Using the Acutrol3000 TCP/IP Interface

Technical Manual

TM-9384C

ACUTRONIC

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Introduction

The Acutrol3000 motion controller contains a TCP/IP interface. This interface is used to communicate between the GUI (graphical user interface) computer and the Real-Time computer. It can also be used as a communication interface between the Acutrol3000 and a host computer.

Using the Acutrol TCP/IP interface is straightforward when done in a standalone mode. Additional considerations are required when connecting to an existing network.

This document defines the method for connection of the Acutrol3000 to a host computer in both standalone mode and when connecting to a network.

1 Standalone Configuration of TCP/IP

Normally the Acutrol3000 GUI connects to the real-time computer via a simple Ethernet crossover cable. To share this connection with a host computer, simply replace the single crossover cable with two normal cables and connect each of the cables to separate ports on an Ethernet hub/switch/router. The host computer can then be connected to any remaining ports on the hub/switch.

The Acutrol3000 Real-Time computer uses the IP address 192.168.53.1. The Acutrol3000 GUI uses the IP address 192.168.53.2. The host computer can use any IP address greater than 192.168.53.101.

The host computer can then connect to port 9878 of the real-time computer (192.168.53.1). See TM-8004 Acutrol3000 Command Language (ACL) Programming Manual for a definition of the available commands.

2 Network Configuration

Additional considerations apply when connecting a host computer to the Acutrol through an existing network.

The Acutrol3000 uses the IP address **192.168.53.1** for the Real-Time computer and **192.168.53.2** for the GUI computer. Currently these addressed are fixed and cannot be dynamically assigned. As such, these addresses are probably not compatible with the existing network.

In order to interface the Acutrol3000 to an existing network, a router is used. The router is configured to translate the fixed IP addresses to an IP address that is compatible with the existing network. Figure 1 shows a typical network configuration with the Acutrol3000 and a router.

