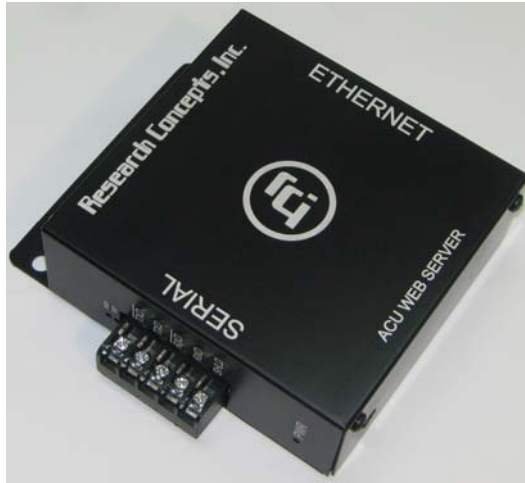


# RCI Web Server User's Manual

RCI P/N: FP-SER-ETH-SERVR2



Content Subject to Change  
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## 1.0 THEORY OF OPERATION

### 1.1 User Interface Overview

The RCI Web Server allows control of an ACU (RC1500, RC2000 or RC2500) by using a web browser. A built-in HTTP server communicates with the ACU using an internal serial port. The server allows control and feedback of the current controller operation using a web-based user interface. Detailed information on the use of the main user interface is given in section 3.1 of this document.

### 1.2 Ethernet-to-Serial Overview

The RCI Web Server also provides an Ethernet-to-serial connection. The entire remote control protocol can be used by encapsulating regular serial messages within UDP datagrams. The corresponding replies are returned in similar fashion. Detailed information on the use of UDP encapsulation is given in section 3.3 of this document.

## 2.0 CONFIGURATION

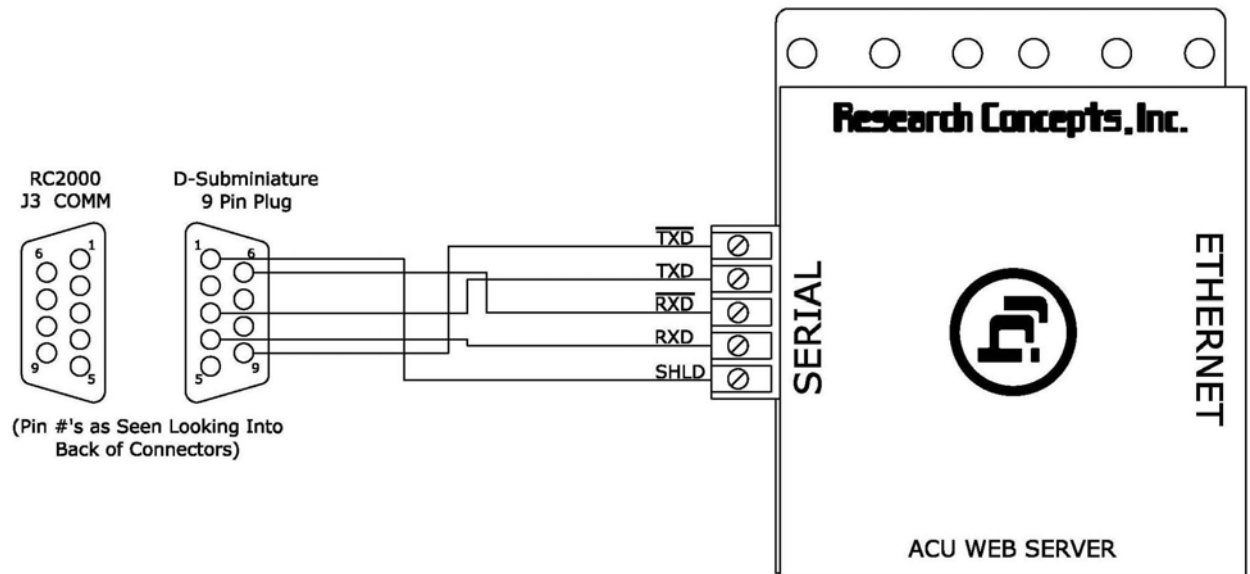
### 2.1 Physical Interface

The RCI Web Server comes in a 4.25" x 3.5" box that mounts using standard rack holes. The box has four indicators to show network and serial port status and activity.

