

SDA 100 Controller Operators Manual



WARNINGS

The controller has voltage present on the control cable wires, even when the power button has been pushed to “Off”. Unplug the power supply and disconnect the 25-pin D-sub connector before making any connections or cutting or splicing the cable wires. If the controller has power and the control cable wires short out, this will damage the driver chips inside the controller.

We **HIGHLY** recommend that you ground the chassis of the controller to your station ground.

When operating with over 200 watts, it is important that you do not transmit while the antenna is adjusting.

CONNECTING CONTROLLER

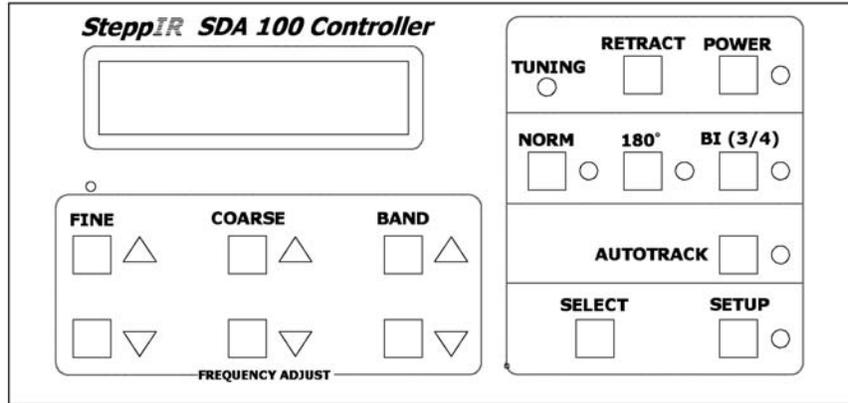
Once you have connected the power cord to the controller and plugged the other end of the cord into the power outlet (the universal power supply can accept 100 - 240 volts AC, 50-60Hz), turn on the controller and then check that the screen display shows “Manual Mode, Elements Home”. If it does not display that then go to page 16 and retract elements. Then disconnect the power plug and then plug the 25 pin control cable connector to the mating connector on the back of the controller. Plug in the power plug to the controller then turn on the controller. It is then advisable to perform a “Calibrate” function before using the antenna for the first time. This ensures the controller is in sync with the antenna.

If the control cable connector comes loose at any time while the antenna is moving the calibrate function will need to be done.

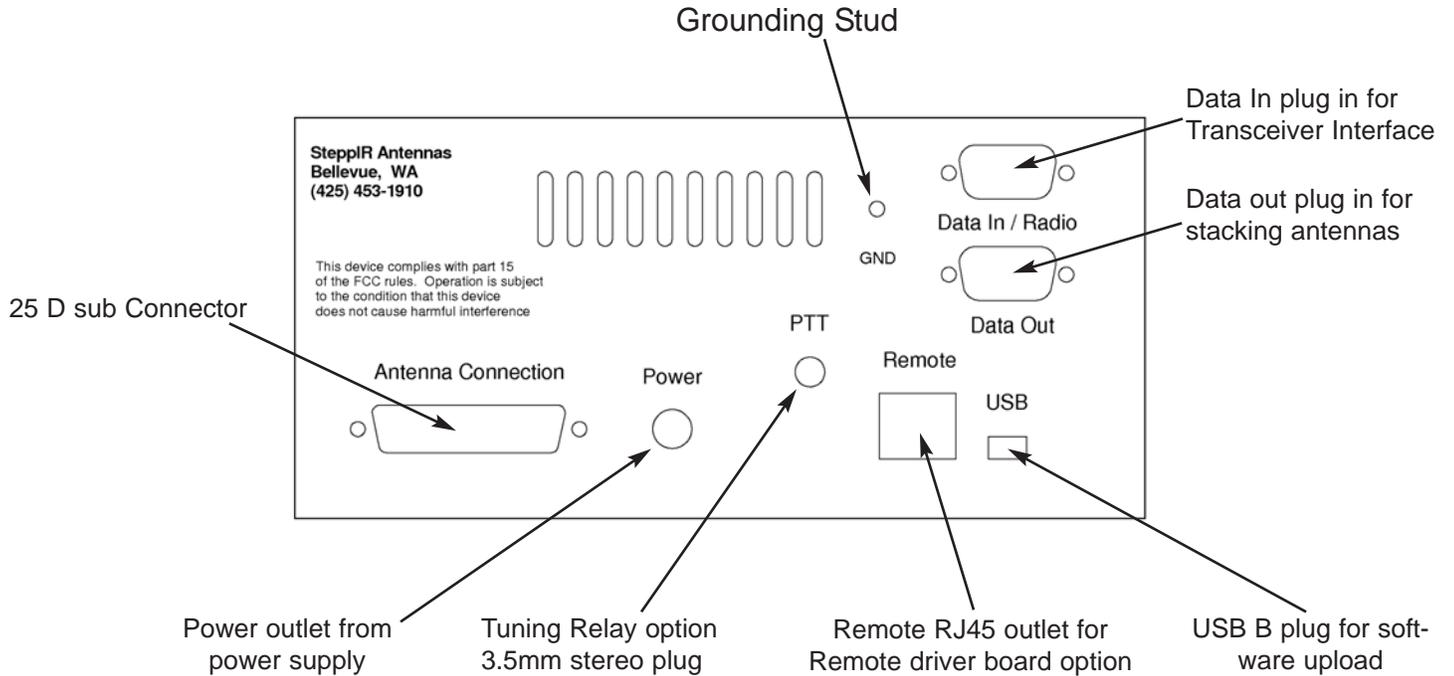
Also, on the back of the controller, there are two ports - “Data In” and “Data Out”. If you have purchased the transceiver interface option, there will be two 9 pin d-sub male connectors in the ports. If you have not purchased the interface, there will be a plastic cover over the ports. For more information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

