



## Scorpion Antennas Controller

### Instruction Manual

Firmware V11.8

November 2012

**Please Read This Manual Completely Before Operating The Controller**

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## Introduction:

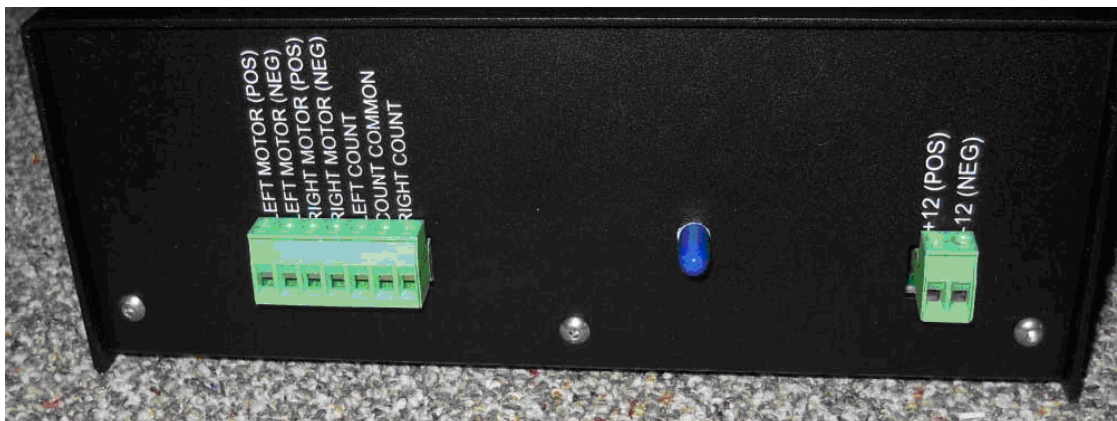
The Scorpion Antennas controller provides a convenient way to manually operate all Scorpion Antenna models including the Scorpion Home Package and Scorpion Rotatable Dipoles. The built in display indicates the antenna position, and for dipoles the positions of both the left and right legs.

The controller features:

- Eight user programmable memory presets (in two banks holding four presets each)
- Manual up/down buttons for both left and right legs of dipoles
- Ability to “jog/shuttle” dipole legs in the same or opposite directions
- Two “Both” buttons that simultaneously lengthen or shorten the legs of rotatable dipoles
- Automatic retract button to fully bottom the antenna and zero the counters with one touch
- Real-time antenna stall current and running current diagnostic display
- Real-time antenna tach-pulse diagnostic display
- The controller is powered from a user supplied 12 volt source

## Installation:

**Step 1: Connect power, antenna motor and tach-pulse cables to the controller as shown in the following connection diagram.**



To make connections to the Euroblock terminals, use a 1/8" flat screwdriver to:

1. Turn the terminal screw counter-clockwise to open the connection point.
2. Plug in the stripped wire into the opening.
3. Turn the terminal screw clockwise to clamp down on the stripped wire.

Repeat for all connections on the Euroblock as shown in the connection diagram above. Pay special attention to polarity when wiring the two-terminal DC-power block or damage will occur to the controller.

Connect a “Home Package Antenna” or single screwdriver antenna to the right motor terminals.

**WARNING: Any time you transmit, there will be RF imposed on the control leads. It is recommended that these leads have the RF choked off from them.**

**Step 2: Preliminary setup for testing antenna control.**

Initially the motor threshold current for both motors is set to .7 from the factory so that proper operation of the controller can be verified. Power up the controller and manually actuate each side (Left & Right) one at a time.

- Verify that when the left or right leg is lengthened "Toward 80 Meters" that the respective position counter increases.
- Verify that when the left or right leg is shortened "Toward 10 Meters" that the respective position counter decreases.
- If either side retracts (counter decreases) when you are extending "Toward 80 Meters", reverse the positive/negative motor leads for that side.

After verifying that when the left and right buttons are pressed "Toward 80 Meters" the respective counters increase; and verifying that when the left and right buttons are pressed "Toward 10 Meters" the respective counters decrease, you are ready to proceed to Step 3.

**Step 3: Automatic over current threshold setting for normal controller operation.**

Retract both legs to their stop using the retract button. When both left and right counters stop, turn off the controller. The firmware assumes both antennas are retracted to their stop so that the threshold current setting for each motor can be determined.

Power up the controller while holding both the M1 and M2 buttons.

