SteppIR™

Yagi ● Dipole ● Vertical

(Patent Pending)

BiggIR Vertical Instruction Manual

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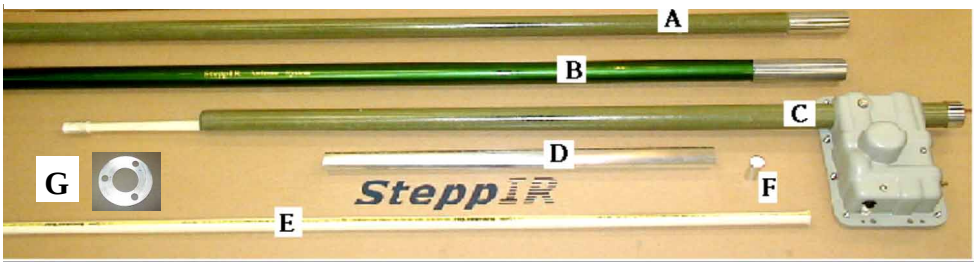
Installing the BiggIR Vertical



A: Extension EST
B: 25' Telescoping Fiberglass Pole
C: Antenna Housing with EST
D: 24" x 1.5" OD Aluminum Mounting Tube
E: Diverter Extension
F: Rain / Vent Cap
G: Guy Ring

Lay the antenna housing and element support tube (EST) flat on it's side (figure 1). There will be a 3/4" diameter piece of plastic pipe protruding out the end of the EST with a coupler attached to it (figure 2). Firmly insert the 56" section of 3/4" diameter plastic pipe (component E, in above picture) as shown in figure 2 and figure 3. The flared end of the tubing should be pointing away from the antenna housing. You will now want to slide the second section of the EST tube (Component A in above picture) firmly onto the first section of the EST tube, as shown in figure 4 and figure 5. Be certain that the coupler on the extension EST firmly bottoms out. Firmly wrap the joint with electrical tape and vulcanize with the silicone tape as shown in figure 5a and 5b. It is not necessary to do this if you will be guying the antenna, because the downward tension created by the guy wires will "lock" the BiggIR in place. *In order to achieve the factory rated wind load of 80 mph, three guy wires (or ropes) are required (figure 21). Without the guy wires, the antenna is rated at 60 mph maximum wind load.*

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 5a

Figure 5b

The diverter extension will protrude out of the second section of the EST as shown in figure 6. Also shown in figure 6 is the guy ring. There is a shoulder on the coupler that is attached to the telescoping pole. Slide the guy ring onto this shoulder (figure 7). Slide the butt end of the telescoping fiberglass pole over the EST tube until it firmly bottoms out as shown in figure 8. Firmly wrap the joint with electrical tape and vulcanize with the silicone tape as shown in figure 8b and 8c. It is not necessary to tape the joints if you will be guying the antenna, because the downward tension created by the guy wires will "lock" the BiggIR in place.

Figure 6

Figure 7

Figure 8

Figure 8b

Figure 8c

STEP 7: **Telescope the fiberglass tube by pulling each joint out firmly, until securely locked in place and fully extended.** When fully extended, the pole must be a minimum of 24' 8" (296 inches) in length when measured from the butt end of the pole to the tip. Attach one #16 stainless reinforcing clamp at the tip of the second section of the telescoping pole, leaving approximately 1/2" from the edge (fig 9). Figure 10 shows the two clamps together (the sections are telescoped out, so you have to look closely for the 2nd section reinforcing clamp in the picture). Starting at the 1/2" area to the right of each clamp, firmly wrap the black 3M tape around each side of the joint, first wrapping in half wraps to the right, and then overlapping in half wraps to the left. Be sure to pay close attention to the actual joint, an extra wrap or two at the joint is always recommended (fig 11). Be sure to use plenty of electrical tape on each joint. Apply the silicone wrap to the left side of the reinforcing clamp, overlapping the clamp in the same manner as the electrical tape (fig 12). You will want to completely cover the 3M tape so that you will have a weatherproof seal. The silicone tape will not stick to any surface - it bonds only to itself. The wrap will immediately start to cure once contact is made, and will be fully cured within 24 hours. You can assist in the curing by using a hair dryer or heating element if desired. Be sure to firmly press or "rub" the wrap once it is applied, to ensure that the wrap is properly adhering to itself. On the remaining joints for the pole, you will not require a reinforcing clamp, but you will still need to wrap the black tape in the same manner, and cover it with silicone wrap (fig 13 and figure 14). You will use approximately 24"" of silicone wrap for the largest joint, 22" for the 2nd joint, 17" for the third and 11" of waterproofing for the smallest joint.

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

Figure 14

When you are finished taping and wrapping the joints, you will then want to install the aluminum vent fitting and foam plug on the tip of the telescoping tube. The purpose of the vent cap is to keep the rain out, yet still allow air flow through the foam plug into the telescoping tube. The foam plug will already be inside the vent cap. Position the vent cap so it bottoms out on the tip. With the cap positioned loosely on the tip, wrap 3 or 4 layers of tape flush with the bottom of the vent cap (approximately 1-5/8" from the tip) as shown in figure 15. This will center the cap when you push it down onto the tape (figure 16). You will want to push until the vent plug is half way bottomed out, so that it is centered on the tape, yet will still allow the foam to breathe. Using electrical tape, secure the cap to the tip of the pole, being careful not to block the vent holes on the bottom of the cap (figure 17). Weatherize the joint by applying silicone wrap over the electrical tap (fig 18)