Other options that are available with the SDA 100 controller are the Tuning Relay, Remote Driver Board and Advanced Lightning Protection (ALP). These options will have different wiring configurations on the back of the controller. Refer to each options section for more information.

FRONT



BACK



CONTROL BUTTONS

POWER

During power up all 7 LED lights will light and the display will show what antenna software the controller is programmed with along with the program version, After 3 seconds the display will change to the last used function and operating frequency. From the factory the screen will appear as shown below.



```
Manual Mode
Elements Home
```

The power light will remain lit along with the **NORM** light or depending on the last mode you were operating on. example: **180** or **BI (3/4)** and also **AUTOTRACK** if you are using a Transceiver Interface.

NOTE:

Even if your controller is turned off by using the **POWER** button there is still a holding current being sent out to the elements on the antenna. This is to hold the antenna element in the exact position after being used.

FREQUENCY ADJUST

This function gives the user the ability to adjust his/her antenna with great accuracy and speed. Giving the user the range to move between 59.990Mhz to 6.950Mhz and tuning the antenna every 50Khz. This is achieved by using three different control buttons, **BAND**, **COARSE** and **FINE**.

BAND UP / DOWN

This will move the antenna to whatever band the user selects. The factory defaults are as shown in **Figure 1**. Whenever the controller is tuning the antenna the tuning light will be blinking red.

These two up and down buttons also have a dual purpose by acting as a toggle up and down for the SET UP function. This will be described in greater detail later in the the manual.

COARSE UP / DOWN

Adjusts the frequency by 100Khz either up or down.

FINE UP / DOWN

Adjusts the frequency by 10Khz either up or down.

RETRACT

With one touch of a button the user can retract all elements to the home position and the controller will power down automatically. The function of retracting the elements through the **SET UP** menu is still available and will be described in the **SET UP** section of the manual.

MODES OF OPERATION

NORMAL

The **NORM** mode is used when you are manually operating your controller, and the primary intended use will be in the ham bands (to use the optional transceiver interface, the user must be in the **AUTOTRACK** mode). When in the **NORM** mode, to tune through the bands simply use the FREQUENCY ADJUST BAND up and down button, and the controller will simultaneously adjust the length of each element to that frequency that is chosen. Each time the up or down button is hit the antenna will adjust to the next preset frequency. The display will show what frequency the antenna is tuning to, plus the tuning light will be blinking red. By using the COARSE and FINE up / down buttons, it is possible to adjust the antenna to the nearest 50 KHz. You can also adjust to frequencies outside the ham bands.

When the controller is in the NORM mode the bands that can be toggled through are pre-programmed to get the antenna close to the desired frequency. Most of our antennas work very well over a 100 KHz frequency range (minimum except on 80m). The Bandwidth will depend on which model antenna you have but it will be at least 100 KHz.

180 BUTTON

The 180 degree mode feature is one of the most popular among SteppIR users. The 180 mode allows you to electrically “rotate” the antenna 180 degrees from your current **NORM** direction beam heading. This is done by simply pressing a button, and in 2-1/2 seconds (quicker on higher frequencies, longer on lower) the transformation is complete. The existing reflector becomes a director and the director becomes a reflector, and you now have a completely different antenna in the exact opposite direction. With the two element Yagi, the director becomes a reflector. In addition to greatly reducing your rotator use, many SteppIR users report that the 180 function is an excellent tool for short path / long path operation, or for picking up that elusive multiplier in the heat of a contest! At SteppIR, we think the best use for this function is when we want to show off the great front to back performance of the antenna!

BI (3/4) BUTTON

The BI (which stands for bi-directional) function operates in a similar manner, except when enabled, you are now operating with gain in opposite directions. You will have approximately 2 db less gain than normal but now you have gain in both the forward and reverse direction. This feature can be very handy for those who are involved with net operation or ham contests where hearing (or sending) signals from two directions can give you an advantage.

AUTOTRACK MODE

The **AUTOTRACK** mode must be toggled if the optional transceiver interface was purchased. This function must be enabled via the Setup Mode. The antenna will be under the control of the radio ONLY when in this mode. When under the control of the radio the antenna will be re-optimized every 50 KHz and will follow the radio to any frequency within the range of the antenna.

