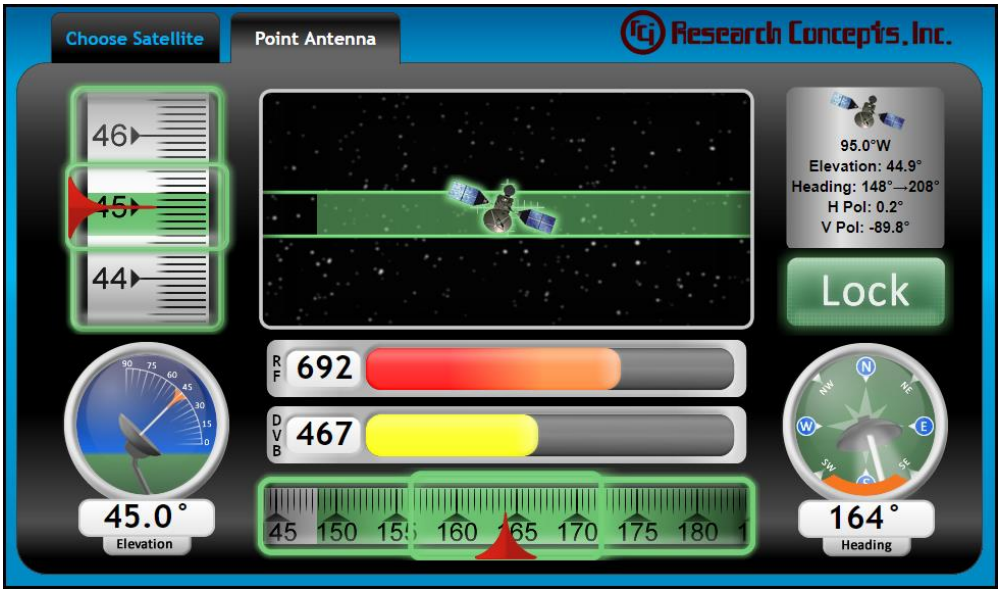
RC300

The Flyaway Companion



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REVISION HISTORY

Date	By	Description
7/20/10	RC	Creation of Manual
4/2/14	KJ	Removed old address
9/25/14	JDK	Add information for DVB-S2.
11/10/16	BK	Updated Warranty
7/6/17	RC	Updated Configuration Items
10/19/18	KJ	Small changes to the new WiFi section and updated the TOC
10/26/18	TB	Add information for SBS2 update.
11/14/18	TB	Add section for security settings page. Add gateway to TCP/IP settings.

System Requirements

Supported Operating Systems: Windows 2000; Windows XP; Windows Server 2003; Windows Vista; Windows 7

Supported Browsers*: Internet Explorer 8.0; Mozilla Firefox 3.6

* JavaScript must be enabled in the browser settings. See Enabling JavaScript in Appendix A for details.

Specifications

Physical			
Size	10.1 inches x 6.3 inches x 3.6 inches		
Weight	2.4 lbs		
Temperature	-40C to +50C		
Power			
AC Adaptor Input	100 to 240VAC, 50 to 60Hz		
DC Input	24VDC, 4W		
Connectors	**Box Connectors**	**Mating Connectors**	
GPS (TNC)	Amphenol Connex 122192	Amphenol Connex 122116	
RF (F-type)	Electronix 34-113	Allied Electronics 647-0082	
DC Power	Switchcraft L712AS	Switchcraft 761KS12	
Ethernet	Molex 84700-0001	Molex 84700-0002	
GPS			
Antenna Gain	10 to 30 dB		
Antenna Supply Voltage	2.5 to 5.5VDC		
Antenna Current Consumption	12mA ± 2mA (typical) @ 5.5V, 6mA ± 1mA (typical) @ 2.5V		
DVB	**DVB-S1**	**DVB-S2**	
RF Frequency Range	940 to 2160 MHz		
Symbol Rate	1 to 45 MS/s		
Demodulation	QPSK	QPSK	8PSK
FEC Code Rate	1/2, 2/3, 3/4, 5/6, 6/7, 7/8	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	3/5, 2/3, 3/4, 5/6, 8/9, 9/10
RF Signal Range Min	-82 dBM @ 27.5 MS/s c/r 7/8		
RF Signal Range Max	-8 dBM @ 27.5 MS/s c/r 7/8		
Protection Margin to Adjacent Channel Interference	25 dB min		
External (optional)			
Input Voltage Range	0 – 10 VDC		
External LOCK input	5VDC		
Sensors			
Elevation Accuracy	± 0.2^{o}		
Heading Accuracy	± 1.5^{o}, undisturbed field		

Chapter 1 Introduction

The RC300 Flyaway Companion is designed for both the technical and the non-technical operator of a flyaway antenna system to assist in the process of locating and locking on to a particular satellite.

1.1 Organization of this Manual

Chapter 2 is the installation portion of the manual.

Chapter 3 describes the user interface and the basic operation of the unit.

Chapter 4 explains the advanced operation of the unit.

Appendix A provides troubleshooting information.

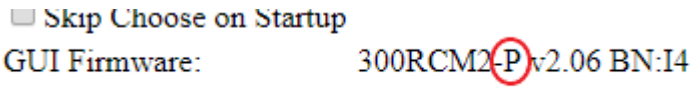
Appendix B provides detailed drawings of the unit.

1.2 Before You Begin

Please read and understand the manual. Time invested in understanding the installation and operation of the Flyaway Companion will insure satisfactory results. The unit has been tested thoroughly and will work accurately and reliably if it is installed and configured properly. There is an old saying in the controller business - "Garbage in, garbage out". Be sure to follow the procedure described in Chapter 2 for installing and configuring the unit.

1.3 Software Configurations

Although satellite selection is discussed further in Chapter 3, it is important to note that different software configurations can be installed on the RC300 depending on the type of receivers you have in your system. The RC300 currently supports DVB (S and S2) and SBS2 Beacon Receivers. A digit in the GUI firmware version will indicate what type of receiver/s will work in your system (as shown below).



The table below describes the type of receiver available for each possible firmware version.

Digit Indicator	Type of Receiver
H	DVB-S2
L	SBS2 Beacon
P	DVB-S2 and SBS2 Beacon

Chapter 2 Installation

2.1 Mounting the RC300

Mount the unit rigidly to the back structure of your antenna such that the back of the unit is pointed in the same direction as the antenna.

See Appendix B for a detailed drawing of the RC300.

2.2 Mounting the GPS Antenna

Mount the GPS antenna in a position where it has an unobstructed view of the horizon and sky.

2.3 Connecting the Cables

Step 1) Connect the GPS antenna to the unit.

Step 2) Connect one end of the Ethernet cable to the unit and the other end to your computer.

Step 3) Connect one end of the coaxial cable to the unit and the other end to the inline power injector. The RC300 does not provide power to the LNB. An external power source is required.

Step 4) Connect the power cable to the unit.

2.4 Configuring Your Computer

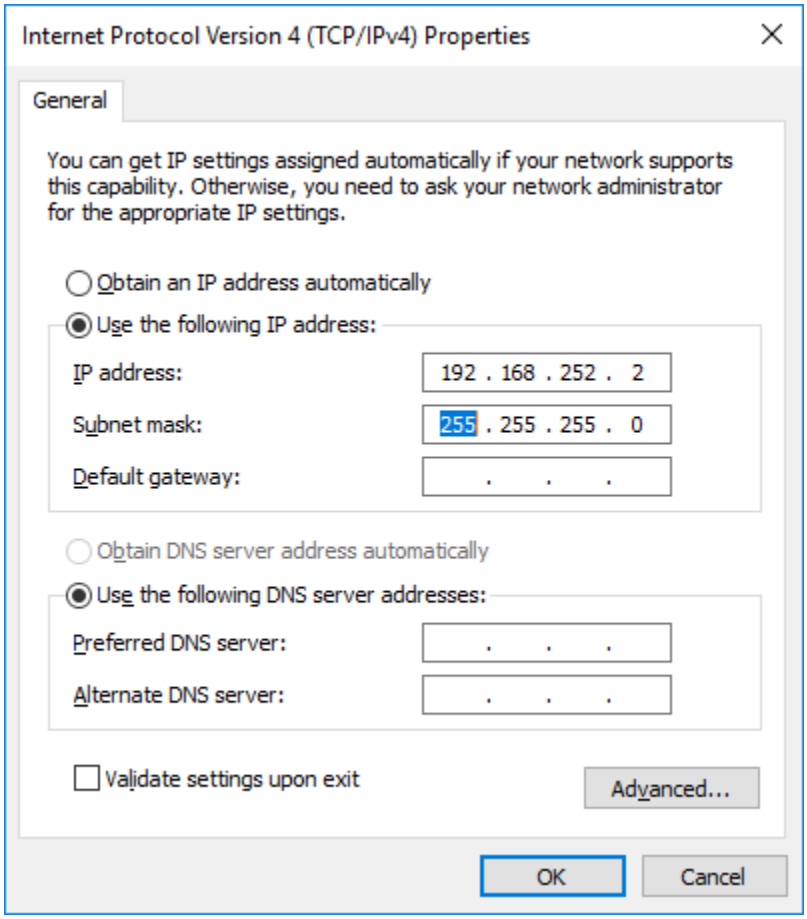
Step 1) Open the Internet Protocol (TCP/IP) Properties window.

Step 2) Write down your current IP Settings before making any changes.

Step 3) Select the “Use the following IP address:” option.

Step 4) Change the “IP address” to 192.168.252.2.

Step 5) Change the “Subnet mask” to 255.255.255.0.



2.4.1 Wi-Fi Option Configuration

As an option, an RC300 can come preconfigured with a wireless router installed inside. If the RC300 is configured for wireless there will be a “W” in position 7 of the RC300 part number (i.e. 300-xxWxxxxxxxx-xxxx). If the Wi-Fi option is available the PC being used, should be setup for DHCP.

The default SSID for the wireless router will be RC300 s/n:xxx (where xxx is the serial number of the unit). For RC300 serial numbers below 288 the default wireless password is 12345678. For RC300 serial numbers 288 and above, the default wireless password is 1234567890.

The wireless router will DHCP all addresses between 192.168.252.100 and 192.168.252.250. Any addresses between 192.168.252.2 and 192.168.252.99 will be treated as static. The RC300 will be at a default static IP address of 192.168.252.1.