Figure 15

Figure 16

Figure 17

Figure 18

The SteppIR vertical antenna comes with a 1.5" OD aluminum mounting post, 2 feet in length (component D in picture on page 2). If using guy wires, the SteppIR vertical can be mounted directly into the ground without concrete (the guy wires will "lock" the antenna in place) You will want to ensure that the mounting pole does not shift or settle over time, using concrete to secure it in the ground is a way to eliminate the potential for this problem. Position the mounting pole so that the bottom of the element housing is 6 inches above the ground (figure 20). After the mounting post is in place and level, you are ready to erect your SteppIR Vertical! In order to achieve the factory rated wind load of 80 mph, three guy wires (or ropes) are required (figure 21). Without the guy wires, the antenna is rated at 60 mph. Connect your guy wires to the guy ring before erecting the vertical, and then slide the small end of the included flexible connector to the mounting post. This coupler is used to keep the antenna from potentially "twisting" in high winds. Pick up the antenna at the base (figure 22) and slide the antenna housing onto the mounting pole (the end that is machined goes into the antenna housing tube), until it firmly bottoms out (figure 23). Place the larger end of the flexible coupler over the antenna housing tube (a small amount of bar soap or other lubricant will help the process). Tighten clamps on the coupler and secure the guy wires. Now you are ready to connect the radials! Figure 24 shows the lug on the antenna housing used for attaching your radial system We recommend using a lug connector at the end of your radials, and then tightening the lug onto the connector post shown in figure 24. If you purchased the optional radial kits, you will notice there are 4 wires per set, all soldered and crimped to a lug connector.

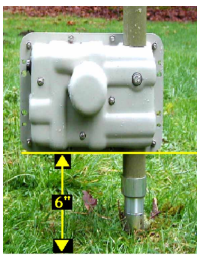


Figure. 20

Figure 21

Figure 22

Figure 23

Figure 24

Radial Systems for Elevated and Ground mounted Vertical Antennas

All vertical monopoles need some form of counterpoise in which antenna image currents flow to work efficiently. This counterpoise usually consists of a system of radial wires placed either on the ground or elevated above ground.

This is not an in depth publication but simply a general guide on installing and using the SteppIR verticals. There is much more information available in various publications if you need it. The ARRL Antenna Handbook is a good source for additional information.

By following a few simple guidelines, you can obtain excellent performance from vertical antennas mounted on the ground or elevated above the ground. There are a number of verticals available that say "no radials required", but they do have "radials", in the form of a shortened, tuned counterpoise system. As you might expect, you pay a price for such a small counterpoise system—less efficiency.

As you will see in the following pages, you can get fairly high efficiency with a relatively modest radial system that will far outperform small counterpoise systems. It should be noted that counterpoise systems are only good for curing near field losses caused by losses from the earth, which is a poor conductor of RF, even with good soil. There is nothing you can do about far field losses that reduce the signal strength and low angle radiation, except get to some saltwater. We briefly discuss salt water locations later on in this article.

Ground Mount or Elevate?

Ground Mounting:

PROS	CONS
• The radials can be any length and they work on all frequencies • Easy to mount • Easy access • Lower visual profile • Eight to twelve 0.1 wavelength radials gives 60% - 65% efficiency (one set of 8 - 12 radials cut to 0.1 wavelength at lowest frequency)	• Takes 120 radials to equal an elevated vertical with 2 resonant radials (90% efficient) • Surrounding objects can reduce signal strength

Elevated Mounting:

PROS	CONS
• + 90% efficient with two .25 wavelength radials • Antenna is generally more "in the clear", so surrounding objects don't cause as much attenuation • A peaked metal roof will make a very good all-frequency radial system	• Requires two .25 wavelength radials for each band of operation (radials interact, so spacing will affect length) • Mounting is generally more involved • Visually higher profile • Must be mounted high enough that people won't walk into it • Needs to be about .2 wavelengths high to get an ideal 50 ohm match • Radials need at least a 20° slope to get a good match • Involves adjusting and fine tuning the radial lengths in some cases

Ground Mounting:

If you chose to ground mount the vertical, pick a spot that will allow you the best chance of spreading your radials evenly around the antenna, and away from trees and other objects if possible. Mount the antenna within one foot of ground if possible, the closer to ground the better. Next, you will need to determine how much effort and wire you are willing to invest in this installation. The tradeoffs are as follows:

1. More radials equals higher efficiency (see figure 1)
2. More short radials are generally better than a few long ones
3. If only a few radials are going to be used, they need not be very long
4. If you have very good earth (very few of us actually do), you can obtain good performance with very few radials.

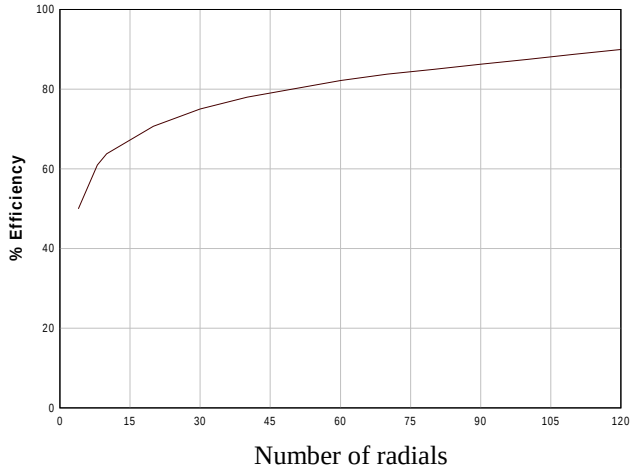


Figure 1

Four radials are what we consider to be the absolute minimum in average soil. How much you have to gain with good a radial system depends on how good your earth is. Most of us have poor earth conditions, so the radial system is important. The worse the earth is, the more can be gained with radials. Figure 2 shows a graph produced by Brian Edward (N2MF) that illustrates the relative signal gain you get with the radials and varying length over poor earth. With better earth, the gain difference between 4 radials and 120 radials will be about 2.5 dB, as opposed to 4 dB with poor earth.

