



Expanded Troubleshooting Guide: Controller

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I. ---- Intro

The Controller is a necessary part of the SteppIR antenna. All the necessary electronics are in the controller to set the SteppIR Elements to the correct length for the selected frequency.

When we designed the controller there were no driver chips available that would guarantee they would survive in the environment that we required so we chose to socket them so they could be changed out.

The controller uses electrically erasable permanent memory for the program and default element lengths. The default lengths will not be erased for any reason so you can always go back to them.

When Driver chips fail there is most often a problem the in the Antenna control cabling, grounding, or lightning/static voltages. . When a driver chip fails the control cable should be checked for problems before installing a new chip.

1 ---- Warning Messages or trouble codes

The SDA100 has some self-diagnostics, what it can detect depends on which Driver board you purchased.

Unfortunately some versions of firmware remember error messages even after the controller power is unplugged. A common message to see is "antenna cable open" which can be caused by turning on the controller without the antenna cable connected.

To know for sure if the message is real the controller must be told to tune to a different frequency. If the message clears then it was from a previous time and should not be a reason for concern.

The "Check Driver configuration" message is a indication that the display board is having trouble



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communicating with the Motor Driver board.

This can happen if:

- The Remote board is selected in the options menu but there is no remote Driver board.
- Selecting Options from the options menu that require new element lengths. Power should be cycled to update the driver board.
- Incompatible Firmware. If the firmware is updated in the controller with a version that has options that the driver board firmware does not support.

If none of the above is true then the Driver board has failed.

With a Remote Driver board this message could be caused by the cat 5 interface cable or a loss of power or ground at the remote site. If this message pops up occasionally with a Remote Board it indicates a cable or ground problem with the Cat 5 cable.

"Low Supply Voltage" The Driver chips require a minimum of 16 Volts to operate the Element motors, this message is an indication the supply voltage is less than 16 volts. Most common cause the wrong power supply is being used. This condition will prevent the antenna from tuning.

"Driver Chip Error" indicates that there is an overload condition on the power supply going to the Driver chips. This is most often a indication of a bad driver chip, this condition will cause the antenna to stop tuning. With the Standard driver board the driver chips must be removed until the message goes away. With the ALP board the message will have a number after it indicating which driver chip is causing the problem. The numbers are 1=U5, 2=U6, 3=U7, 4=U8, 5=U9.

"Antenna Cable Open" This is a ALP board only message and it should have a number at the end of the message, 1 through 0 (for 1 through 10).

First it helps to understand that each motor has 2 windings and each winding has 2 wires. The ALP Driver can detect the current in each of these windings, the message will appear when this current is not present.

The numbers represent pin pairs and go as follows 1= pins 1,2 on 25 pin, 2 is pins 3,4, 3=5,6, 4=7,8, 5=9,10, 6=11,12, 7=14,15, 8=16,17, 9=18,19, 0=20,21

2 ---- Controller shuts off when trying to tune.

When the controller is idle it puts a low voltage on the motor windings to keep the motors locked in place. When the operator selects a new frequency for the SteppIR Antenna the first thing that happens is the drive voltage (24 to 33vdc) for the motors is switched on.

If one of the driver chips has failed what can happen is there will be a overload as the voltage is applied to the Driver chips.

The external 24 or 33 volt supply will detect the overload and momentarily shut down which resets the controller turning off the motor supply voltage so the controller is already to try again. Sometimes you will hear a high frequency squeal from the internal 5 volt supply when this happens. The driver board must be repaired before the controller will quit doing this.



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3 ---- Option Boards

The SDA100 has several boards that plug into the Driver board, some are added for particular antennas and some are Options like the transceiver interface and the push to talk relay. The Transceiver board mounts to the rear panel and is held in place by the connector standoffs. The small relay boards for the coax switch and PTT relay all stack on top of each other and are held in place by a single stand off through the middle.

If you replace the driver board make sure to also transfer all the small boards over to the new one.

4 ---- Keep blowing same driver chip

When the controller keeps losing the same driver chip it indicates there is a cable problem.

Intermittent connections or bad insulation can cause this problem, it can be one of the most frustrating to trouble shoot because everything looks good.

Often times if there is no obvious damage to the cable it is best to just replace it before the frustration level gets too high.

The most frequent reasons for the problem:

- a. Rodents and squirrels love cable jackets, look for nicks and holes.
- b. Rotator loop - could have gotten stretched from runaway Rotor or the cable cracked from just blowing around in the wind.
- c. The cable got pinched, can happen with crank up towers.
- d. Loose strands of wire at cable junctions.