Using the other modes of **NORM**, **180** and **BI** can all still be used while in the **AUTOTRACK** mode. By pressing the **AUTOTRACK** button so that the light is not lit is a very quick way to disable automatic antenna frequency following.

NOTE:

The **FREQUENCY ADJUST** buttons are active when in this mode and will cause the antenna to start to change frequency until the controller sees another command from the radio which could be up to 2 seconds. Therefore you want to avoid accidentally hitting the band buttons while using the transceiver interface to control the antenna.

The transceiver interface will update the frequency if it is enabled with the radio or computer on overriding the band buttons almost immediately. If using the **RETRACT** button to home the antenna the controller will override the transceiver interface and will go through an automatic shut down once the elements are completely home.

SETUP MODE

The **SETUP** menu can be toggled by pressing the button on the front of the controller so that the amber LED light is lit. This will change the screen so that it shows.

Mode Key to EXIT
Up Dn to SCROLL

Once this screen appears on the display the **BAND** button will act as your scrolling button up and down to select what option to modify. The following options can be selected in the **SETUP** menu.

RETRACT ELEMENTS
CALIBRATE
CREATE, MODIFY
TRANCEIVER SETUP
FACTORY DEFAULT
TEST MOTORS
OPTIONS MENU

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. Don't confuse "retracting" with "calibration". Doing a calibrate guarantees the element is brought home and then extended from a known start point. Retracting assumes the proper amount of tape is extended and simply reels that much in to home position and leaves it. We recommend retracting the elements during lightning storms, this greatly reduces the conductive area of the antenna platform. In ice storms retracting the elements greatly reduces 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 extended. These poles are easy to replace so even if you damage the telescoping fiberglass support elements (pole), the most valuable part of the antenna should be safe!

The controller will ask you if you want to send the elements "home", which means retracting the elements inside the antenna housing. To retract the antenna, press the BAND up or down button once, and YES will start flashing. Press the select button, the display will say "Home Now? / Homing". The red TUNING light will be flashing, this means that the antenna is retracting, when the light stops flashing, the new message will read "Done", then will return to the "Retract Elements" menu. The 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.

CALIBRATE

NOTE:

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! It doesn't matter what frequency you are on when you calibrate, when complete the antenna is calibrated at all frequencies.

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 does not "know" where the antenna is adjusted to unless you start at a known place. The antenna housing sent to you has each element retracted inside to "Home", and the controller is set to "Elements Home". If you power up the controller and it says "Elements Home", and you connect the antenna control cable with the elements physically retracted, system is calibrated and ready to go!

If you need to calibrate, select calibrate in the **SETUP** menu, the antenna will retract all of the elements, and the stepper motor will continue to over-step for up to 50 seconds 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 as much as 50 seconds, this is normal. When calibration is finished, the antenna will go to the last frequency you were on before you started the calibration process. The entire process takes less than a minute.

To calibrate the antenna, press the **BAND** 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 “Calibrating”. Notice that the **TUNING** red light will be flashing the entire time the antenna is calibrating. When the controller is done calibrating the antenna, the LCD screen will then display the last antenna segment the controller was on before the calibration. When the red **TUNING** light quits flashing, the controller leaves the calibrate mode and returns to the mode previously set to.

CREATE, MODIFY

The factory default antennas that are programmed into your controller have been modeled and field tested to provide very good gain, without sacrificing the front to rear performance. The create, modify menu allows you to change the length of any of the SteppIR elements for each master antenna segment. 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.

The driven element can be changed up to +/- 5% in length to obtain a better match with no appreciable change in gain or front to back performance, so it is always best to just tune the driven element to correct SWR problems. This feature is especially good for those of you who experiment with modeling programs such as EZ-NEC or YO PRO.

When you have finished changing the respective lengths, you can save the new antenna to memory, overriding the factory default antenna for any given ham band or frequency range. 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 ham band or specific frequency range, or all of them at the same time if desired.

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 the availability of antenna modeling software has been a giant leap forward in antenna design to fully exploit it you need to be able to modify the elements length with the antenna mounted in its operational position. We are able to change the elements length in the air while on an antenna range and determine very closely our electrical element length. Others must just estimate it, thus leading to less than optimum performance. 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, modeling programs output the electrical length of the element - not the physical length. Our controller indicates the physical length, the electrical length is from 2% - 3.5% longer due to the conductor diameter (our strip is equal to .28 in. diameter tube) mounting hardware and dielectric loading due to the telescoping fiberglass poles. We have this data accounted for and programmed into the factory default antennas.

The 4 element antennas have two directors, Director 1 and Director 2. See the installation manual to determine the location of each on the antenna. The 2 element and 3 element antennas will also display Direct 2 even though they have only one director (Direct 1). Make sure you select the correct one. We did this to make our software compatible across our entire product line.