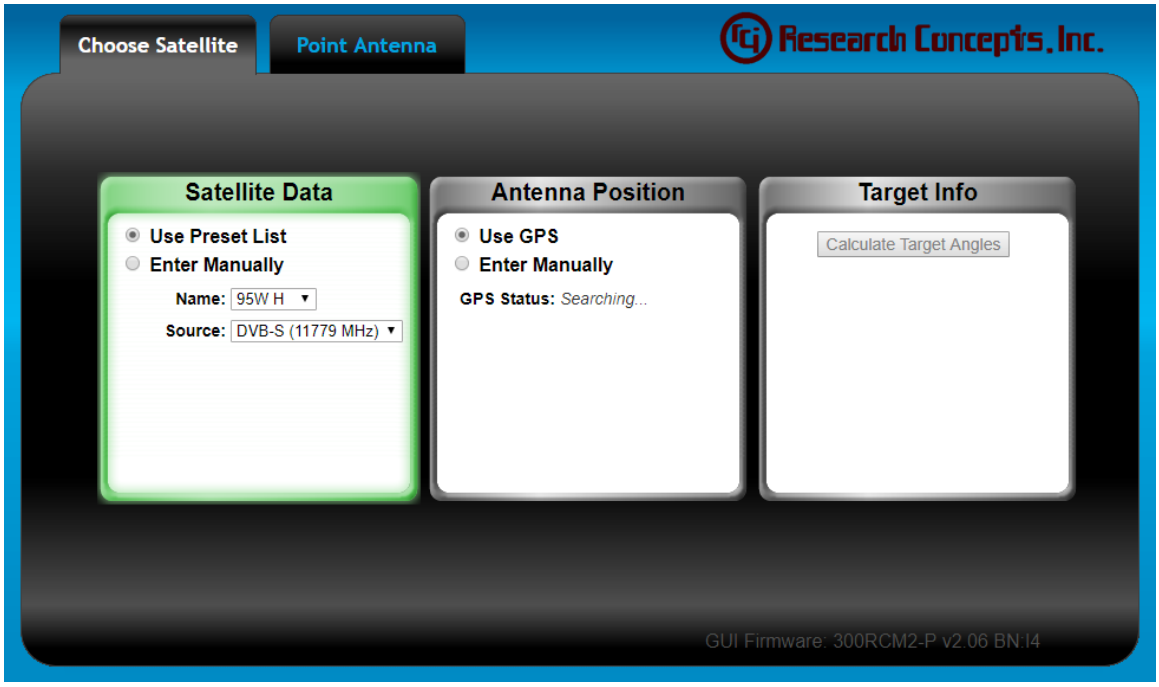
!!If changing settings on the router, it may be necessary to also change the IP settings of the RC300 to ensure that communication is not lost!!

For support on configuring or restoring the wireless router feel free to contacting Research Concepts support at support@researchconcepts.com . Just indicate the serial number of the RC300 and a configuration file or setup instructions can be sent.

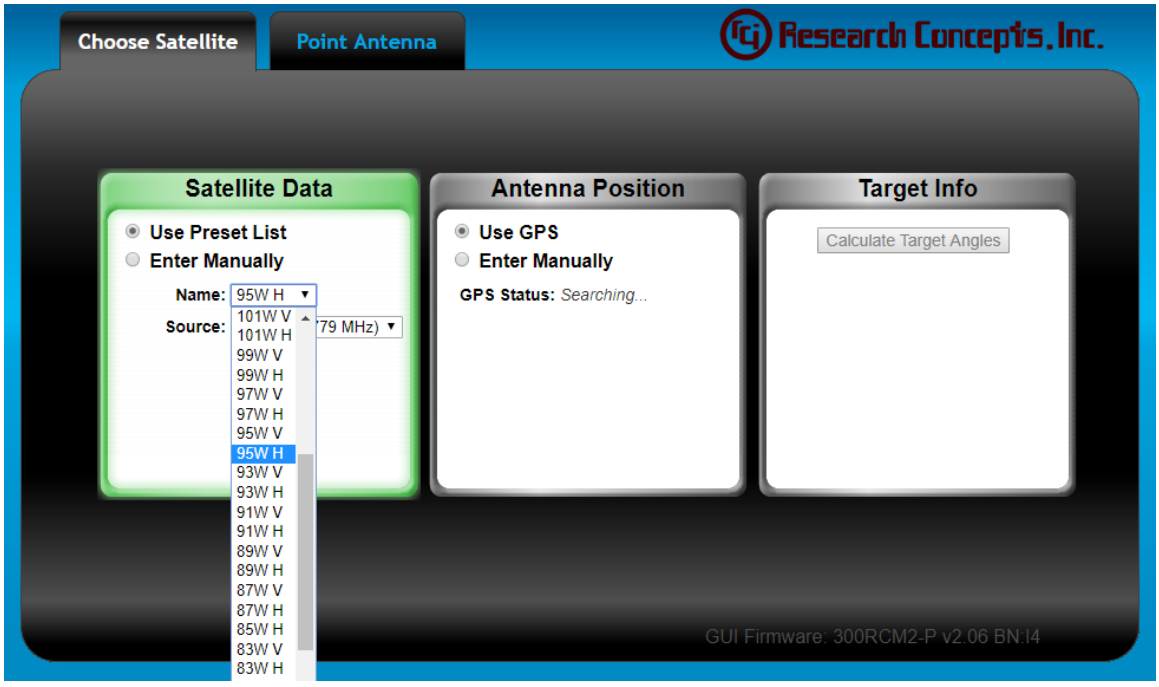
Chapter 3 Basic Operation

3.1 Choosing a Satellite

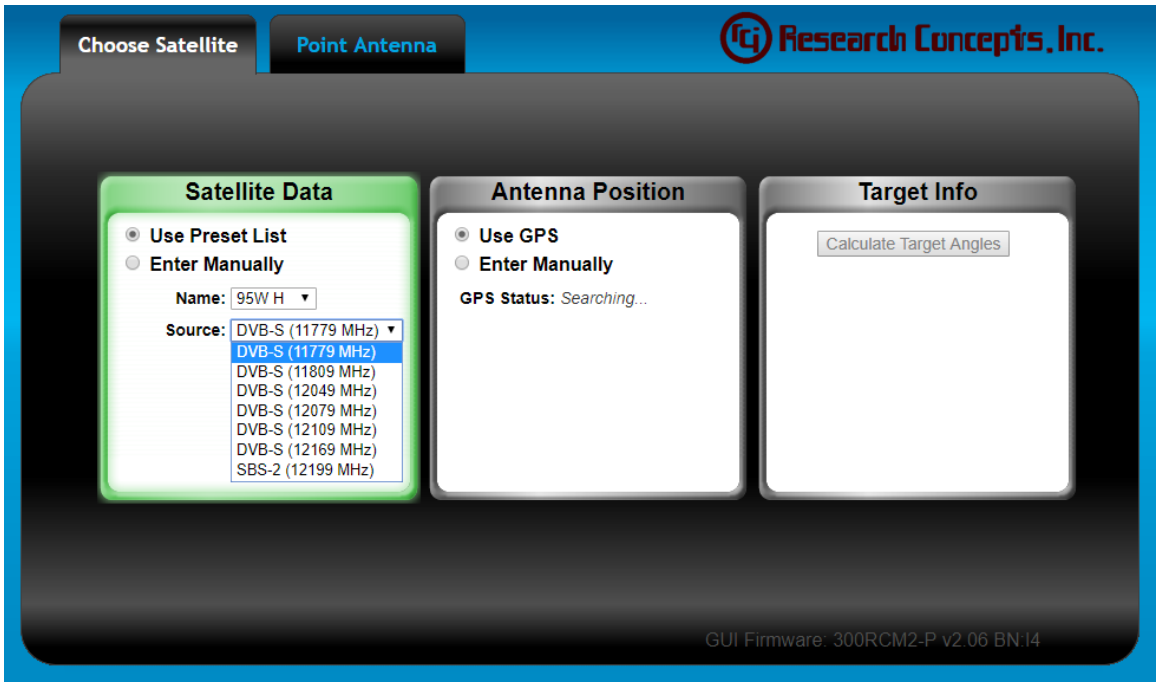
Step 1) Enter “192.168.252.1” into the address bar of your web browser. It may take a minute or two to load the entire interface.



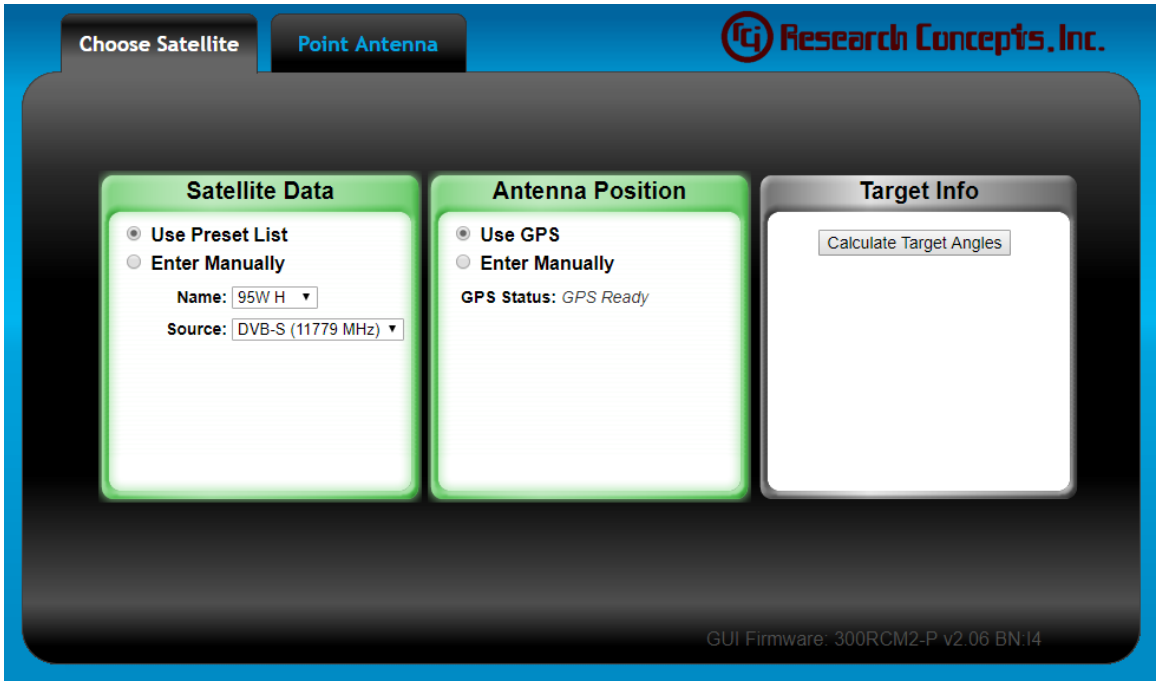
Step 2) Select the name of the target satellite by clicking on the “Name” drop down box.