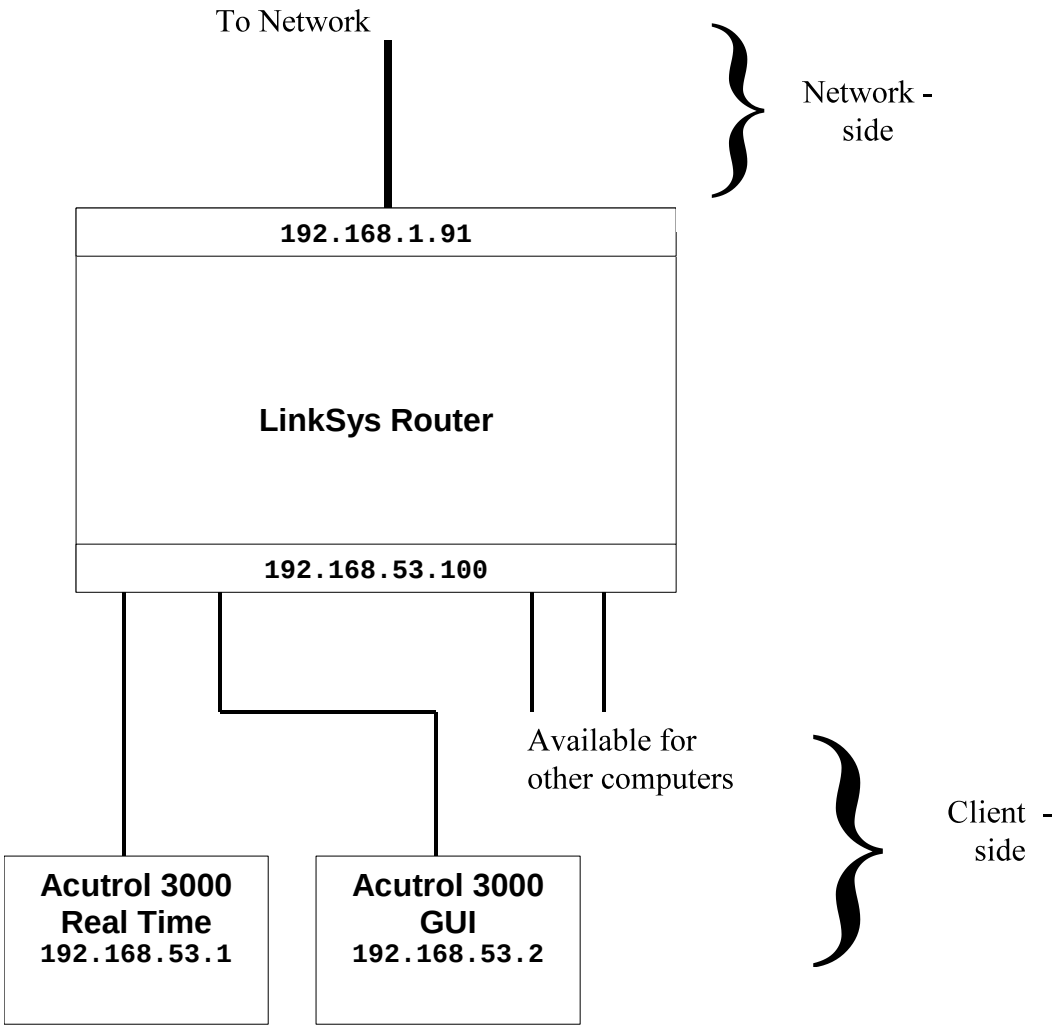

Figure 1 Acutrol3000 Network Configuration

The Acutrol3000 is located on the client side of the router. On the client side, the network is configured for addresses in the **192.168.53.XXX** subnet. The following addresses are reserved on the client network:

Address	Node
192.168.53.001	Acutrol3000 Real-Time Computer
192.168.53.002	Acutrol3000 GUI Computer
192.168.53.100	Router

Any computers connected to the client side of the router must have a static IP address in the range of **192.168.53.0** – **192.168.53.255**. DHCP should be enabled on the router to allow the temporary addition of, for example, a laptop to the LAN.

The network side of the router can be configured to either dynamically obtain an IP address from a DHCP server, or it can be configured manually with a static IP address.

NOTE: A router is available as an option kit with the Acutrol3000 pre-configured by Acutronic. Order Part Number 1202E54L. Drawings are included in Appendix A.

3 Hardware Configuration

Acutronic recommends the use of a Linksys Router Model BEFSR41. Acutronic has tested this router extensively for proper operation. The configuration listed below is for this particular router. Other routers may be used, but the configuration will need to be similar to ensure proper operation.

3.1 Before starting

Connecting the Acutrol3000 and Router to your network will require information about your network that can be obtained from the network administrator. Contact your network administrator and obtain the following information prior to configuring the router.

NOTE: *This document describes router settings that will work with most networks. However, some networks may have unique configurations that could require slightly different router settings. It is suggested that you review this document with your network administrator.*

- **Static IP address**. This address must be unique for this Acutrol3000 and must be compatible with your existing network. Static IP addresses are normally assigned by a network administrator.
- **Host name.** This is a name associated with the static IP address.
- **Default gateway.** This is the IP address the router will query when connecting to the network.
- **Domain Name Server (DNS) address.** This is the IP address that computers can query to convert domain names to IP addresses.
- **RIP2.** The Routing Information Protocol version 2 (RIP2) allows routers to exchange routing table information when the network topology changes. Verify that your network is compatible with this protocol.

3.2 Router Configuration

To configure the router, you will need a computer that has an Ethernet connection and a Web Browser.

- Start with both your computer and router powered off.
- Plug the network cable supplied with the router between your computer network connection and one of the router data ports (Port 1 – Port 4). Do not plug the router into the network yet.
- Plug in the power adapter of the router. Press the RESET button on the rear of the router to erase any previously stored information.

- Turn On the computer.
- Open Internet Explorer and enter the URL: http://192.168.1.1. Note: Usage of Internet Explorer is recommended, some browsers have compatibility issues with Linksys routers.
- When the user name / password popup appears, leave the username blank and enter the password **admin**. Press OK.
- To set up a Static IP Address for the Router on the Network:
  - Select **Static IP**
  - Set **IP Address**: *Use the static IP address obtained from your network administrator.*
  - Set **Default Gateway**: *Use the default gateway address obtained from your network administrator.*
  - Set **Static DNS 1**: *Use the domain name system (DNS) address obtained from your network administrator.*
  - Set **Host Name**: *Use the host name address obtained from your network administrator.*
- To set up a Dynamic IP Address for the Router on the Network:
  - Select **Obtain an IP Automatically**
  - Set **Host Name**: *Use the host name address obtained from your network administrator.*
- Set **Local IP Address**: **192.168.53.100**
- Set **Subnet Mask**: **255.255.255.0**
- Set **Local DHCP Server** to **Enable**.
- Set **Start IP Address**: **192.168.1.101** NOTE: The **192.168.1.101** will change to **192.168.53.101** when **Save Setting** is hit below.
- Click the **Save Settings** button. You will get a prompt. Click **OK**.
- The browser will try to reload the page but will get an error.
- Open a windows command window (**Start-> Run**, Enter **cmd**).
  In the command window, type

```
C:\> ipconfig /release
C:\> ipconfig /renew.
```