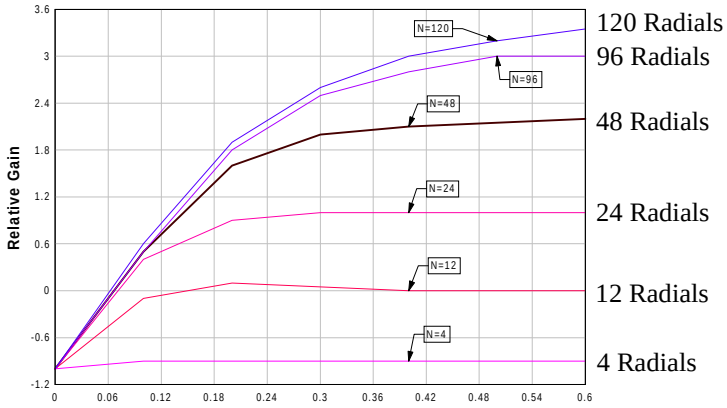


Figure 2

If you are restricted to .1 wavelength radials there is not much advantage to using more than about 24 radials. You can see from figure 3 that if more radials are used there is a huge advantage to making them longer.

If you cannot lay the radials out in a symmetrical radial pattern, don't worry too much - it will distort your omni-directional pattern a bit but won't reduce your efficiency very much. Lay the radials out in the best manner possible given your situation. There are various ways to accomplish laying a radial system, including turning corners, etc. Good results are limited only to your creative energy and determination! Be aware that very high voltages can exist at the ends of radials, so be certain that no one can come into contact with them. It is a good idea to use insulated wire to protect from corrosion, and don't bury the radials any deeper than necessary, one to three inches is sufficient.

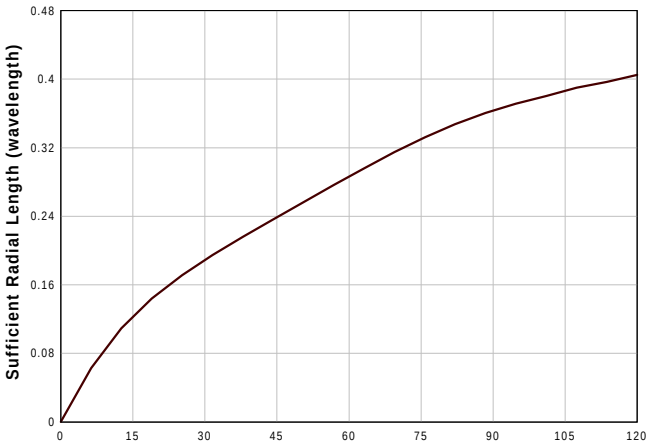


Figure 3

Elevated Mounting:

You can elevate a vertical just a few feet from the ground (4 feet for 20m, 8 feet for 40m) and get fairly good performance with just 2 radials (elevated as well) per band of operation. The problem is you won't have a very good match to 50 ohms, and the close proximity of the earth will degrade the signal - especially if it is poor earth. For ideal matching, we recommend .2 wavelength (about 15 feet on 20m and 30 feet on 40m) at the lowest planned frequency of operation As the height decreases below .2 wavelength, the ground losses start to increase, unless you have very good ground. When a vertical is raised off the ground the impedance drops fairly rapidly from 36 ohms (Over perfect ground or with many radials it will be close to 36 ohms, over real ground it is generally 40–60 ohms) to about 22 ohms when .3 wavelength is reached. This would make a pretty poor match to 50 ohms, so a couple of tricks are in order. Once you elevate a vertical, two radials are all you really need. It is important that you try to keep a 180° angle between the two (opposed, directly in line) for the best pattern. Spread the radials out as far as possible to reduce interaction, if they are less than a foot apart it can be difficult to get a good match on all bands. To facilitate a match to 50 ohms you can angle the radials downward, this raises the impedance of the antenna as you increase the angle downward. Figure 4 shows the approximate relationship of radial angle to impedance:

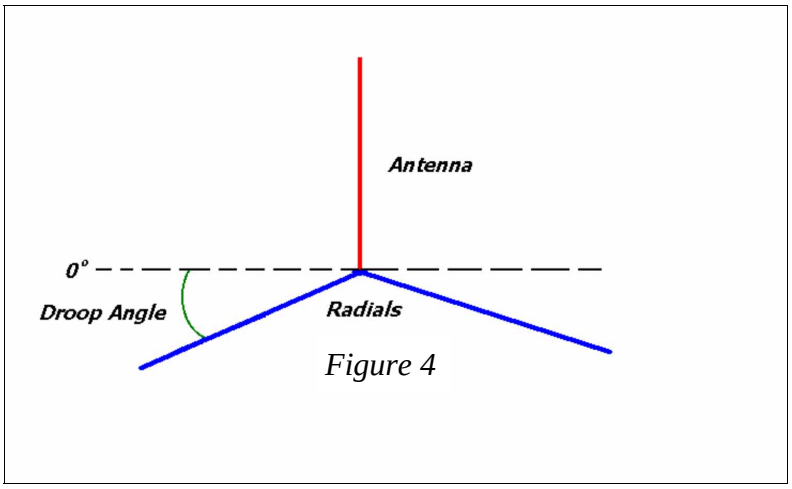


Figure 4

Radial Droop Angle	=	Antenna Impedance
0°	=	22 Ohms
10°	=	28 ohms
20°	=	35 ohms
30°	=	47 ohms
40°	=	53 ohms
50°	=	55 ohms