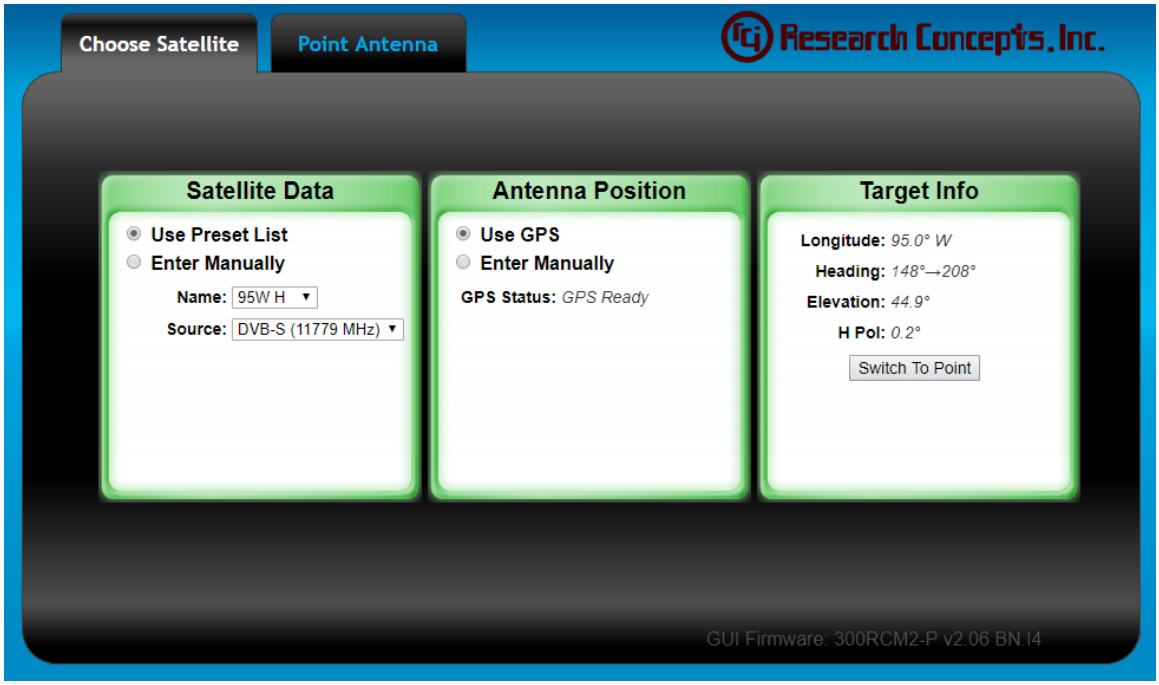
Step 3) Select the signal source and frequency of the signpost by clicking on the “Source” drop down box.



Step 4) Wait for the GPS receiver to achieve a valid lock. The GPS Status will change from “Searching…” to “GPS Ready” when the GPS receiver achieves a valid lock.

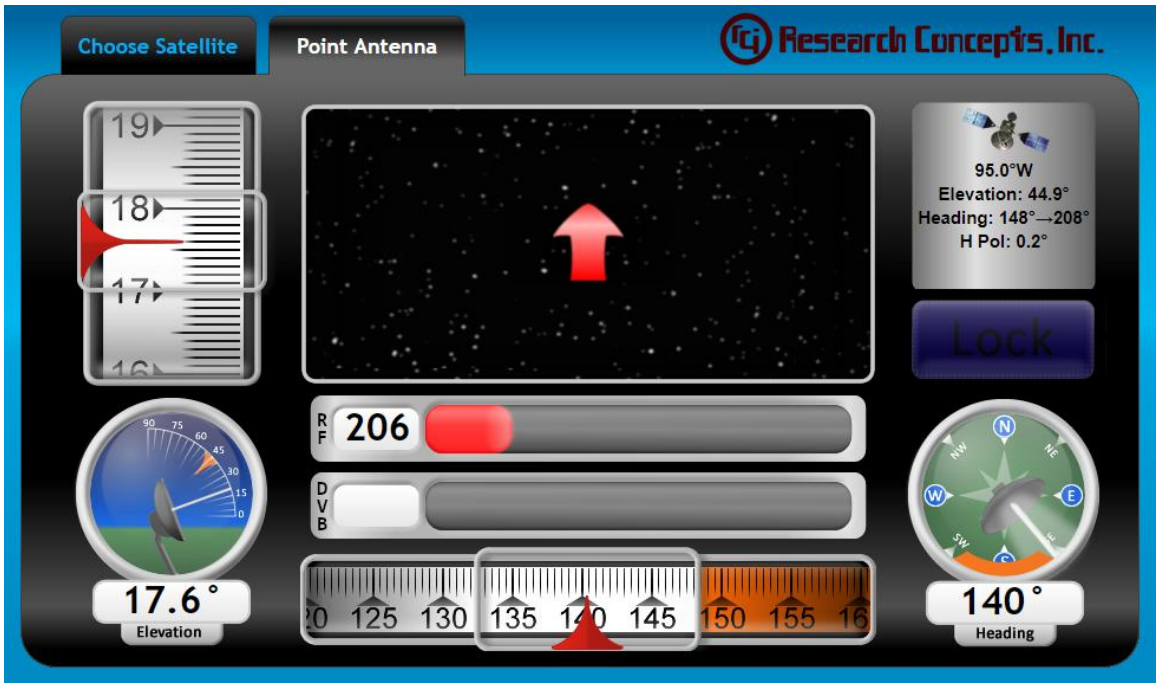


Step 5) Click the “Calculate Target Angles” button to calculate the target angles.

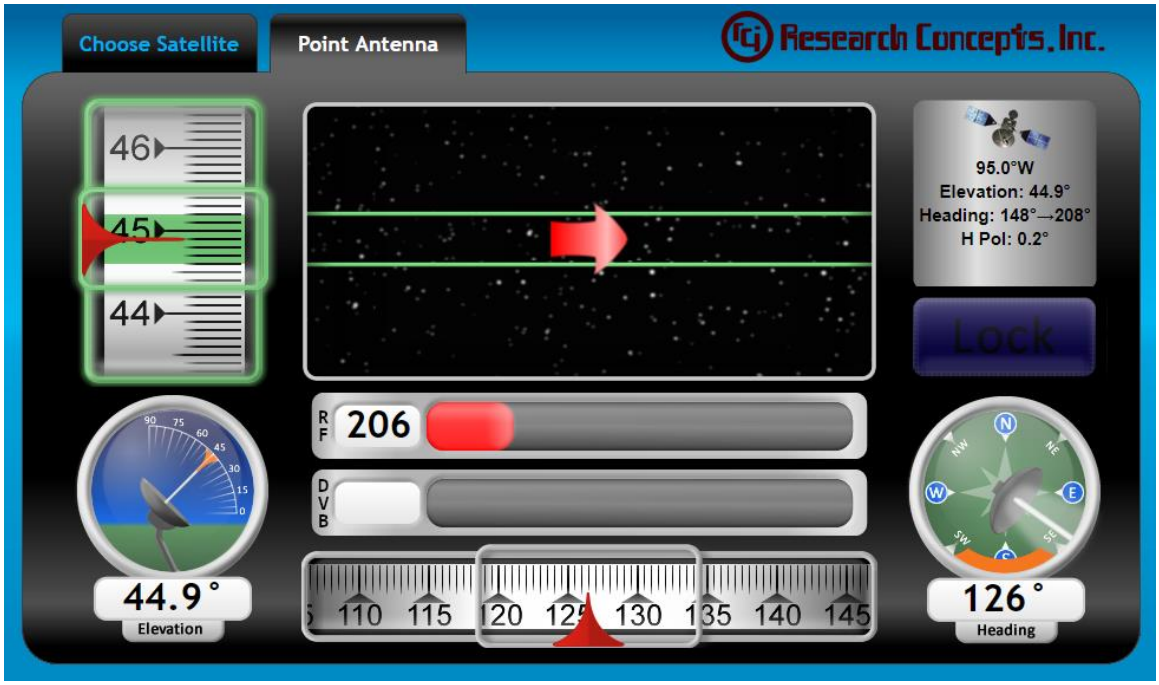


3.2 Finding a Satellite

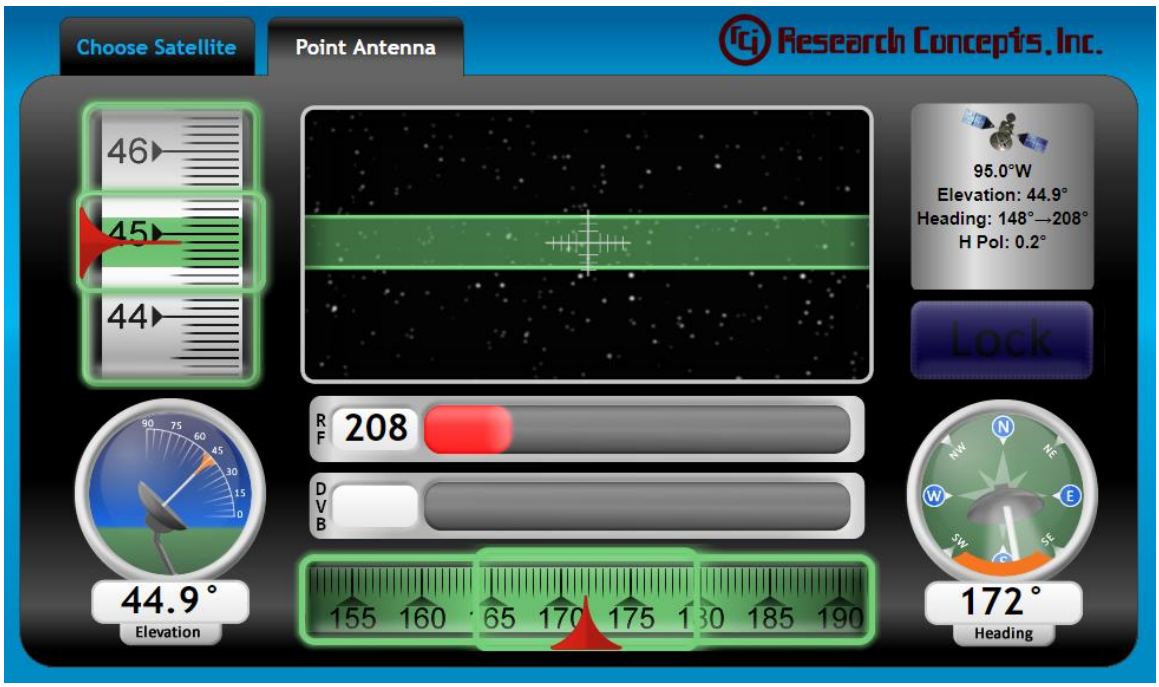
Step 1) Click the “Switch To Point” button to switch to the “Point Antenna” tab.