- D1 = Director 1**
- D2 = Director 2**
- DVR = Driven**
- REF = Reflector**

To scroll across through the different elements use the **BAND** up or down button. Hit the select button once the desired element is flashing. This will allow for adjustment for each individual element. Use the **BAND** up and down arrow to change the lengths of the element. Note that the TUNING light will flash as you move the element. When you are finished making all adjustments, press the up or 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 or down button to make the proper choice ("YES" or "NO") and press the select button. If you selected "YES", the new lengths will be saved into memory for the ham band or frequency range you are currently on. After saving your new antenna the controller will scale it and use it throughout the entire ham band or frequency range you created it in. If you create a new antenna or modify the factory default antenna in any of the range segments the controller will then scale that antenna throughout the selected frequency range and only the selected range. Creating and modifying an antenna anywhere (it is best to chose a frequency near the bottom of the range) in a frequency range will change the entire range.

Figure 1 Yagi Master Antenna Frequency Range (MHz)

6.95 - 7.85	20.80 - 24.85
7.85 - 8.85	24.60 - 27.50
8.85 - 10.0	27.50 - 29.00
10.0 - 11.3	29.00 - 34.50
11.3 - 12.5	34.50 - 41.00
12.5 - 13.95	41.00 - 49.50
13.05 - 15.8	49.50 - 51.00
15.8 - 18.05	51.00 - 54.00
17.85 - 20.80	

You can create the antenna at any frequency within the ham band or general frequency segment. For the very best results model the new antenna in the middle of the band or frequency segment and set the controller to that frequency before creating the antenna. The frequency coverage range of each of our antennas is broken up into numerous blocks for each direction (**NORM, 180 degrees, and BI (3/4)**), each covered by a different antenna model (**Figure 1**). Using the create antenna mode you can modify and save any of the master antennas (**Figure 1 & 2**). The frequency range is identical for the all three direction modes of the antenna (**NORM, 180 degrees, and BI (3/4)**). If you select "NO", no changes will be made, your antenna segment will be just as it was before.

Figure 2 BigIR Master Antenna Frequency Range (MHz)

3.4 - 3.5	17.9 - 20.9
3.5 - 3.6	20.9 - 24.9
3.6 - 3.75	26.9 - 27.9
3.75 - 5.2	27.9 - 34.9
5.2 - 6.9	34.9 - 49.0
6.9 - 9.9	49.0 - 49.5
9.9 - 13.9	49.5 - 50.9
13.9 - 17.9	50.9 - 54.0

TRANCEIVER SETUP

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 through its computer port, and will automatically re-adjust every 50 KHz as you tune through the bands.

If you have the transceiver interface option (2 - 9 Pin connectors on the rear of the controller), you will also need an optional interface cable for your specific rig, 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. There is a second 9 pin D-sub connector below the first called “data out”, this connector is used in the event you stack two SteppIR Yagi antennas, it allows the two controllers to communicate to each other, so that when any change in frequency on one of the controllers, the other will follow. It also allows the user to connect the SteppIR directly to a PC.

NOTE:

We can also supply an optional “Y” cable that allows the user to run a logging program concurrently with the SteppIR controller. (Not required for ICOM radios)

Select the **SETUP** button, and use the **BAND** up or down arrow to select “Tranceiver Setup”. To enter, press the **SELECT** button. The screen should be as shown below.

Din Dout Mode Done

Up Dn to SCROLL

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 **BAND** up or down arrow until “Din” (Input) or “Dout (output)” is flashing, and then press the select button. Depending on the purpose you can change both input or output to different Baud rates. You can then use the **BAND** 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 for the radio type you will be using. Press the **BAND** up or down arrow until “Mode” is flashing and then press the select button. Now you can use the **BAND** 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 refer to Saving Settings below) be sure you set your transceiver up according to your radio manual to broadcast frequency data. Note that iCOM radios require CI-V transceiver mode enabled

NOTE:

When done the controller power switch must be cycled off then back on for the new settings to take effect.

To use the transceiver interface you must put the controller into **AUTOTRACK** mode so the amber light is on. When you tune your rig the SteppIR controller will now automatically re-adjust every 50 KHz. To disable automatic tracking simply select the **AUTOTRACK** mode so the amber light is off. The controller will be set to the same frequency it was at when you exited **AUTOTRACK** mode. It is also possible to disable tracking by using the “Options Menu”.

FACTORY DEFAULT

When you use create modify to edit a band (say 20m, normal direction) and save the results, the factory default length for that band in the normal direction is replaced with the new values. This command is used to clear the saved antenna back to the factory defaults. For more information on creating or modifying antennas, refer to the creating and modifying antennas section and the saving antennas to memory section of this manual. You can restore the factory default for a specific saved memory or you can completely restore all of the factory defaults at once.

If you want to restore the factory default on a single saved memory, you must first go to that frequency and direction. Enter the **SETUP** mode and select “Factory Defaults” when the controller displays “Current ?” (this is asking if you want to restore factory defaults for the current antenna frequency). Select “YES” if this is the option you want. Select “NO” and the next menu will ask if you want to restore all antennas to factor defaults.