Note: above 50° results in diminishing returns

Elevated Mounting (continued)

Can't get enough droop angle to achieve a good match? Simply adjust the antenna element slightly longer than the factory 1/4 wavelength (up to 20% longer) settings and the impedance will rise. This will cause the radials to be too long, so they may need to be pruned a bit. Be aware that increasing the antenna 2% to 3% longer may require radials to be 5% to 7% shorter. Once you have a good match, replace the factory default values by saving the new antenna (to do this you will use the "create, modify" feature in the setup mode).

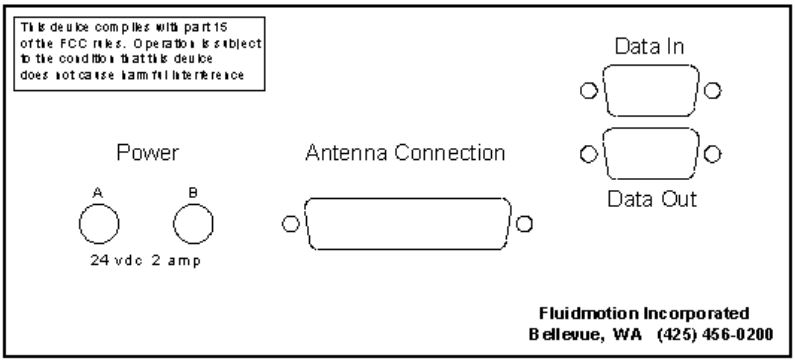
When the vertical is elevated you can get away with just one resonant radial, however, the pattern won't be omni-directional. You will have -12 dB to 15 dB null in one direction

Using a Vertical in on or Near Salt Water:

If you are lucky enough to have a dock over salt water, a vertical can offer unparalleled performance for low angle DX. Simply mount the vertical to the dock and attach two radials for band of operation. They can be stapled right to the dock if it is non-metallic. Mounting the vertical in ground flooded by salt water a couple of times per day can be equally effective. Proximity to the ocean improves the far field loss of a vertical and allows very low angle radiation - get as close to the water as possible to enhance performance.

Due to the fact that RF does not penetrate more than 2 inches into the water, direct coupling (a wire in the water) is difficult. Objects like metal floats or boats, providing they are large enough, can make good grounds in salt water. If you are using a metal boat or large metal object, corrosion is no longer a problem because the large surface capacitively couples to the water. When using a small metal float (3 ft x 3 ft is just enough to "connect" to salt water), you want to be certain that the metal does not corrode over time. For long term immersion, Monel is a good (but fairly expensive) choice.

Connecting the controller to the antenna



On the back of your controller, there are two power connections: primary, and AUX. You can use either one of these to connect the included 24 volt power supply cord. The AUX is intended for use with 4 antenna elements or more.

Once you have connected the power cord to the controller and plugged the other end of the cord into the power outlet (the universal power supply can accept 100 - 240 volts AC), you will want to turn the controller on by pushing the on/off button located on the front of the controller. It is advisable that you do not hook the antenna control cable to the controller when turning the unit on for the first time, so that you can be certain that the controller display reads “elements retracted”. If it the LCD display does not say this, you will want to refer to “retracting the elements” on page 17. When the display reads “Elements Retracted”, you can then hook the control cable up to the back of the controller. This is accomplished by mating the 25 pin male connector on the cable to the 25 pin female connector in the middle of the back panel of the controller.

Also on the back of the controller, are two ports - “Data In” and “Data Out”. If you have purchased the transceiver interface option, there will be two 9 pin d-sub male connectors in the ports. If you have not purchased the interface, there will be plastic covers over the ports. For more information on the transceiver interface refer to page 14

Using the BiggIR controller

Using the BiggIR Controller - Modes of Operation

There are three modes of operation with the SteppIR controller: Amateur, General Frequency and Setup. To access any of these modes, press the “mode” button, located at the bottom right corner of your controller front panel. The mode button is a 3 position toggle, each time you press the button, the controller will change to the next mode, and the respective LED will light up adjacent to the mode description. It is important that you click on the “select” button within 2-1/2 seconds after arriving at the desired mode. If you do not, the controller will default back to the last mode you were at. The select button is located just to the right of the mode button.

Amateur Mode:

When in the amateur mode, to tune through the bands you simply press the desired band button, and the controller will simultaneously adjust the length of the element to that segment. To tune the antenna from this point, you simply press either the up or down button, and the antenna will tune 50 KHz per click. When in the amateur or general frequency mode, whenever the antenna is adjusting an asterisk will flash. When the antenna has finished adjusting, the asterisk will disappear. It is important that you do not transmit while the antenna is tuning if you are operating with more than 200 watts.