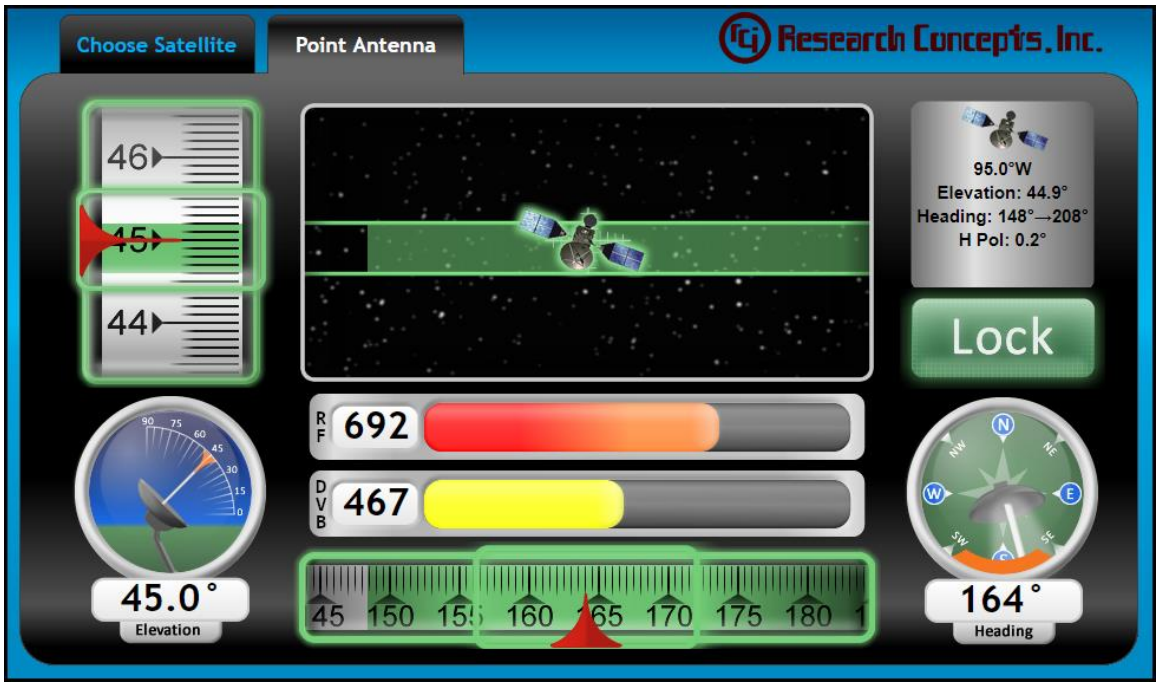
Step 2) Adjust the antenna's elevation until the target elevation is reached.



Step 3) Adjust the antenna's heading until the crosshair is displayed in the target box.



Step 4) Begin scanning across the target box by adjusting the antenna's heading until Source Lock (DVB, BCN – SBS2 Beacon, EXT - External) is achieved.



Chapter 4 Advanced Operation

4.1 Choosing a Satellite Manually

Step 1) Select the “Enter Manually” option.

Step 2) Enter the longitude of the target satellite in degrees.

Step 3) Enter the polarization position (Pol) associated with the satellite.

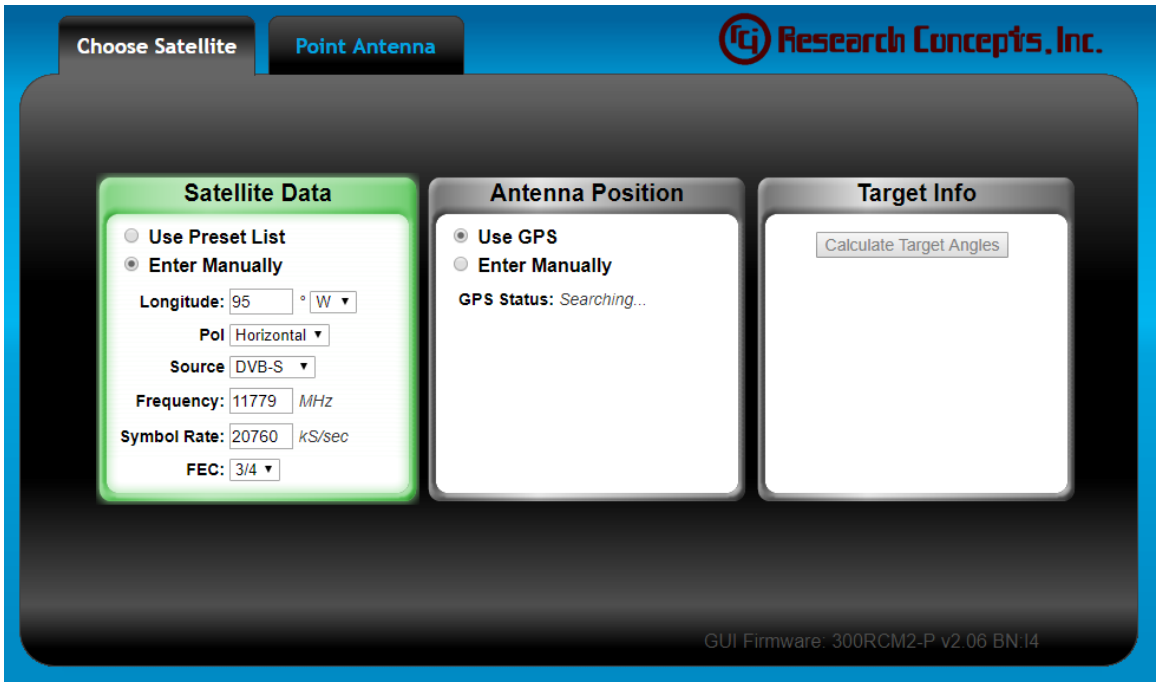
Step 4) Select the signal source being used (DVB-S, DVB-S2, SBS2 for SBS2 Beacon, EXT for External Receiver).

Step 5) Enter the frequency of the target signpost in MHz.

Step 6) Enter the symbol rate of the target signpost in kS/sec (only applicable when using DVB-S and DVB-S2).

Step 7) Enter the FEC of the target signpost (only applicable when using DVB-S, this entry is not displayed when DVB-S2 is selected).

Note: In the case where an external receiver (EXT) is used as the signal source, steps 5-7 will not apply. If the external receiver has a discrete lock output, leave the Threshold value at 0. If the external receiver does not have a discrete lock output, the Threshold value will be used to create a lock when the signal strength is above the Threshold value (acceptable values range from 0-999).



DVB signpost information can be found at ***www.LyngSat.com***, or other similar websites.

4.2 Enter Antenna Position Manually

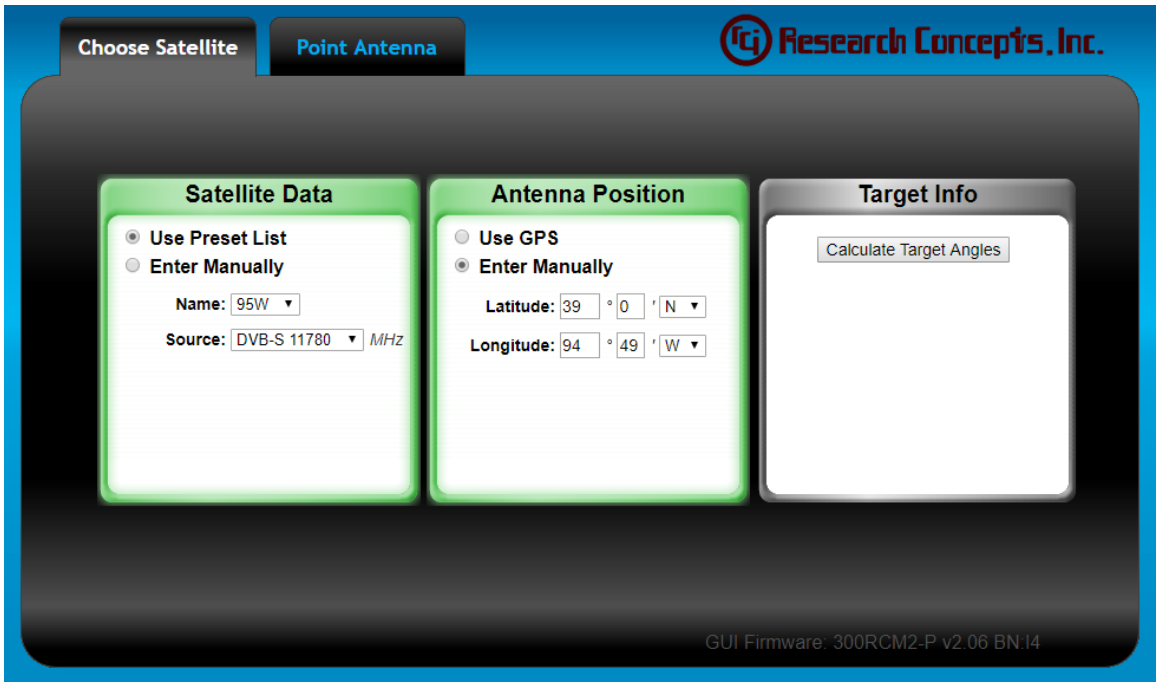
Step 1) Select the “Enter Manually” option.

Step 2) Enter the Latitude of your antenna in degrees and minutes.

Step 3) Select the hemisphere (N for North, S for South) by clicking on the drop down box.

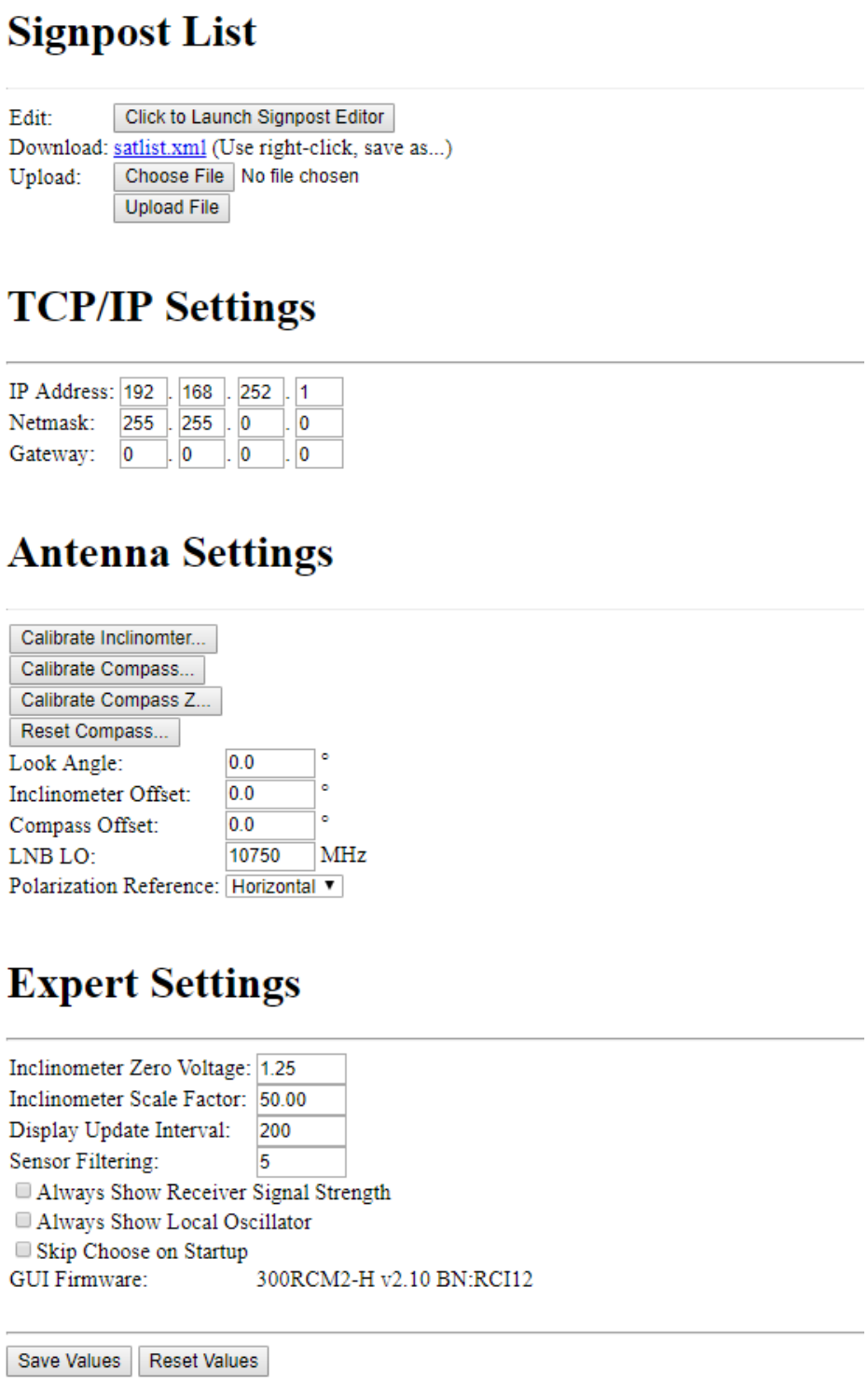
Step 4) Enter the Longitude of your antenna in degrees and minutes.