A calibration menu (see below) will appear on the display. Press M4 to proceed with the automatic calibration. Once completed, a current threshold for each motor is saved automatically in non-volatile memory for normal controller operation. **Your Scorpion Antennas Controller is now ready to use!**



Motor Current Calibration Menu

## Using the Scorpion Antennas Controller

### Tuning your dipole:

It is recommended that an analog SWR Meter be used with this controller so small SWR variations may be observed. Initially, press "Retract" and then place your transmitter in transmit (carrier inserted) at a minimum power level to see reflected power on the SWR meter. While watching reflected power, press the "Both" button "Towards 80 Meters" and watch for a dip in reflected power. Once that has been observed, you may use the individual "Left" and "Right" buttons to fine tune the SWR. When you have acquired the minimum reflected power, if it is above 1.5:1, you may wish to mal-adjust one side a small amount and use the other side to reduce SWR. By performing this minor adjustment procedure, you should be able to come very close to a 1:1 SWR. Alternately, you may utilize an antenna/SWR analyzer to facilitate adjustment of the antenna system.

**Using the Memory Buttons:**



Once you have acquired an acceptable SWR, you may memorize the antenna leg counts in any of eight memory positions by pressing and holding one of the memory buttons (M1, M2, M3 or M4). The length of time a memory button is held determines the bank and memory number as follows:

**Memory Storage:**

Button	Bank A (hold for 2 seconds and the display will indicate)	Bank B (hold for 4 seconds and the display will indicate)
M1	MEMORY 1	MEMORY 5
M2	MEMORY 2	MEMORY 6
M3	MEMORY 3	MEMORY 7
M4	MEMORY 4	MEMORY 8

When the memory location you want to store appears on the display, release the button. For example, if you want to store an antenna position in MEMORY 7, press and hold the M3 button for four seconds and release it when “MEMORY 7” appears on the display.

Once an antenna position is memorized, the left and right counts will be displayed along with the memory location.

**Memory Recall:**

**To recall memory positions 1 through 4 (Bank A), a “single tap” of the M1, M2, M3 or M4 button is required.** When you tap once, you will see dashes progress across the display followed by an asterisk and then the memory location as follows:

----- \* and then the memory location will be displayed. For example, suppose antenna position [LEFT 35 RIGHT 37] is stored in MEMORY 4. To recall MEMORY 4, tap the M4 button. The display will show: ----- \* followed by [35 MEMORY 4 37]

**To recall memory positions 5 through 8 (Bank B), a “double tap” of the M1, M2, M3 or M4 button is required.** When you tap once, you will see dashes progress across the display. Hit the second tap the moment the asterisk appears. Think of a “double-tap” as being similar in timing to a “double-click” of a mouse to start a software application on your computer. There is a video demonstration of the “double-tap” technique on the Scorpion Antennas website at <http://www.scorpionantennas.com/>

Tach-pulses from the antenna are rather coarse, so using a memory position will take you to the band of operation, but it may be necessary to “touch up” the left and right sides for lowest SWR.

## Additional Controller Features

All of the additional features, which are diagnostic, are activated by pressing a simultaneous combination of front panel buttons during power-up as follows:

- **Display Current Threshold settings for Both Motors--Press M3 + M4 buttons and power up.**
  - Threshold settings stored in the controller will be displayed momentarily, and then the controller will return to normal operation.
- **Manual Current Threshold Setup (one current for both motors)—Power up with “Left” and “Both” buttons pressed “Towards 80 Meters.”** A menu will appear allowing a scroll of currents in steps of 0.1 amps using the “M1” button. Once the current is displayed that you wish to use, press “M2” to save into memory. The controller will automatically restart.
- **Current Test Display -- Power up with left up & left down buttons pressed.** The controller will go into a current test display where you can operate either motor up or down and get a current usage display. There is no over current limitation in this mode and you can only operate one motor at a time. Power cycle the controller to exit the test display, and then “Retract” the antenna to synchronize the counters.



- **Reed-Switch Diagnostic – Power up with right up & right down buttons pressed.** This display shows the tach-pulses from the antenna alternating between “1” (reed-switch open) to “0” (reed-switch closed). The alternation between 1 and 0 may happen rapidly because of the motor speed. Power cycle the controller to exit the test display, and then “Retract” the antenna to synchronize the counters.