Multiple master antennas are necessary because the boom length looks longer electrically as you go up in frequency. We have judiciously broken the frequencies up and modeled a unique antenna for each range. This and a smart software algorithm allow an optimal antenna at every frequency without having to model hundreds of antennas. If you create an antenna anywhere within the frequency range of a master antenna the new antenna will be scaled by the software algorithm so you have an antenna with the same performance characteristics throughout that range. To ensure the absolute best performance in the ham bands (any master segment where a ham band occurs) we modeled the master antenna at a frequency near the center of each ham band. So if you are changing a model and create the new antenna near the center of the frequency range, that antenna will then be replicated throughout the entire segment.

TEST MOTORS

The “Test Motor” function is only used during the installation of the antenna. It provides for testing the control cable wiring before final assembly and raising the antenna. If you are raising the antenna with the control cable attached it is a good way to check that you have connected all of the element cables correctly.

If you are not going to connect the control cable and test it on the ground make sure you have the element control cables positively identified and well marked (DIR2, DVR, REF etc) . If you get the elements mixed up on the terminal block you will get very confusing results such as, high SWR, low performance, etc. Mark the cables coming from each element box with colored electrical tape or a felt pen. Mark them before you tape them along the boom, it is very easy to get two parallel wires mixed up. Now when you are on the tower it will be easy to identify each element control cable positively.

For the MonstIR only DO NOT use the Test Motor unless you have the first two sections completed and attached on each of the three large (70') element housings (DIR2 DVR REF) because approximately 20' of copper will be feed out of each side. This will allow you to see the copper tape just peek out of the 3/4” CPVC liner tube.

When performing the Test Motor NONE of the 18' telescoping poles should be installed at this point or you won't see the tape extend out approximately 1” to 4”. This test allows you to verify that each element is indeed the one the controller thinks it is and that it is wired correctly (not running backwards). If there is copper sticking out at the end of testing any element, the motor for that element is wired wrong. The stepper motors will run backwards if you swap the wires on either one of the motor windings.

Before connecting the 25 pin connector on the control cable to the controller, plug in the controller and turn it on. The screen should read “Ham Mode Elements Home”. If it does not run the “Retract Elements” function (Reference this manual). The screen will indicate that it is homing the elements and finish with “Ham Mode Elements Home”. It is now safe to connect the 25 pin connector on the control cable to the controller.

In the case of the Remote Driver Board Option the element can be tested while the antenna is on the ground. With the provided crossover cable that came with the Remote Driver Board Option plug the controller to the remote driver board at the base of the tower via the “Remote” CAT 5 plug. Do plug the 25 pin D sub connector to the controller to test or operate the antenna. Refer to Remote Driver Board section for more information.

WARNING: Do NOT select any of the band buttons at this time. Without the 18' poles installed, if any of the band buttons are selected, the copper tape will come out of all the element housings onto the ground. This could result in damage to the copper tape requiring factory repair.

Check to see if there is any copper tape sticking out of any of the element housings. If there is copper sticking out run the “Calibrate” function and this will bring the tape home (Reference this manual).

Select the **SETUP** button, and use the **BAND** up or down arrow to select “Test Motors”. To enter, press the **SELECT** button. as soon as the “Test Motors” menu is selected the controller will automatically send any of the elements home before doing any of the test. This will be shown by the red **TUNING** light flashing.

These test will be done one element at a time. Use the **BAND** up and down button to test all of the elements for the antenna. The red **TUNING** light will begin flashing and the controller will feed out about four inches of copper out each side of the 20m element housing and 17 feet on the MonstIR elements. Pressing the **BAND** up and down arrows will cause each of the elements to flash in turn, to test a specific element simply press “**SELECT**” when the desired element is flashing. Verify that the element is in the right location and the copper tape is extending properly. To exit the test press the **SETUP** button.

OPTIONS MENU

Select the **SETUP** button, and use the **BAND** up or down arrow to select “Options Menu”. To enter, press the **SELECT** button. There will be 4 options possible in this Menu. Shown below is a controller with a 30m/40m loop option. If the antenna has an option like a 80m dipole it will show “80m” instead of “40m”.

DRIV OFF 40m 6m DONE
Up Dn to SCROLL

6m OPTION

To activate a 6m option use the **BAND** up and down to make the “6m” flash. Then press the **SELECT** button to enter the menu and select “YES” to enable the 6m option.

The lengths for the 6m passive element will be active for the **NORM** and **180** positions in the frequency range of 50 through 51 MHz. There will be a small “p” located to the left of the frequency while operating on 6m. On 6m with the aluminum element kit installed the **180** mode does nothing. The **BI** mode will dramatically reduce the front to back but the antenna will still have some forward gain. This does not effect any other band.

30m/40m or 80m OPTION

To activate the 30m/40m or 80m dipole option use the **BAND** up and down to make the “40m” or “80m” flash. Then press the **SELECT** button to enter the menu and select “YES” to enable the option.

Frequency Offset OPTION

To adjust the frequency use the **BAND** up and down to make the “OFF” flash. Then press the **SELECT** button to enter the menu and use the BAND up or down button to adjust your frequency +/- 15. Which is essentially +/-1.5% of the frequency that the controller is operating on.