Step 5) Select the hemisphere (E for East, W for West) by clicking on the drop down box.



4.3 Configuring the RC300

To access the configuration page, enter “192.168.252.1/config” into the address bar of your web browser. Save your changes by clicking the “Save Values” button. The interface may have to be refreshed for changes to take effect.



4.4 Editing the Signpost List

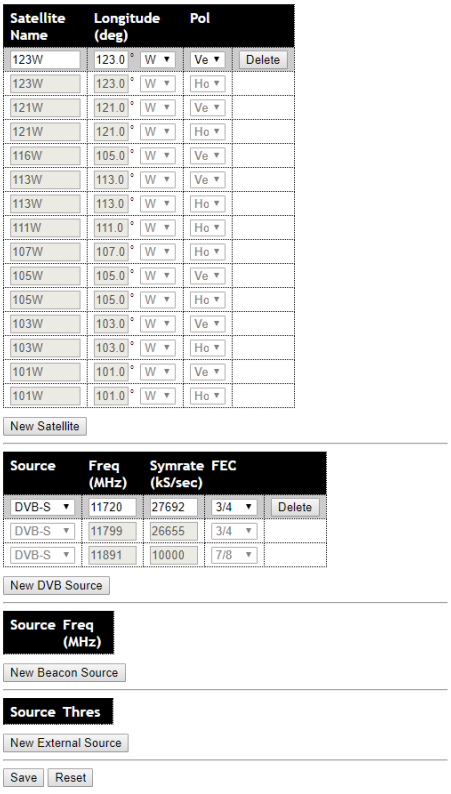
Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) Save a backup of the current Signpost List before you make changes. See Section 4.5 of this manual for instructions.

Step 3) Launch the Signpost Editor by clicking the “Click to Launch Signpost Editor” button. (Note: some pop-up blockers may have to be disabled to launch the Signpost Editor).

Step 4) Make your changes to the Signpost List.

Step 5) Save your changes to the Signpost List by clicking the “Save” button at the bottom of the page.



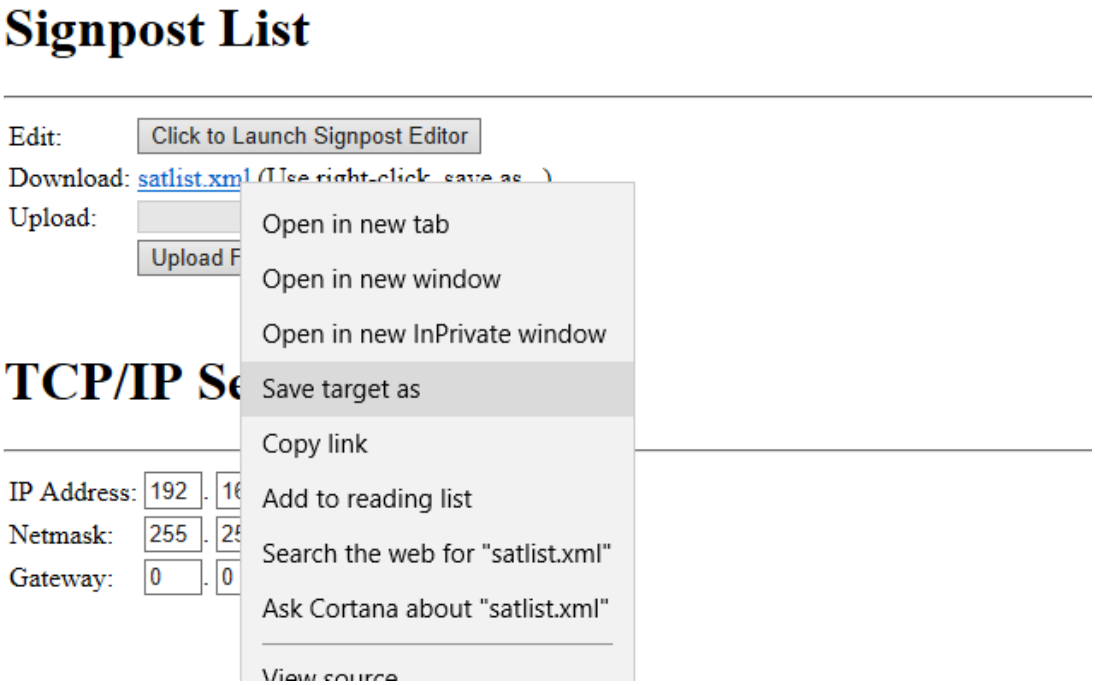
4.5 Saving a Backup of the Signpost List

You may wish to keep a backup of the Signpost List on your local machine. This backup can be uploaded to the unit to restore the Signpost List.

Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) Right click on “satlist.xml”.

Step 3) Click “Save Target As”.



4.6 Uploading a Signpost List

Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) Click the “Browse...” button.

Step 3) Select a saved Signpost List.

Step 4) Click the “Upload File” button.

4.7 Changing the TCP/IP Settings

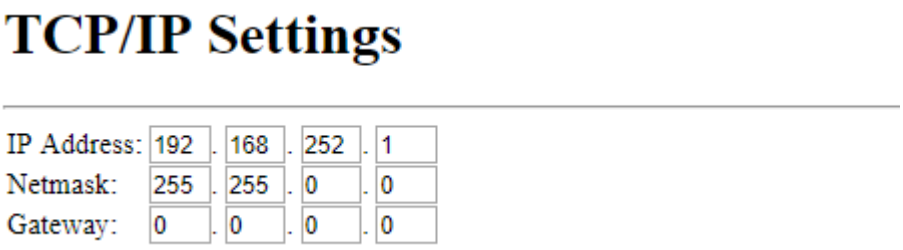
Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) Make your changes to the IP Address, netmask, or gateway.

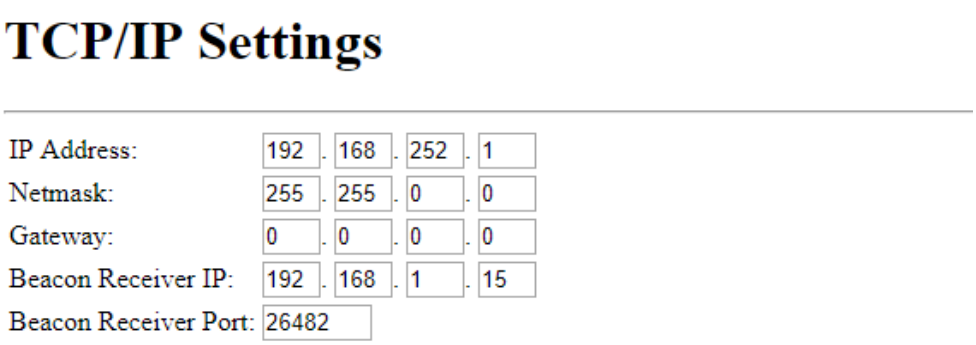
> Note: If your system is built to work with an SBS2 beacon receiver, you will need to enter the correct IP address and port of the SBS2 receiver to use it (see example below).

Step 3) Save your changes by clicking the “Save Values” button. The interface may have to be refreshed for changes to take effect.

Step 4) Write down any changes to the IP address or netmask. You will not be able to connect to the unit without this information.



With SBS2 Beacon Receiver:



4.8 Calibrate the Compass

There are two separate calibration routines for the compass. The first routine (described in Section 4.8.1) calibrates the XY-axes. The second routine (described in Section 4.8.2) calibrates the Z-axis. The XY calibration is typically all that is required for calibration. However, if the compass accuracy is very poor when you adjust the elevation of your antenna then a Z-axis calibration may be needed.

4.8.1 Calibrate the XY-Axes of the Compass

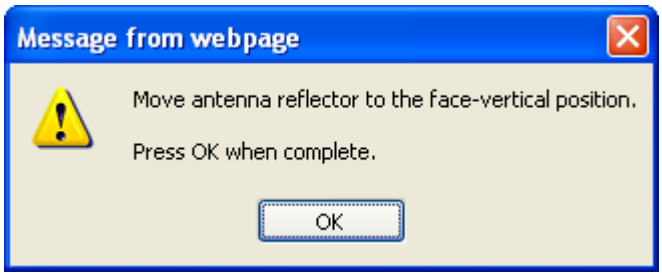
For best results, this calibration routine should be performed with the unit attached to the antenna. If that is not possible, remove it from the antenna and perform the calibration routine.

Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) Start the compass calibration routine by clicking the “Calibrate Compass…” button.

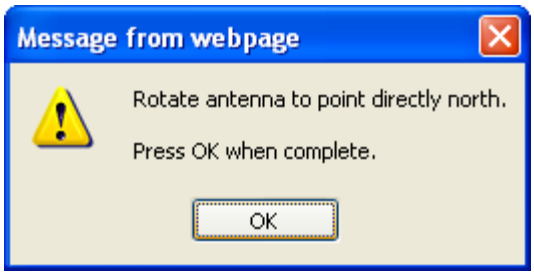
Step 3) Move your antenna reflector to the face-vertical position.

Step 4) Press OK.

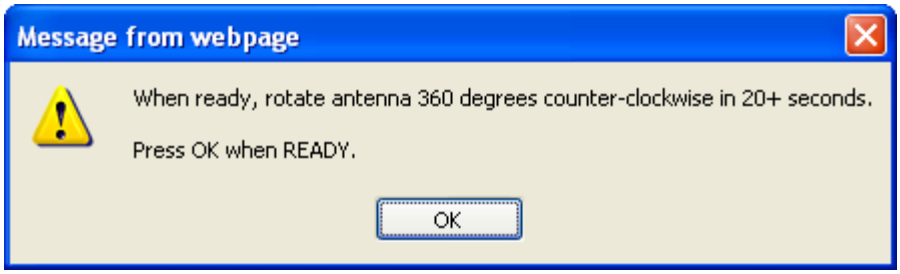


Step 5) Rotate your antenna so that it is pointing directly north.