General Frequency Mode:

There are three purposes for the general frequency mode:

For manual operation, it allows you to scroll through the bands quicker - each time you manually press the up / down arrows the controller will tune 100 KHz, as opposed to 50 KHz per click in amateur mode. When you continuously press the up / down button without releasing it, after a few seconds the tuning adjustment will ramp up to a faster speed, tuning at the rate of 1 MHz at a time.

If you have purchased the transceiver interface option for your BiggIR, you will need to be in the general frequency mode in order for it to function. Refer to the transceiver interface section on page 14 for more information.

In general frequency mode, you can save up to 6 frequencies to memory. Simply adjust to the desired frequency, then hold one of the band buttons down until it starts blinking, and then release the button. The new frequency has now been saved into memory.

Setup Mode:

The setup mode is the mode you use when you want to set up or change certain features of the controller. When you first enter setup, the screen will say “mode key to exit , up / dn to scroll”. “Mode key to exit” means that if you want to exit back to either the amateur or general frequency mode from this point, you would simply press the mode button once and you would exit. “Up / dn to scroll” means that if you press either the up button or the down button, the controller will scroll through the setup menu. Once you get to the desired menu, you press the select button to “enter” that menu item. Each function in the setup mode is explained in detail on the following pages.

Factory Default

When your controller is sent to you, it has 8 factory default antenna lengths in it for the forward direction antenna. These are the antenna lengths that we have computer modeled and field tested - and stored into the memory of your controller. At any point, you can change the lengths of these antennas, and save them to memory (for more information on creating or modifying antennas, refer to the "create modify" menu on page 16. When you save the new antennas, you are replacing the old factory defaults with your new antenna lengths. At some point, you may decide that you want those factory antenna lengths back. This is what the "factory default" section is for. You can restore the factory default for a specific antenna segment, or you can completely restore all of the factory defaults at once.

If you want to restore the factory default on a single antenna segment, first you will want to go to that segment in either the amateur mode or the general frequency mode. For example: Let's say you had previously replaced the antenna segment 14.200 with a new antenna length. Now you have decided that you want to restore the factory default antenna that was originally in that segment. To do this, first you would go to the 14.200 antenna segment while the controller was in the amateur mode. You would leave the antenna at this position, and then proceed to the "factory default" menu in the setup mode.

When you first enter setup mode, you will see "mode key to exit, up / dn to scroll" on the LCD screen. Press the up button once, and it will take you to "factory default". Press the select button to enter into this menu. The second line of the LCD screen will say "Current ? YES NO", and the NO will be blinking. The controller is asking you if you want to revert back to the factory default for the current antenna segment you are on (in our example, 14.200). Entering YES gives you back the original antenna lengths that came with the controller for that segment. To enter YES, you simply press the up or down button, and YES will start flashing. Press the select button, the factory default has been restored *for that single antenna segment*. If you select NO, the screen will then say "All Ant YES NO", with the NO blinking. The controller is asking you if you want to replace all of the antenna segments that are now saved in the controller memory with the original factory default lengths. To do so, press either the up or down button once, and the YES button will now be flashing. Press the select button, and now every one of the factory default antennas has been restored. If you decide not to restore the defaults, you would press NO, and you would be taken back to the setup "factory default" main menu. From there, you can either use the up / dn arrows to further scroll through the setup menu, or you could press the mode button to go back to amateur or general frequency mode.

Transceiver Interface

This menu item is used if you have purchased the optional transceiver interface. To use the transceiver interface, you need to have a rig that has computer interfacing capability. Rigs with these options were primarily manufactured from 1990 on. When enabled, the transceiver interface on the SteppIR controller will "listen" to your rig, and will automatically re-adjust every 50 KHz as you tune through the bands.

The following are radios that we know will work with our transceiver interface module. New radios are added periodically. Note: If you do not see your rig here, that does not necessarily mean the interface will not work. If your rig has an interface, call the factory to be certain whether the interface will work with our controller.

Transceiver Interface (continued)

Icom: All radios that have a CI-V port; 706, 746, 746 PRO, 756, 756 PRO, 756 PROII, 765, 775, 781
Kenwood: TS50, TS570, TS570G, TS850, TS870, TS950SD, TS950SDX, TS2000
Yaesu: FT-847, FT1000D, FT1000MP, FT1000MP Mark V
Ten-Tec: Omni VI, Omni VI Plus; These radios emulate ICOM protocal
SGC: Some of their rigs emulate Kenwood TS-570; these will work with the SteppIR transceiver interface

If you have the transceiver interface option, your controller will come with an interface cable, which has a 9 pin d-sub connector on one end that hooks up to the "Data In" port on the back of the controller. The other end will go to your rigs interface. The transceiver interface option will work with any of the above rigs listed, but the cable connections vary in type depending on the radio manufacturer. We also can supply a wye cable that allows the user to run a logging program concurrently with the SteppIR controller.

Icom uses a mini phono plug connection for their CI-V ports, Yaesu has a 9 pin D sub connection. The newer Kenwood radios use 9 pin D sub connectors, the older Kenwood radios use 6 pin DIN connectors. If you want to use the SteppIR interface with different rigs, you may require additional interface cables, which are available for purchase from SteppIR Antennas.

When you first enter setup mode, you will see "mode key to exit, up / dn to scroll" on the LCD screen. Press the up button twice, and it will take you to "Transceiver Setup, up / dn to scroll". To enter, press the select button. A new screen will appear saying "Baud Mode Done" with DONE flashing.