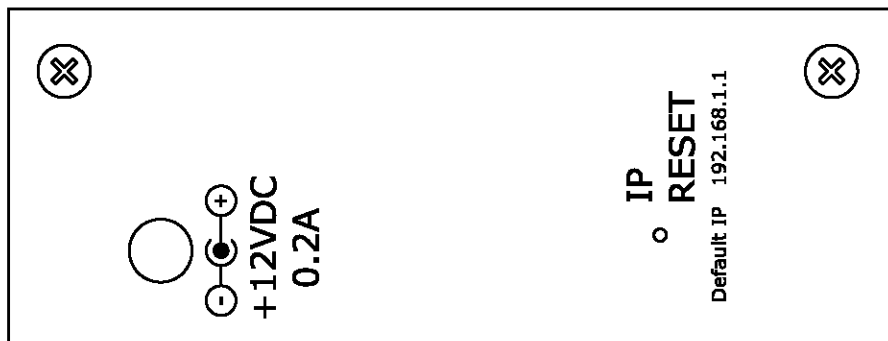
The connection from the target PC or other web-enabled device to the web server should be done with a suitable CAT-5e cable. Depending on other equipment in the network, a cross-over cable may be required. The Ethernet connection is 10/100Base-T.

Input power required: 12VDC at 200mA.

The connection from the web server to the ACU is illustrated in the following drawing:



The Power Input and the IP Reset are located on the side of the enclosure underneath the text “ACU WEB SERVER” as illustrated in the following drawing:



## 2.2 Network Settings

The PC or other web-enabled device and the web server must be properly configured to exist in the same subnet in order to communicate with each other. Ask your system administrator for the subnet mask and a unique IP address, and then configure the web server to that subnet and IP address before connecting it to your network. Specifics on what IP addresses exist within any given subnet and/or how to configure a particular device is outside the focus of this document.

All web servers are factory configured to have an IP address of 192.168.1.1 and a subnet mask of 255.255.0.0. Changes to the IP address or subnet mask can be made from within the configuration interface. Setting the IP address of the target device to 192.168.1.2 with a subnet mask of 255.255.255.0 will usually allow a quick connection to the web server.

### 3.0 DETAILED OPERATION

#### 3.1 Configuration Interface

This section describes the various screens available through the web-based configuration interface. The configuration interface can be reached by adding "/config" to the end of the IP address of the unit. For example, with the default IP address the configuration interface can be loaded by entering "192.168.1.1/config" into the address bar of your browser.

The main configuration interface panel has two navigation buttons. Clicking on these buttons will switch between the available pages. Any changes made to the current page must be saved by clicking the Save button before switching to a different page. The Save button will become enabled anytime a change has been detected.

Each page has several expandable panels. These panels can be expanded and collapsed to show or hide various items. There is no need to save when switching between panels.

The screenshot displays the 'Configuration' page of the RCI Web Server interface. At the top, there are two buttons: 'Configuration Items' (highlighted in orange) and 'Firmware Update'. Below these, the 'TCP/IP Settings' section is expanded, showing input fields for IP Address (192, 168, 252, 111), Subnet Mask (255, 255, 0, 0), Gateway (0, 0, 0, 0), and Applet Port (6767). A collapsed 'Antenna Controller Settings' section is visible below. At the bottom, there are 'Save' and 'Return' buttons.

| Configuration                                     |      |     |     |     |
|---|------|-----|-----|-----|
| <b>Configuration Items</b> <b>Firmware Update</b> |      |     |     |     |
| ▼ <b>TCP/IP Settings</b>                          |      |     |     |     |
| IP Address:                                       | 192  | 168 | 252 | 111 |
| Subnet Mask:                                      | 255  | 255 | 0   | 0   |
| Gateway:  | 0    | 0   | 0   | 0   |
| Applet Port:                                      | 6767 |     |     |     |
| ▶ <b>Antenna Controller Settings</b>              |      |     |     |     |
| <b>Save</b> <b>Return</b>                         |      |     |     |     |

*Configuration Items > TCP/IP Settings*

The available TCP/IP settings and default values are shown below.

**Configuration**

**Configuration Items** **Firmware Update**

▼ **TCP/IP Settings**

IP Address:

Subnet Mask:

Gateway:

Applet Port:

▶ **Antenna Controller Settings**

**Save** **Return**

Applet Port is the port on which the antenna controller will use to communicate with the Applet. This port must be open and not in use on the target web-enabled device.

The interface must be reset if a change is made to any of the settings. The following panel will be displayed during the reset. After the reset is complete, the web browser will reload the page at using the new settings.

**Resetting Interface**

The changes made require a reset.

Please wait 20 seconds...