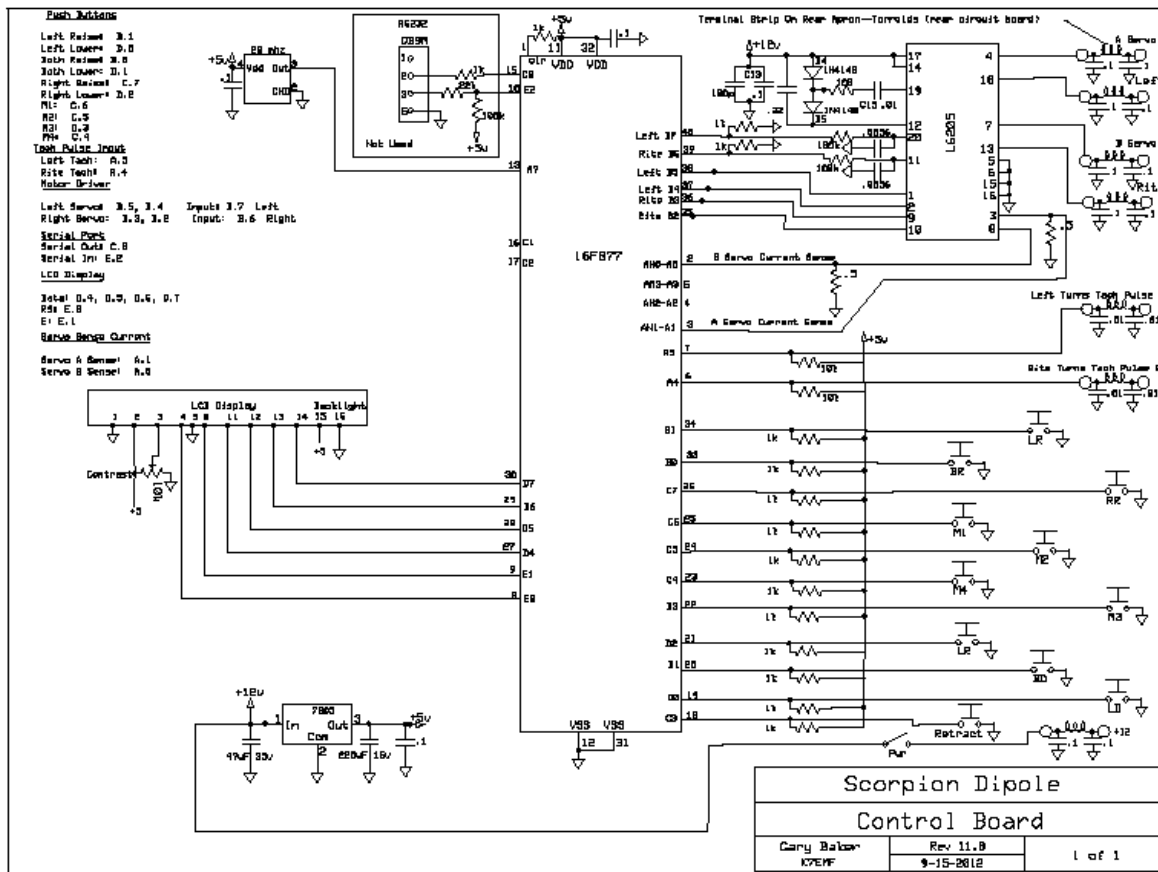
**Troubleshooting:**

Symptom	Useful Diagnostic Feature	Suggestion
Cannot move the antenna	<ol style="list-style-type: none"> <li>1. <b>Display Current Threshold</b> settings for Both Motors--<b>Press M3 + M4 and power up.</b></li> <li>2. Check whether the antenna motor is drawing current using the <b>Current Test Display -- Power up with left up &amp; left down.</b></li> </ol>	<ol style="list-style-type: none"> <li>1. A screwdriver antenna motor typically requires at least 0.7 amps to operate. Try manually setting the current threshold to a higher value.</li> <li>2. If the motor is drawing current when a “Left” or “Right” button is pressed, try manually setting the current threshold to a higher value. Check for a physical problem with the antenna. If the motor is not drawing current, check the cable connections from the controller to the antenna.</li> </ol>
One of the display counters does not change	Check whether the controller is receiving tach pulses from the reed-switch using the <b>Reed-Switch Diagnostic – Power up with right up &amp; right down.</b>	Verify that the antenna is physically moving up/down. Check the cable connections from the controller to the antenna. If the cable and connections are good, you may possibly have a defective reed-switch in the antenna.
Cannot recall Bank B Memories (positions 5 through 8)		Your “double-tap” cadence is not fast enough. Your second tap should happen the moment you see the asterisk on the display. View the demonstration video on the Scorpion Antennas website at: <a href="http://www.scorpionantennas.com/">http://www.scorpionantennas.com/</a>



<p>Counters do not reset when the antenna is retracted.</p>	<p><b>Display Current Threshold</b> settings for Both Motors--<b>Press M3 + M4 and power up.</b></p>	<p>Threshold current setting may be too high. Retract the antenna, turn the controller off, and then <b>Power up while holding M1 and M2 buttons.</b> Press the M4 button to perform an automatic current threshold setting.</p>
<p>I am experiencing a controller issue that is not listed above.</p>		<p>Email or call Ron Douglas:  <a href="mailto:scorpionantennas@cox.net">scorpionantennas@cox.net</a> or          623-326-8780</p>

Schematic:



**Notes:**