The baud rate is the speed in which information is exchanged between the SteppIR controller and your radio. This setting must be the same as the setting in your radio, or the interface will not function. To set the baud rate, press the up or down arrow until BAUD is flashing, and then press the select button. You can then use the up or down arrows to adjust to the proper setting. If you are not sure what this setting is, refer to the users manual for your radio. When the proper baud rate is showing, press the select button. BAUD will now be flashing again.

Now you will want to set up the mode, which is the radio type you will be using. The radios to choose from are: Icom, Kenwood, Yaesu FT847, 1000D, 1000MP and OFF. Press the up or down arrow until MODE is flashing and then press the select button. Now you can use the up or down arrow to scroll through until the proper mode selection is visible. Press the select button, and MODE will be flashing again. To save these settings, use the up or down arrow until DONE is flashing again, and press the select button. The controller will ask you if you want to save these settings, and NO will be flashing. If you do not want to save your changes, press the select button while NO is flashing. If you do want to save them, press select while YES is flashing. YOU MUST NOW TURN THE CONTROLLER OFF AND THEN TURN THE CONTROLLER BACK ON AGAIN BEFORE THE SETUP WILL TAKE PLACE. Once this is done, press the mode button until the "general frequency" LED is lit, and then press select within 2-1/2 seconds. When you tune your rig, the SteppIR controller should now automatically re-adjust every 50 KHz.

Create, Modify

The create, modify menu allows you to change the length of the BiggIR for any antenna segment. In the case of the vertical antenna, the "driven" element is the only one you will need to be concerned with. You can use this feature to try out your own antenna designs, or to "tune out" potential objects that are causing interaction or SWR problems with your antenna. This feature is especially good for those of you who experiment with modeling programs such as EZ-NEC or YO PRO. Computer modeling has dramatically simplified antenna design. With this technology (many modeling programs are available on the internet) the average ham can create his/her own antennas and have a very accurate idea as to what kind of performance to expect *before* the antenna is built. While modeling has been a great help, in the past, when the modeling was done you still would have to go outside and make the necessary modifications in length for every single antenna design, which could be quite cumbersome and time consuming. With the SteppIR adjustable antenna, we have advanced antenna design technology one step further - now you can model *and build* as many different antennas you want, without ever leaving your ham shack! Remember, however, that modeling programs output the electrical length of the element - not the physical length. Our controller indicates the physical length of the element. The electrical length is from 2% to 3.5% longer due to conductor diameter, mounting hardware and dielectric loading from the telescoping fiberglass support poles. We have this data accounted for, and programmed into the factory default antenna length. If you are doing some serious modeling, call or email us at the factory and we can give you more data on electrical lengths.

When you are finished changing the respective lengths, you can save the new antenna to memory, overriding the factory default antenna segments. If at any point you want to restore the factory default antennas, you can do so by going to the "Factory Default" menu in setup, which allows you to easily restore either a single antenna segment, or every one of them if necessary.

When changing an antenna length, the first thing you will need to do is go to the antenna segment you want to change, whether you are in amateur mode or general frequency mode. When you are at the antenna segment you wish to change, you can press 3 buttons simultaneously (up arrow, down arrow and select button) and you will immediately enter the create modify mode. All you have to do from here is use the up / down arrows to reach the desired length, and press select. From there, use the up / down buttons to scroll to DONE, and press select. Select yes or no, and you are done! Or, you can go to the setup mode, and from there to the create, modify menu. To enter, press the select button. A new screen will appear saying "DIR DVR REF DONE" with DVR flashing. For the BiggIR, only the DVR (driven element) is of any consequence, since there is only one element on this antenna. To change the antenna length for this segment, press the select button. Now the display will say Up Dn to adjust, which means use the up or down arrows to adjust the length of the driven element to your desired length. Individual clicks will change the length 0.1" at a time, and if you hold the button down, after a few seconds the controller will ramp up to a higher speed. Once you have reached the desired length, press the select button. DVR will be flashing again, with the new length shown on the second line of the LCD screen. If this is the desired length, press the up / down arrow until DONE is flashing again, and press the select button. The screen will read "SAVE? YES NO, with NO flashing. Use the up / down button to choose the proper choice and press the select button. If you selected yes, the new lengths will be saved into memory for the antenna segment you are currently on. If you select no, no changes will be made, your antenna segment will be just as it was before. Remember, if you ever need to restore the factory defaults, this can be easily accomplished. Refer to the "factory default" instructions for more information.

Calibrate

Calibrating the antenna ensures that the element lengths are exactly what the controller display says they are. Usually, the only way the antenna can get out of calibration is if the power is interrupted or the cable is somehow disconnected while the antenna is changing length. The controller doesn't "know" where the antenna is adjusted to unless you start at a known place. The antenna housing sent to you has the element retracted inside, and the controller is set to "elements retracted". If you power up the controller and it says "elements retracted", and you connect the antenna control cable with the elements physically retracted, you are "calibrated" and ready to go!

If you need to calibrate, it is a simple, two click operation. When you select calibrate, the antenna will retract all of the elements, and the stepper motor will continue to over-step for a few moments after the elements have retracted. In doing this, the controller is making sure that there is not a shadow of a doubt that each element is fully retracted, and back to the known starting point. When calibrating, you will hear a buzzing noise for about 30 seconds, this is normal. When calibration is finished, the antenna will go to the last segment you were on when you started the calibration process. Then entire process takes less than a minute. Whenever your antenna is not acting as it should, we highly recommend that you use the calibrate function before exploring other potential problems. Always calibrate when in doubt—it is easy, and doesn't hurt a thing!