Step 6) Press OK.

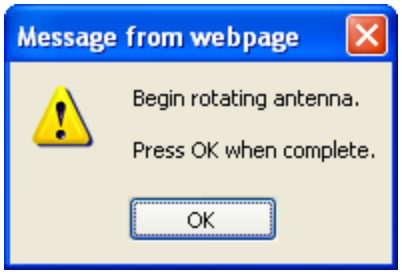


Step 7) When you are ready to rotate your antenna 360 degrees counter-clockwise, press OK.

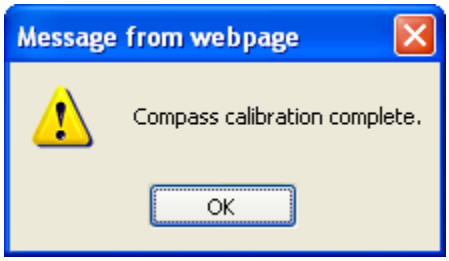


Step 8) Rotate the antenna 360 degrees counter-clockwise taking at least 20 seconds to complete the rotation. The antenna should be kept as level as possible.

Step 9) Press OK.



Step 10) Press OK.



4.8.2 Calibrate the Z-Axis of the Compass

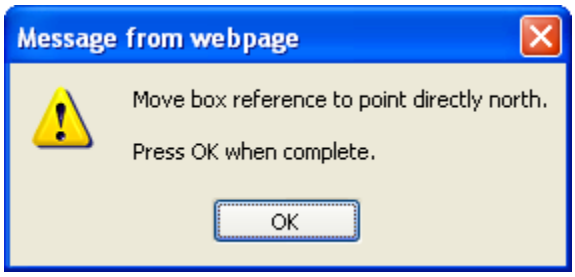
Step 1) Remove the unit from the antenna.

Step 2) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

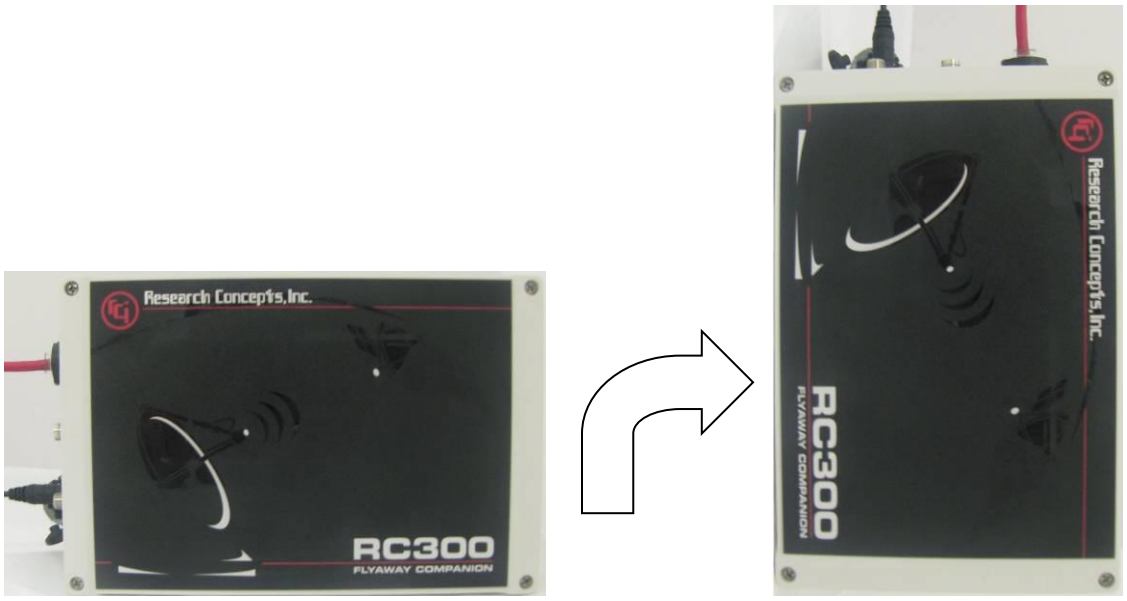
Step 3) Start the compass calibration routine by clicking the “Calibrate Compass Z…” button.

Step 4) Move the unit so that the back of the box is facing directly north. The front of the box (the side with the black overlay) should be facing directly south.

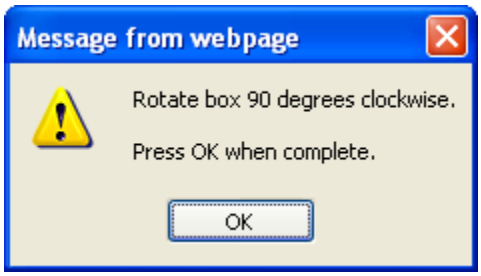
Step 5) Press OK.



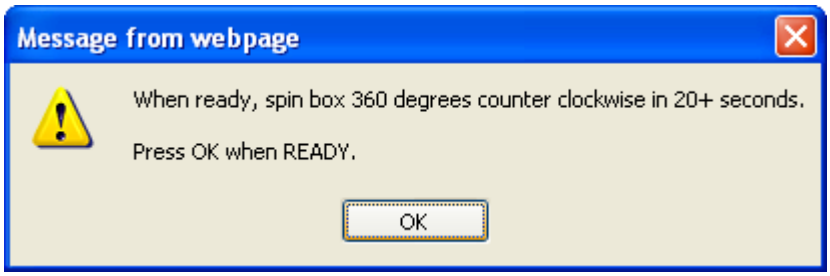
Step 6) Rotate the box 90 degrees so that the connectors are on top side of the box as shown below. The front of the box (the side with the black overlay) should continue to face south.



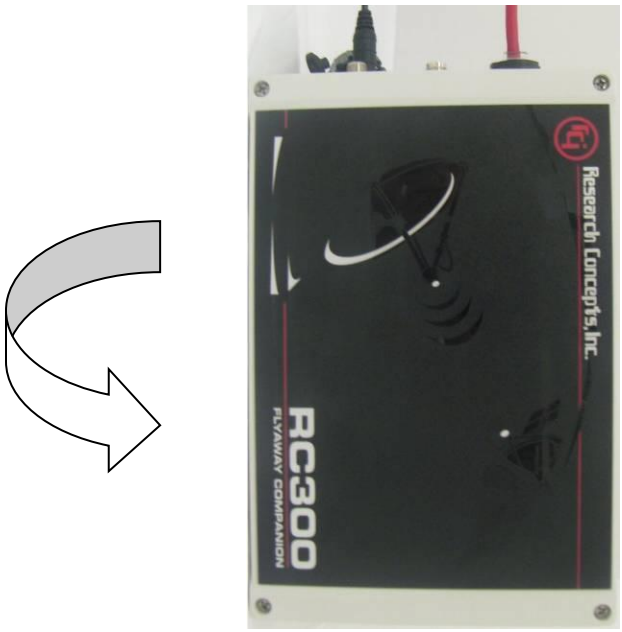
Step 7) Press OK.



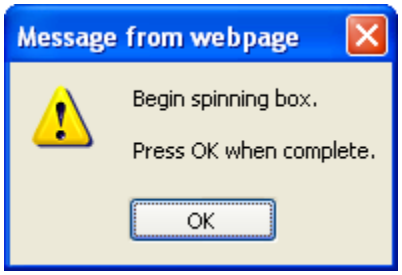
Step 8) When you are ready to rotate the box 360 degrees counter-clockwise, press OK.



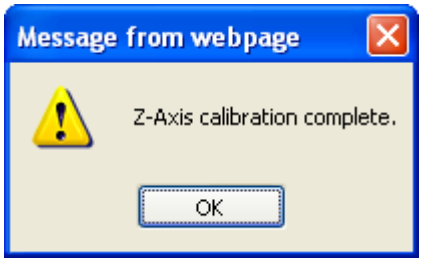
Step 9) Rotate the box 360 degrees counter-clockwise taking at least 20 seconds to complete the rotation. The unit should be kept as level as possible.



Step 10) Press OK.



Step 11) Press OK.



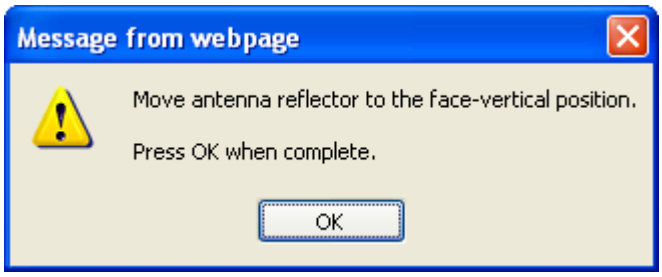
4.9 Calibrate the Inclinometer

Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) Start the inclinometer calibration routine by clicking the “Calibrate Inclinometer…” button.

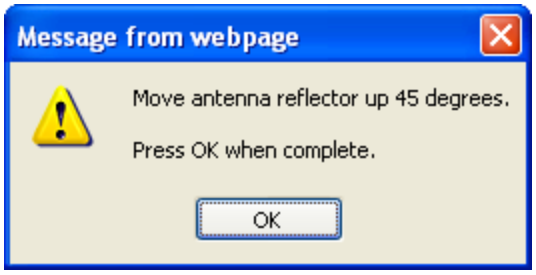
Step 3) Move your antenna reflector to the face-vertical position.

Step 4) Press OK.

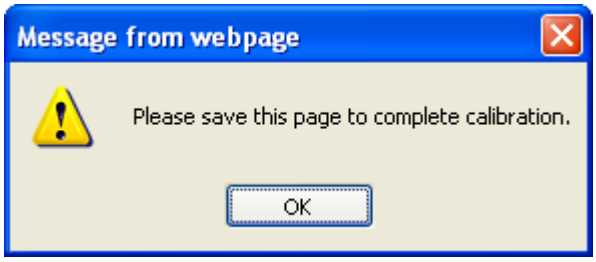


Step 5) Move your antenna up in elevation until reflector is at a 45 degree angle.

Step 6) Press OK.