This is basically a calibration function that can be used to compensate for frequency shift caused by ice buildup or rain (usually makes the antenna look too long), both of which can occur for long enough periods to be irritating. It can also be useful in some cases of interaction or low antenna height situations. There will be a number in the range of +/- 15 displayed in the upper right of the LCD display indicating the offset value. This is a global adjustment to all bands and is based on a percent of frequency. The number is for reference only and does not scale directly. When making this adjustment it is possible to move off the best performance point so some experimenting may be necessary. Adjustment using this feature affects all frequencies proportionately. True for all options, the changes made in this menu will be saved when the controller power is switched off or after about 3 minutes the controller will do an automatic save.

Remote Driver Board OPTION

To activate the “DRIV” (which is the remote driver board option) option use the **BAND** up and down to make the “DRIV” flash. Then press the **SELECT** button to enter the menu and select “YES” to enable the remote driver option.

CONTROLLER OPTION

There are many different options and configurations for the SDA 100 controller. Each option allows the user more flexibility, whether its better protecting the controller from lightning or from operator error. Each option will require the user to know how to set up and activate each individual option in the controller.

TRANSCIVER INTERFACE

This option is used to link a radio, computer or another SteppIR controller to the SteppIR SDA 100 controller. This option is physically located on the back of the controller with two 9 pin Dsub connector in the “Data In / Radio” and “Data Out” plugs. Refer to **Figures 3 - Figure 6** for wiring configurations with the Transceiver Interface.