When you first enter setup mode, you will see "mode key to exit, up / dn to scroll" on the LCD screen. Press the up button four times, and it will take you to "Calibrate, up / dn to scroll". To enter, press the select button. A new screen will appear saying "Calibrate YES NO", with NO flashing. To calibrate the antenna, press the up or down button until YES is flashing, and then press the select button. The screen will now say "Calibrate" with the second line saying "Homing Elements". You will notice that the asterisk will be flashing the entire time the antenna is calibrating. When the controller is done calibrating the antenna, the screen will then show the last antenna segment you were on, with the asterisk still flashing to show that the controller is now adjusting the antenna to the last segment you were on before you calibrated. When the asterisk quits flashing and disappears, calibration is complete and you are ready to go!

Retract Elements

If you ever plan on taking your antenna down, you will first need to retract the elements. In addition, if you want to protect your antenna during periods of non-use, or during lightning storms or harsh winter conditions, you can use the retract element feature for this as well. Many of our customers have retracted their elements during lightning storms, significantly reducing the conductive area of the antenna platform. In ice storms, SteppIR users have also been able to retract their elements, greatly reducing the potential for loss in case of a catastrophic failure. When you retract the elements, the copper beryllium conductive strip is "safe and sound" inside the antenna housing, leaving only the telescoping fiberglass poles. These poles are easy to replace and reasonable in price ($20 each for SteppIR owners), so even if you damage the telescoping fiberglass support elements, the most valuable part of the antenna will be safe!

Retract Elements (continued)

When you first enter setup mode, you will see “mode key to exit, up / dn to scroll” on the LCD screen. Press the up button five times, and it will take you to “Retract Elements, up / dn to scroll”. To enter, press the select button. A new screen will appear saying “Home Now? YES NO, with NO flashing. The controller is asking you if you want to send the elements “home”, which means retracting the elements. To retract the antenna, press the up or down button once, and YES will start flashing. Press the select button, the display will say “Home Now? / Homing Elements”. The asterisk will be flashing, this means that the antenna is retracting, when the asterisk disappears, the new message will read “Element Retracted”. Your antenna is now safely inside the antenna housings. When you want to put the antenna back on the air, simply press the antenna segment you desire, and the controller will adjust to that segment.

3/4 Wavelength mode

This feature allows you to switch your vertical antenna from the standard 1/4 wavelength to a 3/4 wavelength vertical. A 3/4 wave vertical antenna has a 4 dB advantage over a 1/4 wave vertical, and some higher angle energy. We have provided this mode to give you the flexibility of trying both ways when the going gets tough. This feature only works from 21.000 MHz through 54 MHz. When no LED is lit, you are in normal, or 1/4 wavelength mode. When the LED is lit, you are now in 3/4 wavelength mode.

Using the SteppIR controller with your logging program

Logging programs fall into two groups; programs with manual rig control (like TRX-Manager), which allow you to control the radio from the computer, and programs that are focused on logging, with the ability to set the rig to the correct frequency through a spot (like DX Base). The first type of programs poll the radio continuously to get the frequency. These programs work with the SteppIR by using a "Y" cable to link the computers receive data together with the SteppIR's receive data. This way, when the logging program request the radio data, the SteppIR controller also receives a response. There will be a slight delay depending on how fast you have the polling set in the software. The only caveat is that the logging program must be active on the computer for the SteppIR controller to follow the frequency.

The programs that are designed to strictly do "spots" will only be recognized by the SteppIR controller when a spot is selected. Some of these logging programs can be linked to TRX-Manager to get the benefits of both programs. Most of the logging programs, such as Logger, Log Windows and TRX-Manager, send the spot frequency information to the radio and then ask the radio if it got the frequency information OK. The SteppIR controller can only listen to the radio data, not the logging program data, therefore those logging programs that send spot data and do not query the radio (such as Logic 6 and DX-Base) will not work with the SteppIR controller. However, these programs will work if used in conjunction with TRX-Manager.