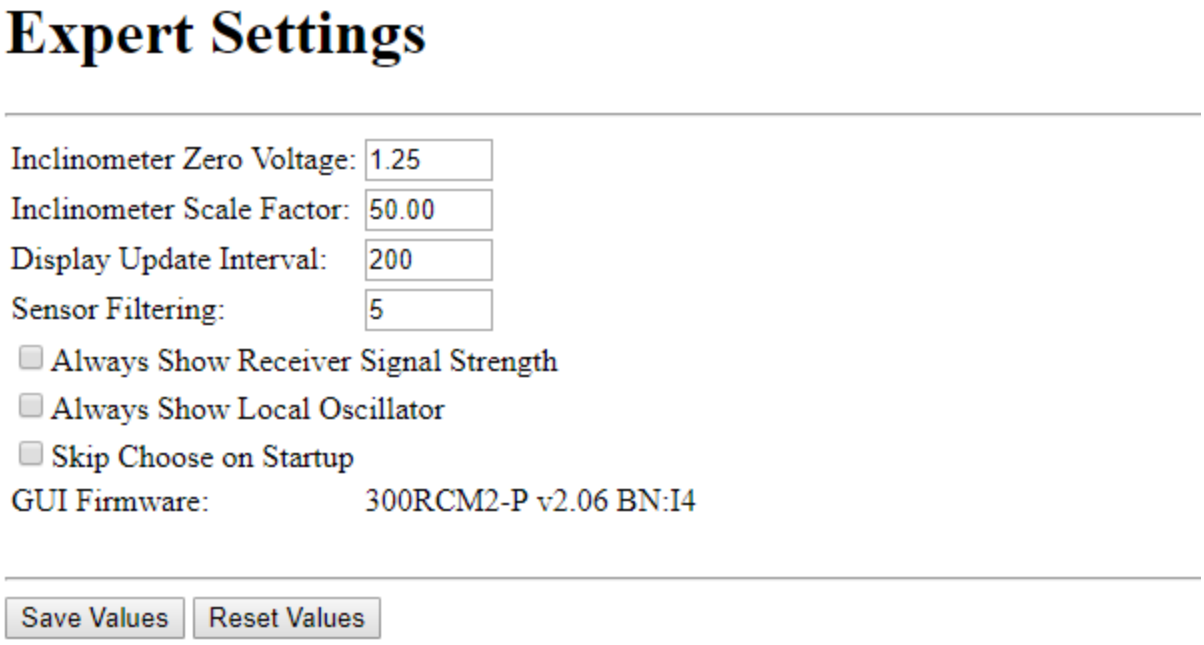


Step 7) Press OK.



When the calibration routine is complete, the results of the calibration will show up in the "Inclinometer Zero Voltage" and "Inclinometer Scale Factor" boxes.

Step 8) Save your changes by clicking the "Save Values" button. The interface may have to be refreshed for changes to take effect.



4.10 Changing the Antenna Settings

Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) Change the value of Look Angle, Inclinometer Offset, Compass Offset or LNB LO.

Look Angle is the antenna bore sight elevation angle when the reflector face is vertical.

Inclinometer Offset is the difference between the antenna’s theoretical and actual look angle.

Compass Offset is the difference between the theoretical magnetic heading and the actual compass heading.

LNB LO is the local oscillator of the LNB which can usually be found on the side of your LNB. Acceptable LO values are between 1000 and 30000 MHz.

Step 3) Save your changes by clicking the “Save Values” button. The interface may have to be refreshed for changes to take effect.

4.11 Changing the Expert Settings

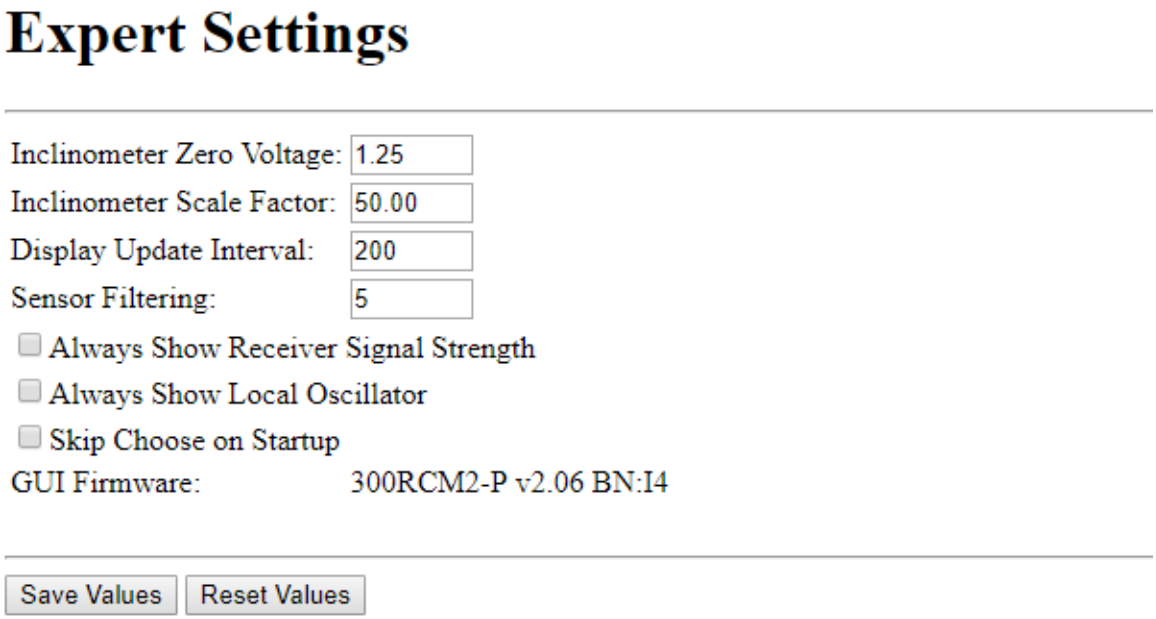
Step 1) Open the configuration page by typing “192.168.252.1/config” into the address bar of your web browser.

Step 2) If you would prefer to have the unit display the Receiver Signal Strength at all times, check the “Always Show Receiver Signal Strength” box. When the box is left unchecked, Receiver Signal Strength will only be displayed when Lock is achieved.

If you would prefer to be able to change the Local Oscillator without having to access the configuration page, check the “Always Show Local Oscillator”. It will be displayed on the “Choose Satellite” tab. When the box is left unchecked, the Local Oscillator can only be changed using the configuration page.

Inclinometer Zero Voltage and Inclinometer Scale Factor should be obtained automatically by performing an inclinometer calibration as described in Section 4.9 of this manual. However, they can be adjusted manually by changing the displayed values.

Step 3) Save your changes by clicking the “Save Values” button. The interface may have to be refreshed for changes to take effect.



4.12 Changing the Security Settings

If you would like to change security settings for the Configuration page and Signpost List Editor, you can do so by following the steps below.

Step 1) Open the security page by typing “192.168.252.1/security” into the address bar of your web browser. The webpage will prompt you to enter a username and password. Default username and password are below:

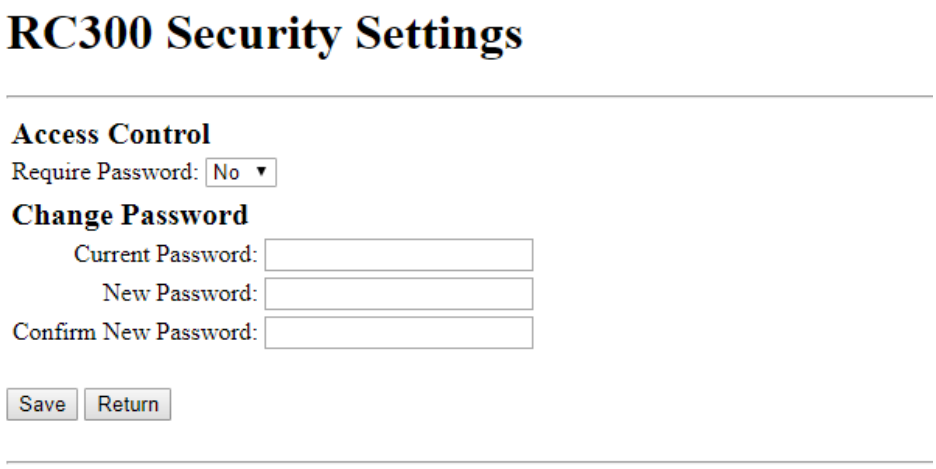
> Username: admin
> Password: password

Step 2) Setting the Access Control to “Yes” will enable the security feature of the RC300. When set to yes, the username and password will be required to access the Configuration page and Signpost List Editor. Leaving it set to “No” will leave the security feature of the RC300 disabled, and the username and password will not be required to access the Configuration page and Signpost List Editor.

Step 3) Make desired changes to the security password.

> Note: Login to the Security page is always required, regardless of Access Control settings, so make note of any changes made to the password.

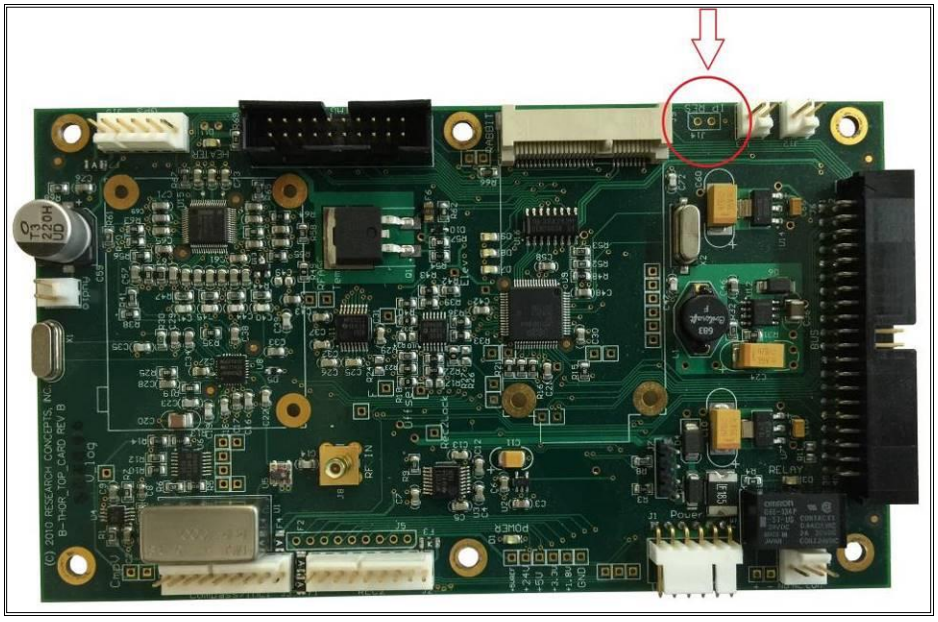
Step 4) Save your changes by clicking the “Save” button. The “Return” button will return you to the main GUI page.