### *Configuration Items > Antenna Controller Settings*

The available Antenna Controller Settings and default values are shown below.

Display Refresh Time is the number of milliseconds between display updates. Key Repeat Time is the number of milliseconds between successive jog keystrokes. Both of these items may be changed to overcome network latency issues. NOTE: The defaults settings for Display Refresh Time and Key Repeat Time should be used unless instructed by support personnel.

SA Bus Address is the address of the communications port used by the ACU. This setting must match the *Comm Port Address* setting found in the CONFIG Mode of the ACU.

Window Name is the name that will be displayed on the browser window. This can be changed to uniquely identify each controller when multiple ACUs are used at one location.

The screenshot displays a web-based configuration interface. At the top, there is a 'Configuration' header with two tabs: 'Configuration Items' (selected) and 'Firmware Update'. Below the tabs, a 'TCP/IP Settings' section is visible. Underneath, the 'Antenna Controller Settings' section is expanded, showing four configuration fields: 'Display Refresh Time' set to 250, 'Key Repeat Time' set to 600, 'SA Bus Address' set to 50, and 'Window Name' set to 'RCI Antenna Controlle'.

| Configuration               |                       |
|-----------------------------|-----------------------|
| Configuration Items         | Firmware Update       |
| TCP/IP Settings             |                       |
| Antenna Controller Settings |                       |
| Display Refresh Time:       | 250                   |
| Key Repeat Time:            | 600                   |
| SA Bus Address:             | 50                    |
| Window Name:                | RCI Antenna Controlle |

### *Configuration Items > ACU Web Settings*

The RCI Web Server will automatically recognize which ACU it is connected to and the ACU Web Settings will vary by ACU. RC2000As and RC2000Xs do not have any ACU Web Settings that need to be configured.

The RC1500 has three ACU Web Settings. Position CW Limit is the azimuth clockwise limit count value. Polarization CCW Limit and Polarization CW limit are the clockwise and counter-clockwise limit count values for polarization. If these are not configured correctly, the gauges will not work correctly. (These settings do not modify the settings on the ACU.)

The screenshot shows a web interface for configuration. At the top, there is a 'Configuration' header. Below it are two buttons: 'Configuration Items' (highlighted in orange) and 'Firmware Update'. A list of settings categories follows: 'TCP/IP Settings', 'Antenna Controller Settings', and 'ACU Web Settings' (expanded with a downward arrow). Under 'ACU Web Settings', there are three input fields: 'Position CW Limit' with the value '1000', 'Polarization CCW Limit' with the value '1000', and 'Polarization CW Limit' with the value '0'.

| Configuration                       |                                   |
|-------------------------------------|-----------------------------------|
| <a href="#">Configuration Items</a> | <a href="#">Firmware Update</a>   |
| ▶ TCP/IP Settings                   |                                   |
| ▶ Antenna Controller Settings       |                                   |
| ▼ ACU Web Settings                  |                                   |
| Position CW Limit:                  | <input type="text" value="1000"/> |
| Polarization CCW Limit:             | <input type="text" value="1000"/> |
| Polarization CW Limit:              | <input type="text" value="0"/>    |



The RC2000C has four ACU Web Settings. Azimuth CW Limit is the clockwise limit count value for azimuth. Elevation UP Limit is the up limit count value for elevation. Polarization CCW Limit and Polarization CW limit are the clockwise and counter-clockwise limit count values for polarization. If these are not configured correctly, the gauges will not work correctly. (These settings do not modify the settings on the ACU.)

**Configuration**

[Configuration Items](#) [Firmware Update](#)

[▶ TCP/IP Settings](#)

[▶ Antenna Controller Settings](#)

[▼ ACU Web Settings](#)

Azimuth CW Limit:

Elevation UP Limit:

Polarization CW Limit:

Polarization CCW Limit:

The RC2500 has four ACU Web Settings. Azimuth Offset should be set to the Azim Display Offset value in the ACU. Elevation Offset should be set to the El Display Offset. Polarization Offset should be set to the Pol Display Offset. Polarization Degrees per Volt should be set to Pol Display Scale Factor. If these items are not configured properly, the Auto Move to specified angles will not work properly. (These settings do not modify the settings on the ACU.)