Icom

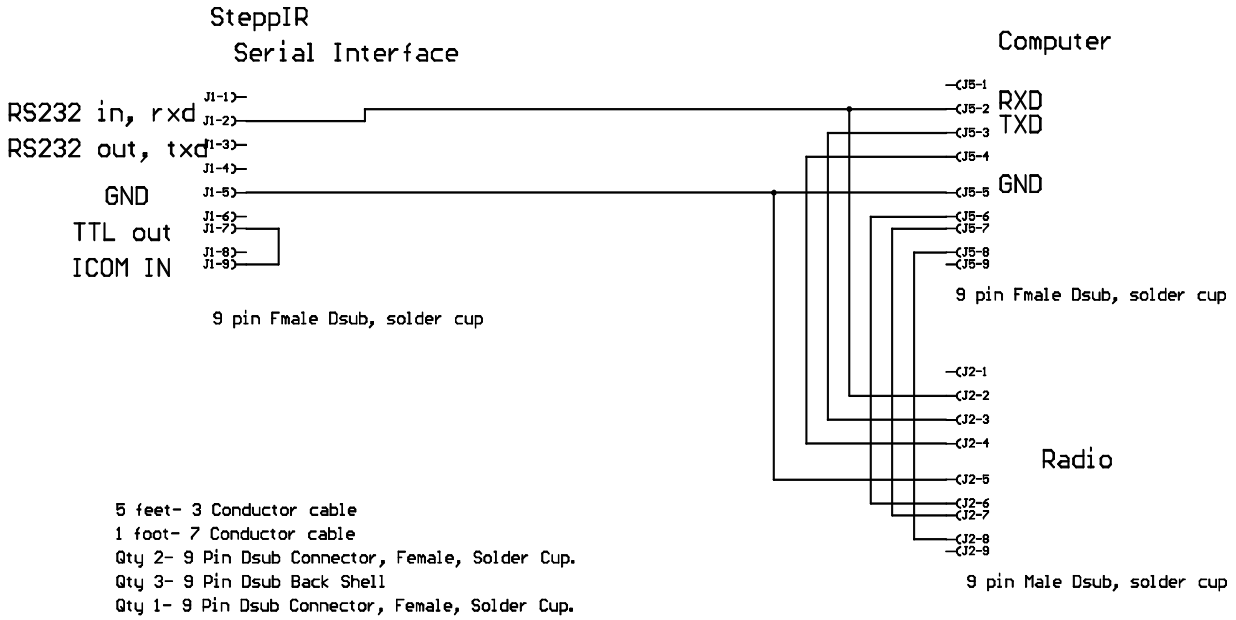
The Icom is unique in that it has no conflicts when using logging programs of any type with the SteppIR controller. This is because the Icom uses a shared serial Buss (CI-V) that can have up to 5 devices connected to it. The SteppIR controller connects to this Buss through a 3.5 mm phono plug. If you are using the Icom CT-17 to interface to your PC, it already has 5 C-IV connectors that the SteppIR can be plugged into. Otherwise, you can simply parallel the SteppIR controller and the radio by using a simple "Y" connector available at Radioshack.™ The part number for this connector is #274-889.

Radio Shack #274-889 Gold Y Adapter for use with Icom radios

Kenwood and Yaesu

If you are using a Kenwood or Yaesu radio, you will not be able to use the Radioshack™ connector mentioned above. You must use a "Y" cable, which is available from SteppIR Antennas, or you can build it yourself by referring to the drawing on page 20.

Note:
Assemble Cable Following Schmatic.



5 feet- 3 Conductor cable
1 foot- 7 Conductor cable
Qty 2- 9 Pin Dsub Connector, Female, Solder Cup.
Qty 3- 9 Pin Dsub Back Shell
Qty 1- 9 Pin Dsub Connector, Female, Solder Cup.

Used for Connecting the Steppir to a Computer when using a loging program

FLUIDMOTION	
TITLE: 9Pin Y Cable	
Document Number:	REV:
Date: 8/17/2002 01:28:46p	Sheet: 1/1

TM

SteppIR

Yagi • Dipole

(Patent Pending)

Specifications	BiggIR	SmallIR
Weight	15 lb 6.8 kg	12 lb 5.44 kg
Max. wind surf. area	1.9 ft^2 0.17 m^2	1.0 ft^2 .09 m^2
Guyed wind survival (w/ 2 guys@ 8′)	80 MPH	100 MPH
Un-Guyed wind survival	60 mph	80 MPH
Element length	32 ft 9.75 m	18 ft 5.49 m
Maximum power	2000 W PEP	2000 W PEP
Frequency coverage MHz	6.9 -54.0	13.8 - 54
Cable Requirements	4 cond	4 cond
Tuning Rate	1.17 MHz / Second	1.17 MHz / Second
Radial System Required?	YES	YES
Feed Type	End fed	End fed
Wavelength	1/4 - 3/4*	1/4 - 3/4*

* Can be used as a 3/4 wavelength antenna on certain bands

Operation Reminder:

When operating with 200 watts or more, do not transmit while the antenna is changing bands or damage could occur in the antenna housing.

Fluidmotion Incorporated

SteppIR™

Limited Warranty

These products have a limited warranty against manufacturer's defects in materials or construction for two (2) years from date of sale. Do not modify this product or change physical construction without the written permission of Fluidmotion Incorporated. This limited warranty is automatically void if improper selection, installation, unauthorized modifications or physical abuse beyond the manufacturer's control has occurred. Manufacturer's responsibility is strictly limited to repair or replacement of defective components. The manufacturer assumes no further liability.

Safe Handling of Copper Beryllium

Handling copper beryllium in solid form poses no special health risk. When sanding or grinding, avoid inhalation or contact with dust or vapors. Wash hands with soap and warm water after handling. For more information about copper beryllium, please contact:

Brush Wellman Engineered Materials
800-321-2076

StepIR™

Yagi ● Dipole ● Vertical

(Patent Pending)

SmallIR Addendum

The SmallIR is much easier to assemble than the BiggIR so we have not made a separate SmallIR manual. The information in the BiggIR manual applies to the SmallIR in every area except the actual assembly. On the SmallIR you do not have the following:

1. **Extension EST**
2. **25' Telescoping Fiberglass Pole (it is 18')**
3. **Diverter extension**
4. **Guy ring**

With the SmallIR you simply prepare the telescoping fiberglass pole and place the rain cap on the end of the tube, just as the manual shows. The fiberglass pole is then inserted into the EST tube on the antenna housing and secured with the provided PVC quick disconnect clamp with the two stainless steel clamps. Tighten the clamps securely to prevent water from getting into the antenna housing. Be careful, you can strip the clamps if you get overzealous. The rest of the manual applies to both verticals, with the exception of the 3/4 wave option—the SmallIR only works in the 3/4 wave mode on 6 meters.

SteppIR™

Yagi ● Dipole ● Vertical

(Patent Pending)

SteppIR Antennas

Web: www.steppir.com