5 ---- Controller Power on after loss of power

The controller does remember the state of the power switch it is just a little slow about it. It takes as long as 5 minutes the first time the controller is switched on for it to remember that the power is on after that it is much quicker.

There is no way to switch the power On or Off remotely. You would need to home the elements and remove power from the power supply to shut down the controller.

6 ---- Get shocked from controller, sparks flying

If you have a ground wire going to the SteppIR controller chassis check your ground system.

If no ground add one, should have a ground on all cables coming from the tower for safety.

7 ---- Continuous blinking of tuning LED

This is a indication the Motor driver board is not working (reporting status), Firmware version may also be missing on power on.

If the Retract button is pressed while this is happening the controller will never turn off it will just blink the LED until it is unplugged.



Controller (Continued)

8 ---- Save function quits working

The memory used by the save function is part of the Controller processor chip that has the firmware. If save quits working this chip needs to be replaced.

9 ---- Switches on Motor driver board

There are 2 switches on the motor driver board.

Switch 1 is for programming.

Switch 2 is used to select Remote driver configuration.

Switch one should be off and switch two on when the board is mounted inside the controller.

10 ---- Small hole in the front of the controller, LCD contrast

The small hole next to the LCD display is the contrast adjustment, it requires a small flat blade screw driver.

11 ---- Firmware reset, old software

The factory reset firmware reset can be done to set all saved values back to their original state.

To do the Reset:

- a. PRESS and hold FINE and COARSE UP buttons then press the POWER switch.
- b. The controller will display "FLASH Boot Loader"
"NORM=BL 180=EE BI=X"
- c. Press the 180 button the 180 LED should light, if not press again.
- d. Press the BI button the controller will turn off.

All saved values are cleared and configuration values are set to factory defaults.

12 ---- Swapping boards

The controller uses the same front panel board for all products.

The controller uses the same Driver board for all products except the DB42 which requires 5 motor channels (a DB42 board will work with any Antenna)

13 ---- Tuning Relay

The tuning Relay is an isolated mechanical relay that can switch 1A at 120V.

It uses the outer two pins of a stereo 3mm jack to make the connection. The barrel of the connector is connected to Ground, be careful!

The relay will be open any time the tuning LED is blinking on the controller.

When connecting the cable make sure the cable you use does not connect to the barrel at the base of the connector which is ground.



Controller (Continued)

When using more than one SteppIR antenna each controller needs it's own tuning relay.

14 ---- Frequency Offset

The Global Frequency offset can be used to correct for changes in element loading.

The fiberglass poles, rain and ice all load the element.

The offset allows the center frequency to be shifted plus or minus about 1.5%

15 ---- Default element lengths

The default element lengths are stored in program memory and cannot be changed. When you use create modify to save element lengths they are saved in a different memory. When the antenna tunes it first checks for saved lengths at the frequency before using the default lengths.

Since we scale the lengths from the bottom through the top of the band based on the frequency the saved default lengths are for a frequency below the band.

To get the default lengths for a frequency like 14.200 first set the controller to 14.200 and select the setup menu option default current and then exit the setup menu. If you want to see what the lengths are use the Create Modify mode.

16 ---- Remote Driver board

It is possible to have a motor driver board external to the controller.

This usually would be done if the cable run is over 400 feet for cost reasons.

Would usually be mounted at the base of the Tower.

We use the ALP board for the Remote motor driver.

The remote board plugs into the RJ45 connector at the back of the controller.

For troubleshooting see Remote Driver documentation.

17 ---- Calibrate verses Retract

The SteppIR keeps track of where all the elements are by counting motor steps, when all is working as it should the controller knows precisely how long each element is.

Retract homes the elements by running them in the exact amount we extended them. Because the most common problem is the elements not being extended far enough do to loss of power or elements stalling, Retract will often bring the antenna back into calibration.

Calibrate runs the elements in the full possible distance without regard for where the controller thinks the elements are.

Calibrate should only need to be run once to get the elements back in sync, it is always best to run calibrate from a higher band like 17M just in case the elements were over extended.

Calibrate can be run with the elements in the home position.



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The most common reason for the antenna to get out of calibration is the loss of power while the elements are extended. The controller supplies a holding current to the motors to keep them from turning.

Before removing power from the controller retract the elements. And if power is lost while the elements are extended do a Calibrate.