## Configuration

[Configuration Items](#)[Firmware Update](#)

▸ TCP/IP Settings

▸ Antenna Controller Settings

▾ ACU Web Settings

Azimuth Offset:

Elevation Offset:

Polarization Offset:

Polarization Degrees per Volt:

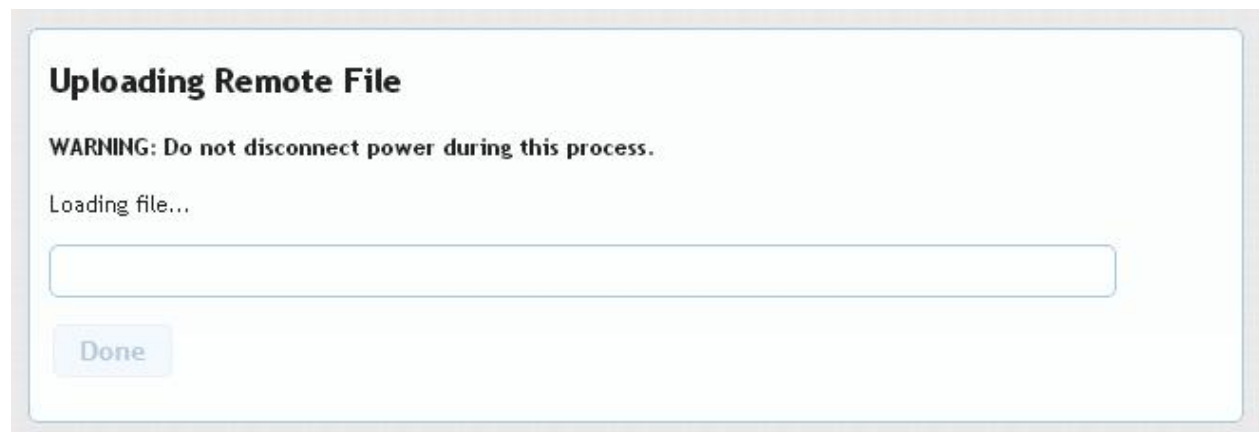
*Firmware Update > User Interface Firmware*

The User Interface Firmware panel is shown below. Choose a file and click the Start Update button to start the user interface firmware update process.



The screenshot shows a web interface with a 'Configuration' header. Below the header are two buttons: 'Configuration Items' and 'Firmware Update'. The 'Firmware Update' button is highlighted. Below this is a section titled 'User Interface Firmware'. Inside this section, it says 'Current Firmware: RCFPS v2.00' and 'Choose a file and click 'Start Update' to begin user interface firmware update.' There is a 'Choose File' button and the text 'No file chosen'. At the bottom of the section is a 'Start Update' button.

The following panel displays the current progress of the firmware update. Click the Done button to return to the configuration interface.



The screenshot shows a web interface with a header 'Uploading Remote File'. Below the header is a warning message: 'WARNING: Do not disconnect power during this process.' Below the warning is the text 'Loading file...' and a progress bar. At the bottom of the panel is a 'Done' button.

### 3.2 User Interface

The User Interface that is displayed depends on the ACU that is connected to the RCI Web Server.

The RC1500 User Interface contains two gauges for displaying Azimuth and Polarization position, a jog panel, AGC output as well as a Satellite List. The Satellite list is automatically populated using the data previously setup in the RC1500. Selecting a satellite name from the Satellite List will begin an Auto Move to that saved satellite.



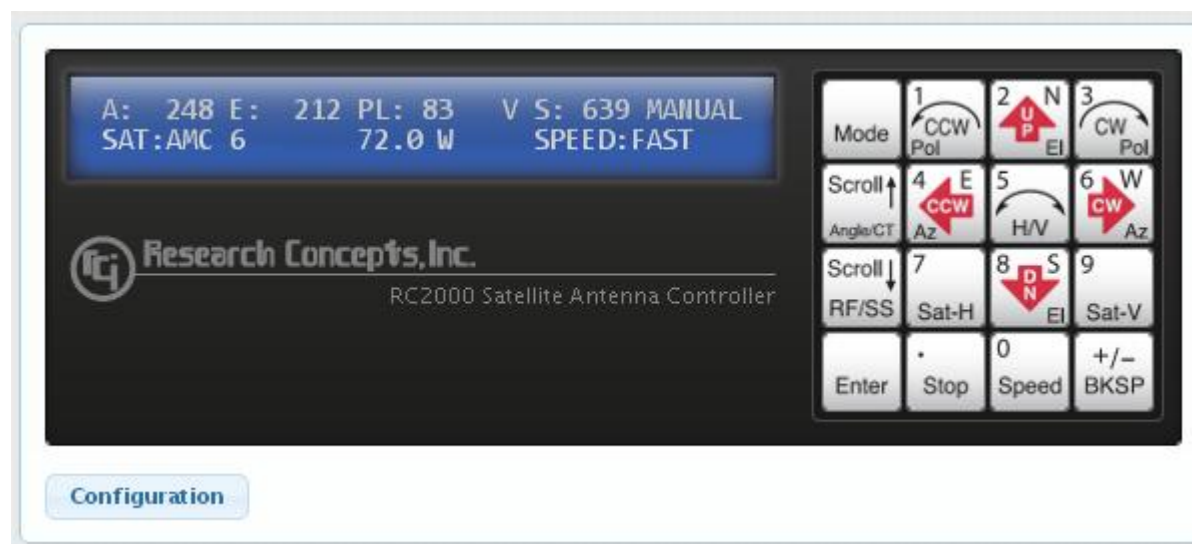
The RC2500 User Interface contains three gauges for displaying Azimuth, Elevation and Polarization position, a jog panel, two AGC outputs as well as a Satellite List. The Satellite list is automatically populated using the data previously setup in the RC2500. Selecting a satellite name from the Satellite List will begin an Auto Move to that saved satellite.