Figure 3 Tranciever Interface to Radio

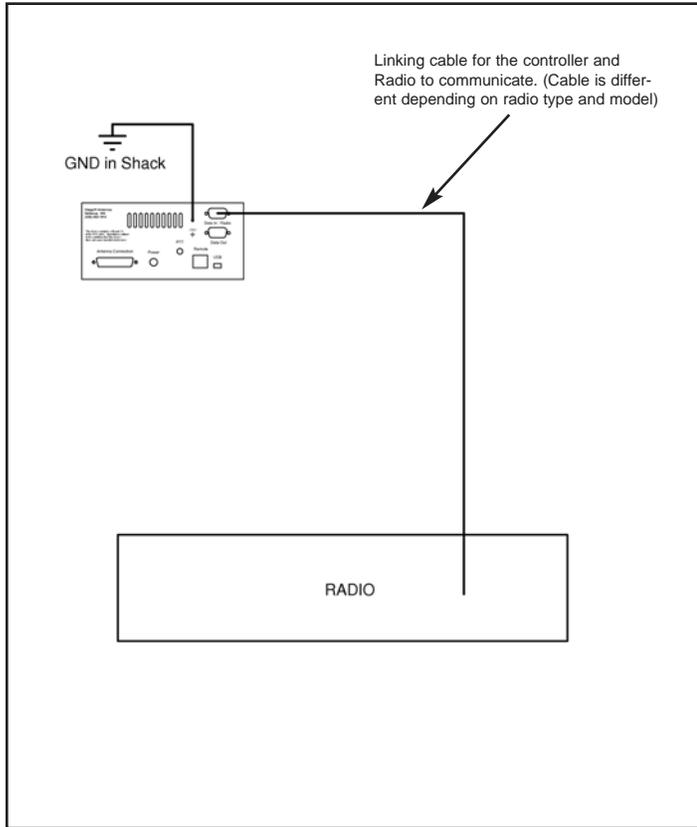


Figure 4 Tranciever Interface with Y cable

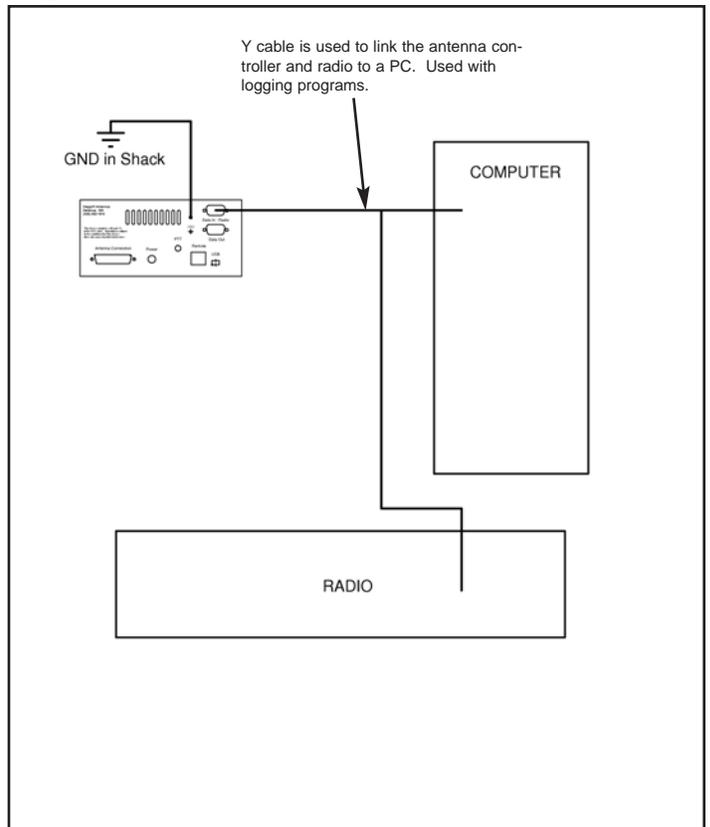


Figure 5 Controller stacked with Y cable

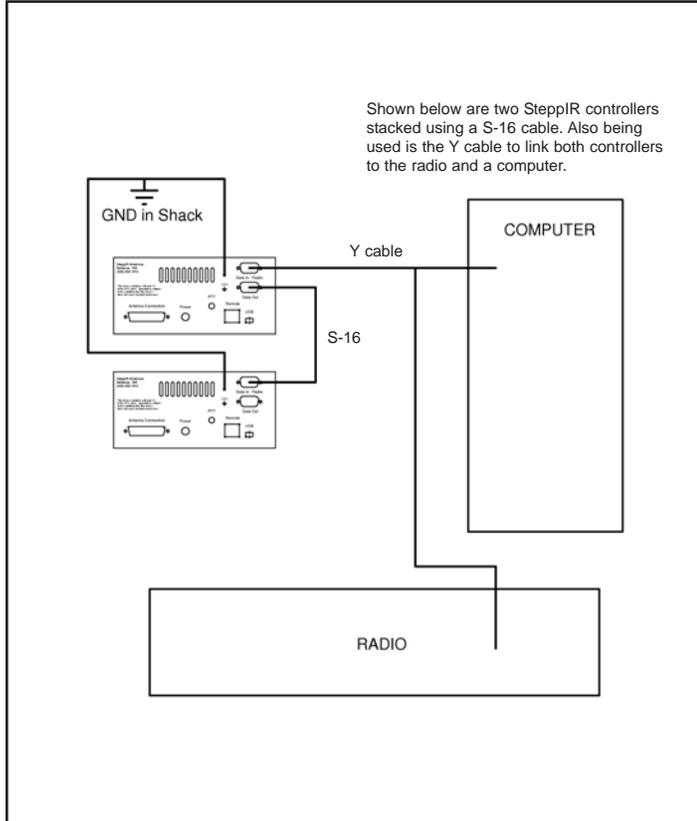
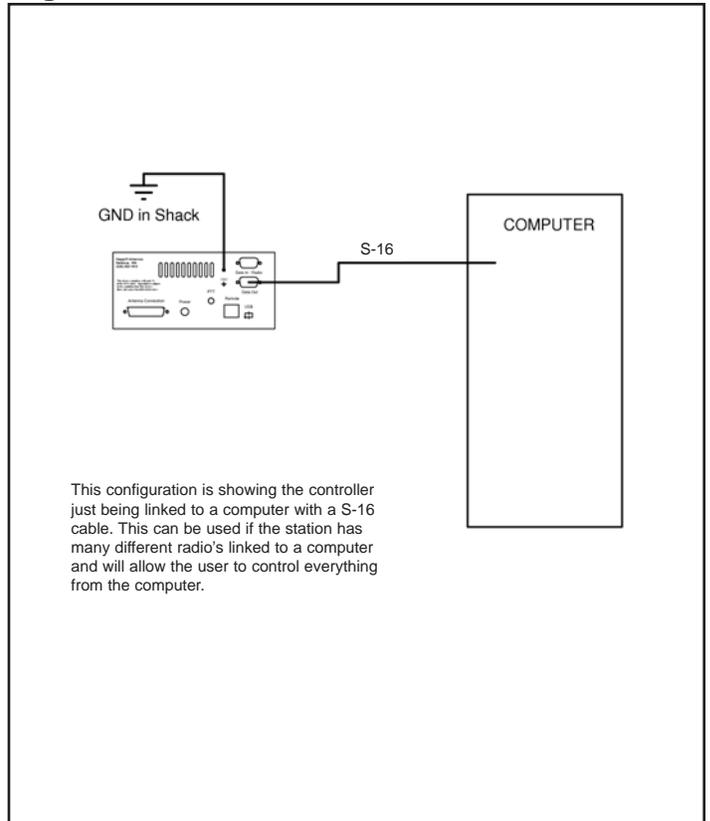
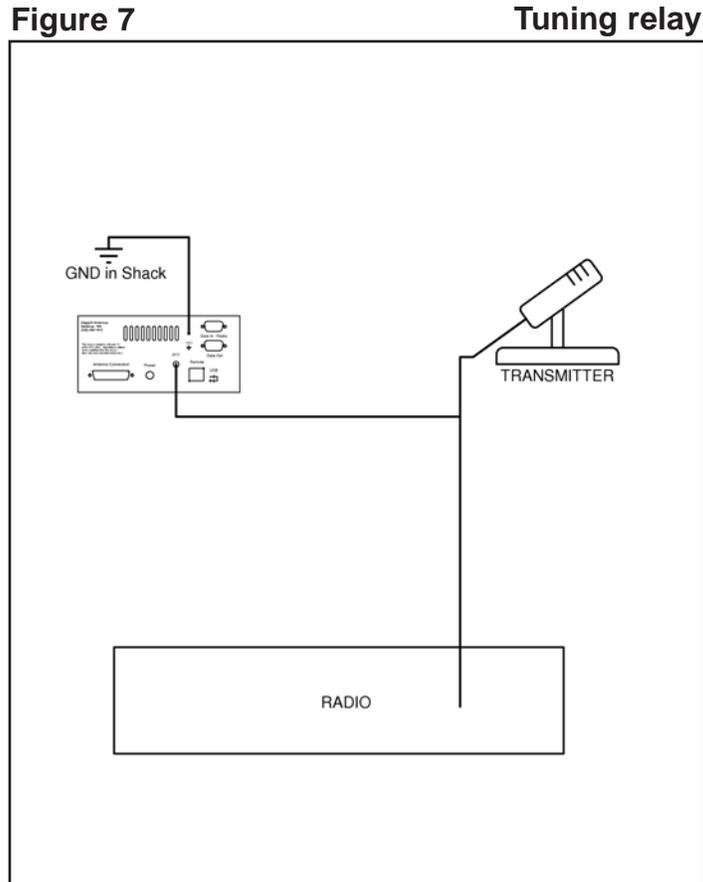


