

**AN-X-AMXRIO  
Communication Module  
for Reliance AutoMax  
Remote I/O**

***User Manual***



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Throughout this manual we use notes to make you aware of safety considerations.

**WARNING!**

Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

These warnings help to:

- identify a hazard
- avoid the hazard
- recognize the consequences

**IMPORTANT!**

Identifies information that is especially important for successful application and understanding of the product.

**TIP**

Identifies information that explains the best way to use the AN-X-AMXRIO

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# ***AN-X-AMXRIO Module Overview***

This document is a user guide for the AN-X-AMXRIO communications module, which connects a computer or other device to a Reliance AutoMax Remote I/O network, using Ethernet. The module acts as a master on the AutoMax remote I/O network.

The module:

- Scans up to 7 slave drops
- Supports up to 248 words of scheduled output data and up to 250 words of scheduled input data
- Scans AutoMax remote I/O racks and heads
- Maintains diagnostic counters

The AN-X-AMXRIO module exchanges scheduled data over Ethernet with a ControlLogix processor, with RPIs from 5 to 3200 ms. Refer to page 22 for details.

The AN-X-AMXRIO module has a web interface for configuration and for monitoring operation. You can communicate with the module using any standard web browser such as Microsoft Internet Explorer.

You can configure the module offline or online. The module can read the configuration of the currently connected AutoMax remote I/O network and store it.

The Windows utility supplied generates tags that can be imported to RSLogix Logix 5000.

A watchdog timer is implemented in the module's hardware. If the firmware does not kick the watchdog within the timeout period, the watchdog times out and places the module into a safe fatal failure state.

A jabber inhibit timer is implemented in the module's hardware. If the network transmitter is on longer than 150% of the longest network frame time, the transmitter is forced off and the module is placed into a safe fatal failure state.

The module firmware can be updated over Ethernet using the Windows utility supplied. Refer to page 53 for details.

---

## Hardware Features



The module has:

- LEDs to indicate the status of the connection to the Ethernet, its own internal state, and the state of the connection to the remote I/O network
- an Ethernet connector
- a 9-pin D-shell connector to connect to the AutoMax remote I/O network
- a power connector

## Package Contents

- AN-X-AMXRIO module
- CD containing software and documentation

## Other Requirements

To exchange scheduled data with a ControlLogix processor over Ethernet requires:

- Version 12 or above of RSLogix 5000
- version 12 or above of the ControlLogix firmware
- 100 Mbit/second Ethernet network and hardware. The network should use switches, not hubs

## Modes of Operation

There are three AN-X modes of operation:

- Boot mode. The AN-X is running its low level startup firmware.

- Configuration mode. This is the mode when you are updating the firmware in the AN-X.
- Production mode. This is the normal runtime mode of operation.



---

## Installation

### Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

Electrostatic discharge can damage integrated circuits or semiconductors. Follow these guidelines when you handle the module:

#### **WARNING!**

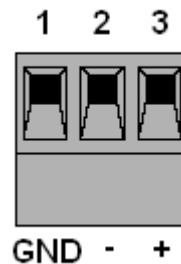
- Touch a grounded object to discharge static potential
- Do not touch the connector pins

### Power

AN-X requires a DC power input of anywhere from 12 to 24 VDC.

Left to right the pins on the power connector are chassis ground, negative voltage and positive voltage.

The chassis ground should be connected.



Power consumption internally is 300 mA @ 12VDC or 150 mA @ 24VDC.

The part number for the power connector is Phoenix MSTB 2.5/3-ST-5.08

### Cabling and Termination

Use a standard drop cable and passive tap M/N 57C380 to connect the module to the coaxial network cable. The drop cable is a multi-conductor cable with 9-pin D-shell connectors at each end. Connect one end to the connector on the module and the other end to the passive tap.

The passive tap has two BNC connectors for connection to the coaxial cables and terminating loads.

The network coaxial cable must be terminated with 75 ohm terminating loads attached to the taps at the physical ends of the network. There should be two and only two terminators on the network.

The cable must be RG-59/U.

## **Ethernet Cabling**

AN-X has a standard RJ-45 connector for connecting to Ethernet.

If you are connecting AN-X to an existing network through a router or switch, use a standard Ethernet cable.

If you are connecting directly between a computer and AN-X, use a crossover cable.

## **Software Installation**

You must uninstall any previous version of the software before you can install a new version. Use the Windows Control Panel Add and Remove Programs to remove the old version.

Insert the CD supplied with the AN-X module and run the setup program on the CD.

## Ethernet Configuration

The AN-X-AMXRIO module connects a computer or other device on Ethernet to a Reliance AutoMax remote I/O network.