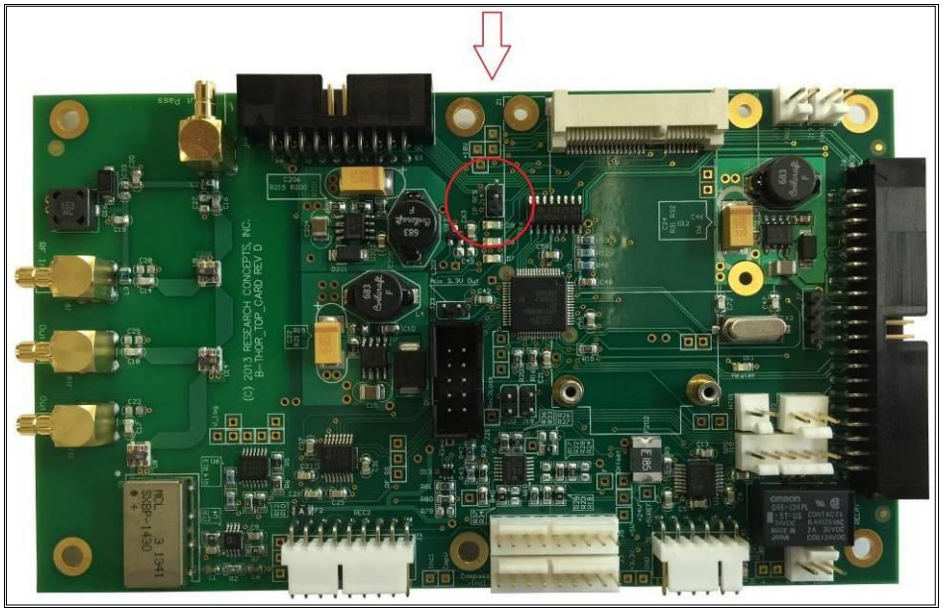
4.13 Resetting the IP Address

Step 1) Remove the lid of the unit.

Step 2) Jumper J14 for ten seconds. After performing a reset the IP address will be 192.168.252.1, the netmask will be 255.255.0.0, and the gateway will be 0.0.0.0. This will also reset the security settings to defaults (See section 4.12). The location of the IP Reset pins is circled in the following pictures:



Rev B Options Board



Rev D Option Board

APPENDIX A Troubleshooting

If you are having problems connecting to the unit:

Step 1) Check that the Ethernet and power cables are connected correctly.

Step 2) Check that the link lights on the Ethernet port of your computer are on.

Step 3) Check that your computer's IP address and netmask are configured correctly (see Section 2.4 of this manual for instructions on configuring your computer).

Step 4) Check that JavaScript is enabled in your browser settings (see Enabling JavaScript later in this Appendix).

Step 5) Check that you are entering the correct IP address into the address bar of your browser.

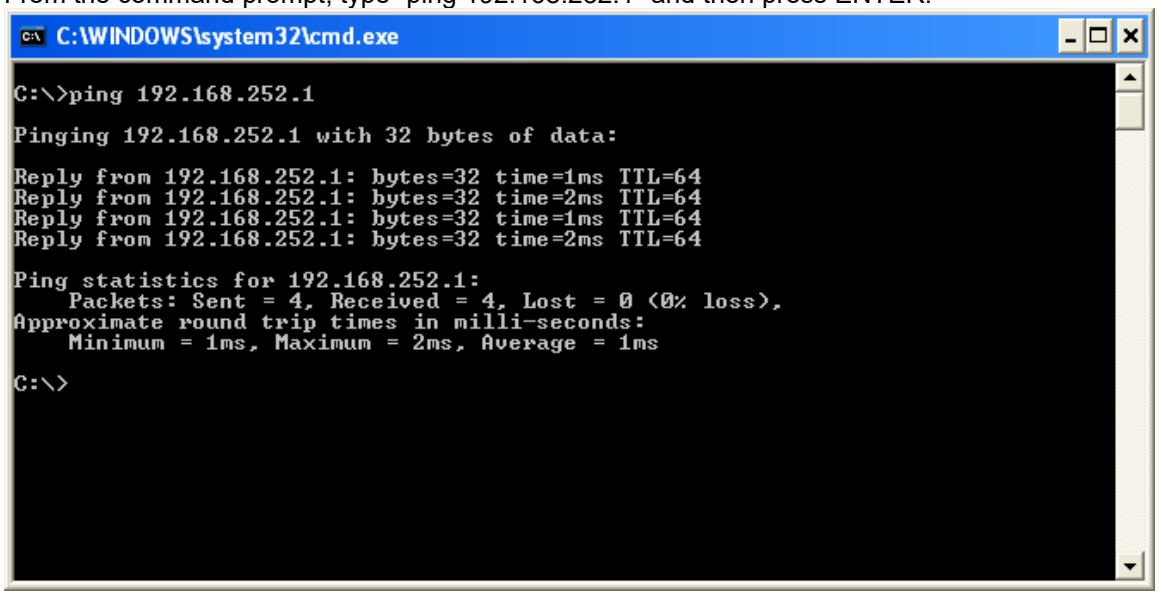
Step 6) Check that you can ping the unit, as shown below.

Step 7) If you cannot connect to the unit after performing Steps 1-6, restart your computer and power cycle the unit. Repeat steps 1-6.

Step 8) If you cannot connect to the unit after performing Step 7, reset the IP address of the unit as described in Section 4.12 of this manual.

Pinging the RC300

From the command prompt, type "ping 192.168.252.1" and then press ENTER.



Enabling JavaScript

Microsoft Internet Explorer 8.x

Step 1) Select "Internet Options" from the "Tools" menu.

Step 2) Click the “Security” tab.

Step 3) Click the “Custom level…” button.

Step 4) Scroll down to “Scripting”.

Step 5) Under “Active scripting”, choose the “Enable” option.

Step 6) Click OK to close Security Settings window.

Step 7) Click OK to close Internet Options window.

Mozilla Firefox 3.x

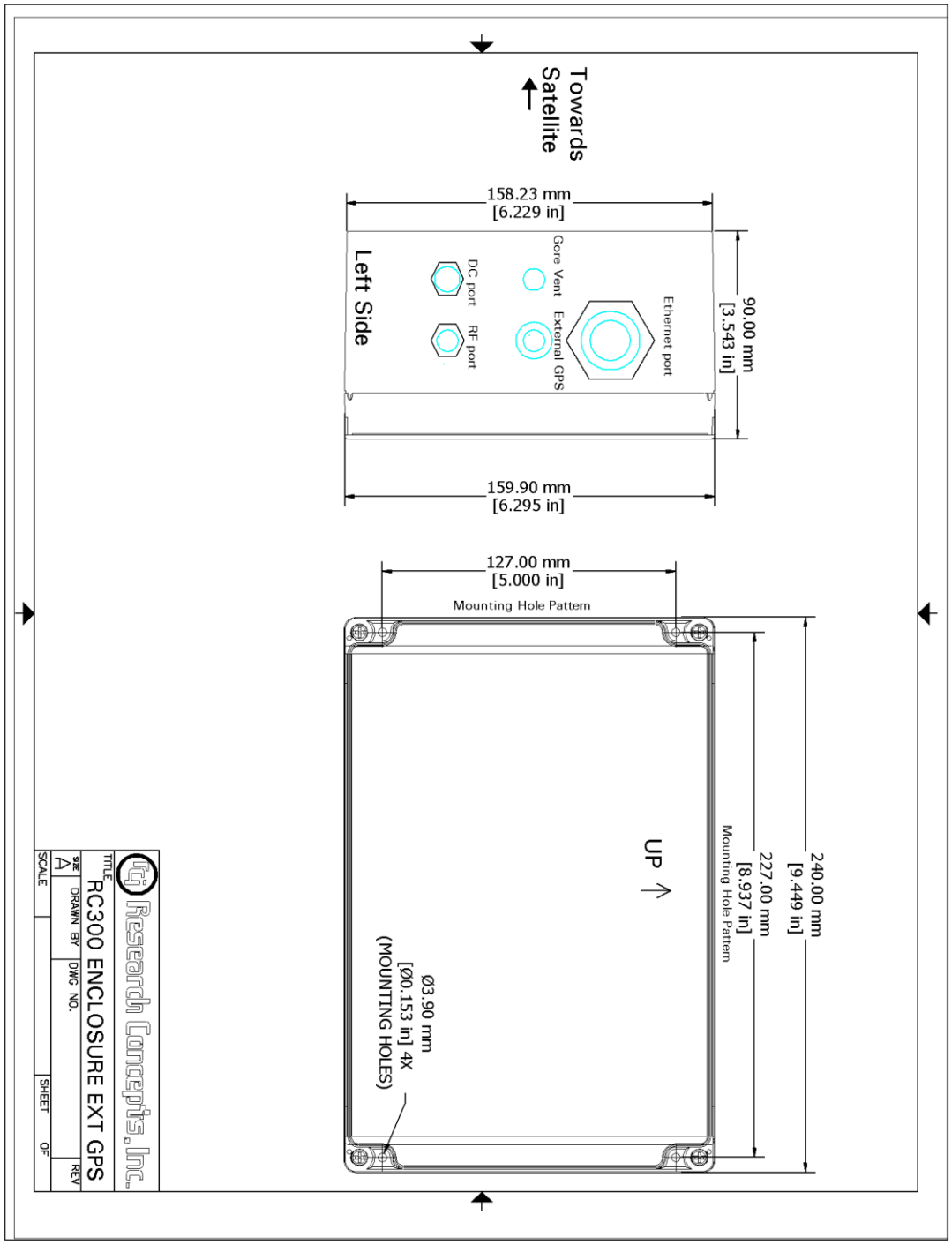
Step 1) Select “Options…” from the “Tools” menu.

Step 2) Click the “Content” tab.

Step 3) Check the “Enable JavaScript” box.

Step 4) Click OK to close the Options window.

APPENDIX B Drawings



LIMITED WARRANTY

New Products

Research Concepts, Inc., RCI, warrants to the original purchaser this product shall be free from defects in material and workmanship for one year, unless expressed otherwise, from the date of the original purchase. During the warranty period, RCI will provide, free of charge, both parts and labor necessary to correct such defects.

To obtain such a warranty service, the ***original purchaser*** must:

1. Notify RCI as soon as possible after discovery of a possible defect, with:

a. Model and serial number

b. Purchase date

c. Detailed description of the problem and circumstances when problem appears, including details on the electrical connection to associated equipment

2. Obtain an RMA number from RCI, then ship the product to RCI in original packaging or its equivalent, fully insured and shipping/customs charges prepaid. RCI is not responsible for damage during shipping.

Repaired Products

RCI warrants *repairs* to be free from defects in material and workmanship for six months from the repair date. If a possible defect is found, use the same process as above to obtain service.

Repair fees for end users are a flat charge based on the equipment being repaired.

Repair fees for Dealers and OEMs are an hourly labor charge plus parts cost. ** ***Dealers and OEMs are responsible for receiving and shipping the products from their customer. ****

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RCI will pay for domestic shipping to return the product using the same method that RCI received it. Customers are responsible for all international shipping charges.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore, read the instruction manual carefully and completely. This warranty does not apply to any defect that RCI determines is due to, but not limited to:

1. Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts
2. Misuse, abuse, neglect, or improper installation including disregard for installation of backup or safety override equipment
3. Accidental or intentional damage, including lightning
4. Water / Liquid damage

There are no implied warranties.

The foregoing constitutes RCI's entire obligation with respect to this product, and the original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages.

For service:

(913)422-0210 support @researchconcepts.com