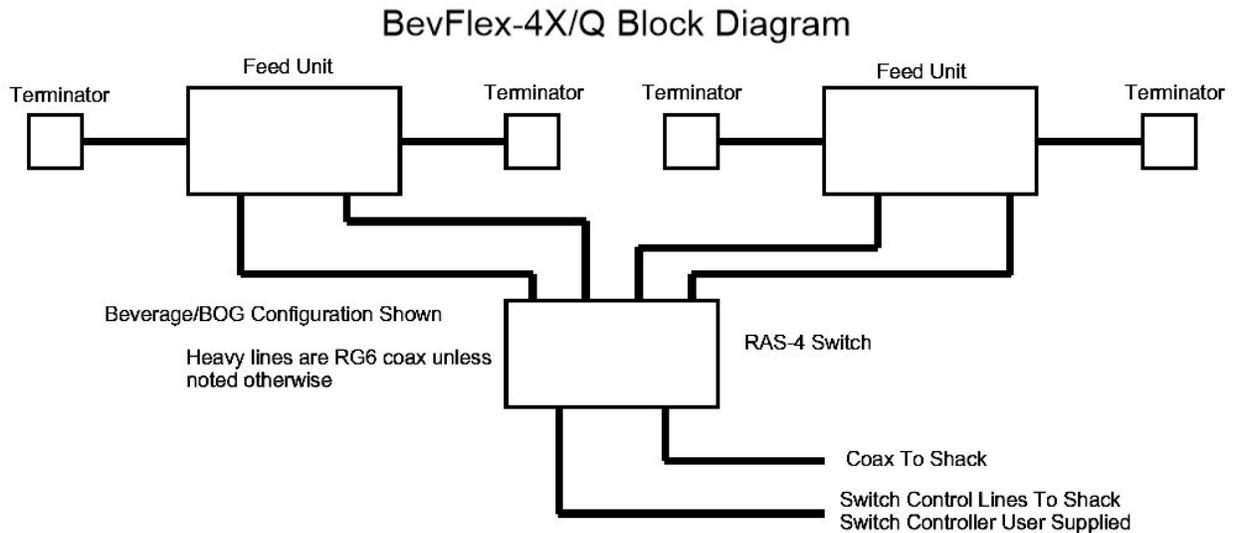
If you are unsure of a Terminator configuration, you can test it with an ohm meter without opening the case. Check the resistance between the F connector threaded barrel (shield) and one of the Screw Wire Terminals. If it shows a low DC resistance, the unit is configured for Beverage/BOG and VE3DO type antennas.

Be sure to put the cover on the proper way after changing the jumper configuration. The bottom of the label goes to the F connector side.

BevFlex-4X/Q Configuration

The BevFlex-4X/Q system consists of two sets of Terminator and Feed Units along with an RAS-4 remote antenna switch. The RAS-4 replaces two shack located Switch Units. This results in a single RG6 coax and control cable back to the shack. The RAS-4 provides proper termination of unselected coax cables for BevFlex-4X operation.

The following block diagram shows the configuration of a BevFlex-4X/Q system with a pair of Beverages or BOG antennas. Normally they would be deployed at right angles to provide enhanced reception in all four quadrants. The system can also be configured with Flag, EWE, or VE3DO antennas. Provide as much spacing as possible with these antenna types as they can interact with each other. The BevFlex-4X/Q system does not have to use the same antenna type on both legs. You could, for example, combine a BOG and EWE antenna.



Because BevFlex-4X Beverage and BOG antennas can be fed at any point along the antenna, you will want to mount the Feed Units and RAS-4 switch at the point the antennas are closest together to minimize the amount of coax needed for installation. Often the antennas will cross. Try to provide at least one foot spacing between the Beverage or BOG cross over points.

Note that a controller switch to the RAS-4 is not included. You can use many commercial switches or home brew your own. Refer to the RAS-4 User's Manual for more information.

Additional Information

Warranty

The BevFlex-4X is warranted for parts and workmanship for a period of one year from the time of purchase. Unified Microsystems will repair or replace failed units at its discretion. Physical or lightning damage is not covered under warranty.

Unified Microsystems may make changes to the design or specifications without notice.

Support

Support for Unified Microsystems products is available by email. w9xt@unifiedmicro.com Include the product name (BevFlex-4X) in the subject line to prevent your message from being lost in the spam.

Disclaimer

Installing antennas can be dangerous. Use caution when installing your BevFlex-4X antenna system. Stay away from power lines. Unified Microsystems is not responsible for injuries sustained while installing its products.

Always disconnect your BevFlex-4X antenna and all other antennas when not operating to prevent lightning damage. Unified Microsystems is not responsible for injuries or equipment damage due to improper installation, lightning or similar events.

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