The RC2000A, RC2000C and RC2000X User Interfaces contain three gauges for displaying Azimuth, Elevation and Polarization position, a jog panel, two AGC outputs as well as a Satellite List. The Satellite list is automatically populated using the data previously setup in the RC2000. Selecting a satellite name from the Satellite List will begin an Auto Move to that saved satellite.



The RC2000A (version 2.70 and up) and the RC2000X (version 1.70 and up) can also access the Remote Front Panel. Pressing keys on the panel performs the same action as if keys were actually pressed on the front panel.



### 3.3 Ethernet-to-Serial

This section describes how the ACU can be controlled remotely over an ethernet connection using the User Datagram Protocol (UDP).

UDP is a simple connectionless protocol where datagrams are sent from a host IP and port to a target IP and port. No acknowledgement, retransmission, or timeout is built in. The SA-Bus protocol used by the ACU remote system fills these roles, making UDP the natural choice for monitor and control over an ethernet connection.

The ACU maintains an open IP connection for UDP datagrams on the user-defined Applet Port. By default, this port number is 6767. The packet data of an incoming datagram is relayed directly to the ACU internal serial port. The ACU response is returned to the host in a similar fashion.

The packet structure of a UDP datagram is beyond the scope of this document. For the following examples, a datagram will consist of a packet header and packet data as illustrated below:

|                   |                 |
|-------------------|-----------------|
| UDP Packet Header | UDP Packet Data |
|-------------------|-----------------|

To send a command to the ACU, make the packet data equal to the full SA-Bus compliant command including the STX, ETX, and trailing checksum as shown below:

|                   |     |         |              |              |     |          |
|-------------------|-----|---------|--------------|--------------|-----|----------|
| UDP Packet Header | STX | Address | Command Code | Message Body | ETX | Checksum |
|-------------------|-----|---------|--------------|--------------|-----|----------|

The reply from the ACU will be in a similar fashion as shown below:

|                   |         |         |              |              |     |          |
|-------------------|---------|---------|--------------|--------------|-----|----------|
| UDP Packet Header | ACK/NAK | Address | Command Code | Message Body | ETX | Checksum |
|-------------------|---------|---------|--------------|--------------|-----|----------|

If no response is received from the ACU, the reply datagram will be:

|                   |    |
|-------------------|----|
| UDP Packet Header | TO |
|-------------------|----|

Research Concepts, Inc. has prepared a demo program written in C#, to assist individuals interested in developing monitor and control software for an antenna controller with the integrated IP option.

## 4.0 TROUBLESHOOTING

### 4.1 Web Browser Will Not Load Main Web Page

| Problem                                 | Solution(s)   |
|---|---|
| Web browser will not load main web page | <ol style="list-style-type: none"><li>1. PC or device assigned invalid address.</li><li>2. Ethernet cable not connected or bad.</li></ol>   |
| Stuck at "Searching For ACU..."         | <ol style="list-style-type: none"><li>1. Software firewall blocking Applet port (6767).</li><li>2. Enable remote mode in the ACU Config menu items.</li><li>3. Make sure the SA Bus Address match on the ACU and RCI Web Server Config.</li><li>4. Browser Cache needs cleared.</li></ol> |



## Revision History

| Revision Date | By  | Description   |
|---------------|-----|---|
| 9/5/13        | RC  | Initial release.  |
| 11/21/13      | JDK | Replace wiring diagram and update description of electrical connections in section 2.1 (page 1) |