- Look at the result from the **`ipconfig /renew`** command. The **`IP Address`** should be **`192.168.53.101`**.
- Open your browser again, but this time enter the URL: http://192.168.53.100.
- Again, when the user name / password popup appears, leave the username blank and enter the password **`admin`**. Press OK.
- Click the **Advanced Routing** tab.
- Make sure that **NAT** is **Enabled**.
- Select **`RIP2`** for **Transmit RIP Version**.
- Select **`RIP2`** for **Receive RIP Version**.
- Click the **Applications & Gaming** tab.
- Click the **Port Range Forwarding** tab.
- Make the following entries:
- **Application:** **`telnet`**
  Start: **`23`**
  End: **`23`**
  Protocol: **`Both`**.
  IP address: 192.168.53.`1`.
  Click the **Enabled** checkbox.
- **Application:** **`ftp`**
  Start: **`21`**
  End: **`21`**
  Protocol: **`Both`**.
  IP address: 192.168.53.`1`.
  Click the **Enabled** checkbox.
- **Application:** **`rsh`**
  Start: **`514`**
  End: **`514`**
  Protocol: **`Both`**.
  IP address: 192.168.53.`1`.
  Click the **Enabled** checkbox.

- **Application:** **A3KGUI**
  Start: **9800**
  End: **9899**
  Protocol: **Both**.
  IP address: 192.168.53.1.
  Click the **Enabled** checkbox.

- Click the **Save Settings** button. Browser will display a message if successful then return to this page.

- Click the **Administration** tab.

- In the **UPnP** section, click **Disabled** for **UPnP.**

- Change the **Router Password** to **router**. Also enter **router** in the **Re-enter to confirm:** field.

- Click the **Save Settings** button. Browser will display a message if successful then return to this page.

- The router will ask you to login again. This time (and forever more) use the password **router**. (Leave **User Name** blank).

- Change **Remote Administration** to **Enabled**.

- Click the **Security** tab.

- Click the **Filter** tab.

- Click **Disabled** for **Block Anonymous Internet Requests.**

- Click the **Save Settings** button. Browser will display a message if successful then return to this page.

- Turn the Router Off. Plug the router into the network. Reboot the router.

- Reboot the computer.

- Verify that you have access to the network by opening some external page, such as http://www.google.com/.

- Verify that you can **ping 192.168.53.100**.

- If you have configured the router with a Static IP:

- From some other external computer on your network, verify that you can ping **`xxx.yyy.zzz.qqq`**, where ***`xxx.yyy.zzz.qqq`*** is the static IP address of the router you entered above.

- If you have configured the router with a Dynamic IP, you can still ping the router, but you must first obtain the router's IP Address as follows:
  - Open your web browser and enter the URL: http://192.168.53.100.
  - When the user name / password popup appears, leave the username blank and enter the password **`router`**. Press OK.
  - Click the **Status** tab to view the Internet IP Address.
- Plug a computer that supplies a telnet and FTP server into the client side of the router.

3.3 Client Computer Configuration

Any client computers (e.g., Acutrol3000 Real-Time or GUI Computer) need to have their default router configured if they are to support FTP, telnet, or other services.

3.3.1 Acutrol3000 Real-Time Computer

Configured at factory. No changes required.

3.3.2 Windows XP/2000 (Acutrol3000 GUI computer)

Configured at factory. No changes required.

3.3.3 Windows XP/2000 Host computer connected to client-side of router

- **Start-> Settings-> Control Panel-> Network and Dialup Connections-> Local Area Connect X**

  Where **X** is the local area connection that will be connected to the 192.168.53. network.
- Scroll down and select **Internet Protocol (TCP/IP)**.
- Hit the **Properties** button.
- Hit the **Advanced...** button.
- Hit the **Add...** button.
- Enter **192.168.53.100** in the **Gateway** field.

- Enter **1** in the **Metric** field.
- Click the **Add** button.
- Click **OK**, **OK**, **OK**.
- Be sure and commit the changes to flash.

3.3.4 Windows XP/2000 (generic)

Make sure that DHCP is enabled.

A. Router Kit Drawings

The Acutrol3000 TCP/IP Router Kit is documented as the drawing series 1202E54 and consists of a parts list and assembly drawing.

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1202E54L | **REVISION: A**

TCP/IP ROUTER KIT

ITEM	QTY	PART OR DWG NO	REFERENCE SYMBOLS	MANUFACTURER	PART DESCRIPTION AND NOTES
001	REF	1202E54A		ACUTRONIC USA	TCP/IP ROUTER KIT ASSEMBY
002	1	1000M70D		ACUTRONIC USA	PANEL BLANK,7"
100	1	BEFSR41		LINKSYS**	ROUTER,W/4 PORT SWITCH
101	1	SM01		LINKSYS**	BRACKET,WALL MOUNT
102	2	A3L850-03-BLK-S		BELKIN**	PATCH CABLE, CAT5E,1 METER

APPROVALS	INITIALS / DATE
ENGINEERING	
PROJECT MAN.	
PRODUCTION	
ECO:	

NOTES: ** THESE COMPONENTS MAY BE SUBSTITUTED WITH VERIFIABLE EQUIVALENT PARTS AS NECESSARY