Figure 6 Tranciever Interface to PC only



TUNING RELAY OPTION

The Tuning Relay Option protects the antenna from damage during tuning with high power. With the Tuning Relay Option we have provided a 3.5mm stereo connector that will plug into the “PTT” (Push to Talk) outlet. The user will need to wire the Tuning Relay Option between the Radio and Transmitter. Due to the many different types of transmitters and radios the cable is not provided and must be made by the user. Refer to **Figure 7** for the wiring diagram for the Tuning Relay Option.

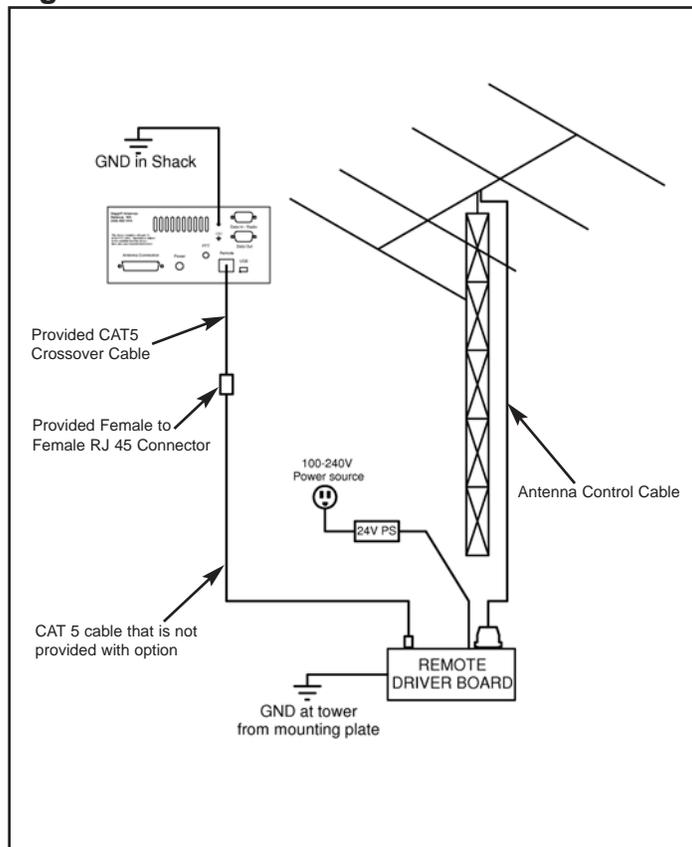


REMOTE DRIVER BOARD OPTION

This option is for the user that needs to have his/her tower a considerable distance from the shack and controller. The problem this creates is line loss due to cable lengths over 500ft. This option solves that problem by placing another driver board at the base of the tower and connecting it remotely to the controller in the shack by use of CAT 5 cable. Now the user only needs to run the control cable up the tower. This option allows the user to have the shack and the remote driver board up to 2000ft away from each other without any problem with line loss.

This option allows for more flexibility for antenna placement but it requires a 100-240V power source out at the tower. With the purchase of the Remote Driver Board there will be a 24V power supply, this is used to power the remote board at the tower. Also provided is a mounting plate for mounting the driver board in dry location out by the tower. This will also act as a grounding plate and should be connected to a good ground. Refer to **Figure 8** for wiring details.

Figure 8 Remote Driver Board



Advanced Lightning Protection (ALP)

This option is for protecting the controller against static and lightning. This is done by using a passive electronic circuit. The ALP driver board has relays that are mounted to the driver board to physically disconnect the controller circuit from the antenna when there is a large surges of current.

There is no set up or activation for this option it is ready as soon as your controller is powered up.

ALP is included with the purchase of the Remote Driver Board Option. IT will be located in the remote driver board not in the controller driver board.

WARNING

This option does not 100% guarantee that your controller is protected against lightning or static build up. This option is intended to greatly reduce the chance of blowing a driver chip from lightning and static.

WARNING