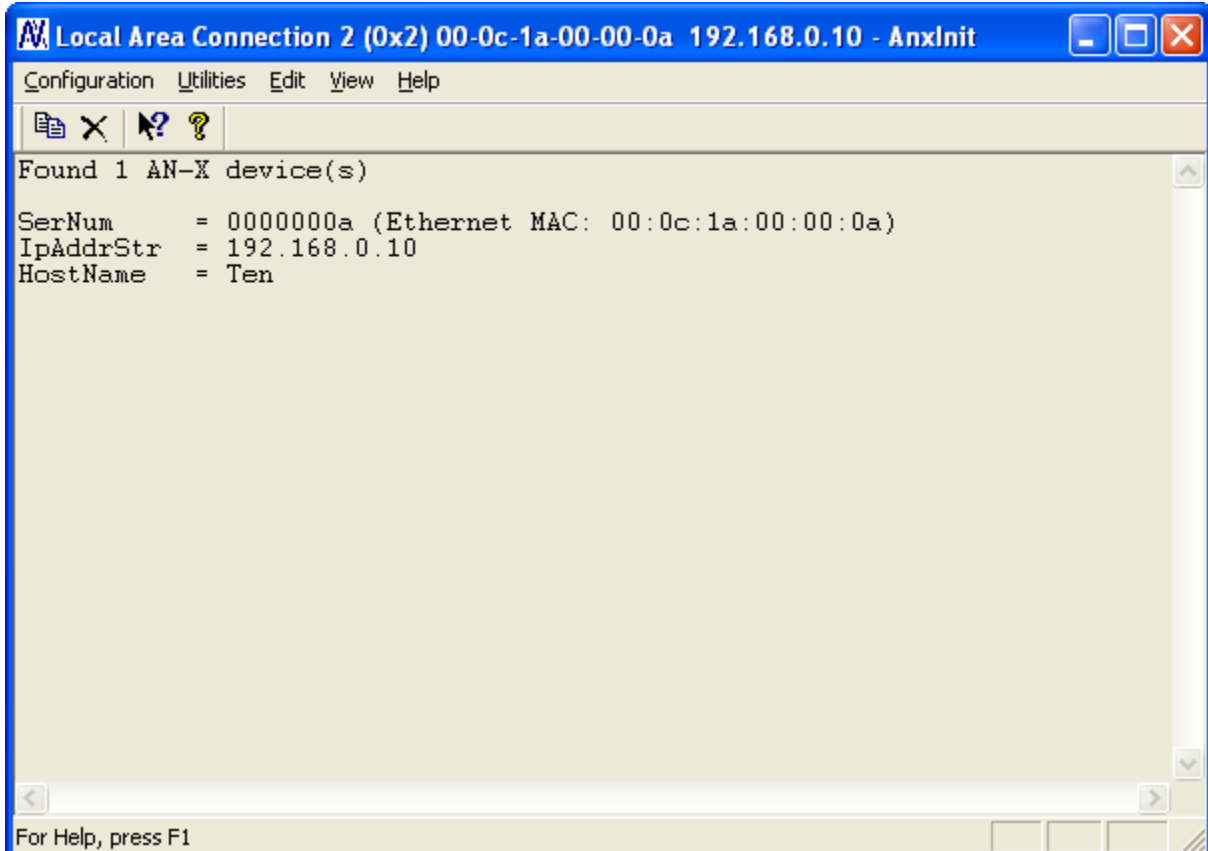
Before you can use the AN-X-AMXRIO to scan I/O, you must configure its Ethernet network properties.

### Ethernet Configuration

AN-X can be configured to use a static (unchanging) IP address or it can be configured to obtain its IP address from a DHCP server.

Unless you have control of the DHCP server, in most applications you will want to configure AN-X to use a static IP address. Otherwise the DHCP server may assign a different IP address each time AN-X powers up, and any software that accesses the AN-X module would have to be reconfigured to use the new IP address.

AN-X is shipped with DHCP enabled. If the AN-X module finds a DHCP server on the network, the AN-X module obtains its IP address from the DHCP server. You can use the utility AnxInit to find the IP address that the DHCP server assigned. Select *Utilities/Locate All AN-X Modules* and AnxInit will locate the AN-X and display its IP address. See page 35.



If AN-X does not find a DHCP server within about three minutes of starting up, it reverts to a temporary static IP address of 192.168.0.41. If AN-X is using this temporary IP address, it repeatedly flashes the SYS LED three times followed by a pause.

**IMPORTANT!**

Use this temporary IP address only for initial setup of AN-X. AN-X will not function for its intended purpose at the temporary IP address.

If you are using multiple AN-X modules, configure one at a time, especially if there is no DHCP server on the network, since they will all revert to the same temporary IP address when they fail to find a DHCP server.

**IMPORTANT!**

If you are connecting AN-X to an existing Ethernet network, consult the network administrator to obtain a static IP address for AN-X and to obtain information about how you should configure AN-X and.

**IMPORTANT!**

The AN-X must be on the local Ethernet (same subnet as your computer) when you set its IP address.

You configure the Ethernet properties using the Windows utility AnxInit supplied with AN-X. You can also set the IP address through the web interface. Refer to page 49.

Use the *Configuration/AN-X IP Settings* command to start the AN-X IP configuration wizard, which takes you step by step through the IP configuration process.

**Step 1**

In step 1, you identify the AN-X you are configuring.

**Step 1: AN-X Selection**

Select this computer's Ethernet adapter that's on the same Ethernet subnet as the AN-X module you want to configure (you may only have one Ethernet adapter in your computer)

Local Area Connection 2

Enter the Ethernet MAC Address of the AN-X module you want to configure. You can get this from the label on the AN-X module or by selecting Utilities/Locate All AN-X Modules (if the module's current IP address is on the same subnet).

00-0c-1a-00-00-0a

Enter the IP address on the local subnet that you intend the AN-X module to use.

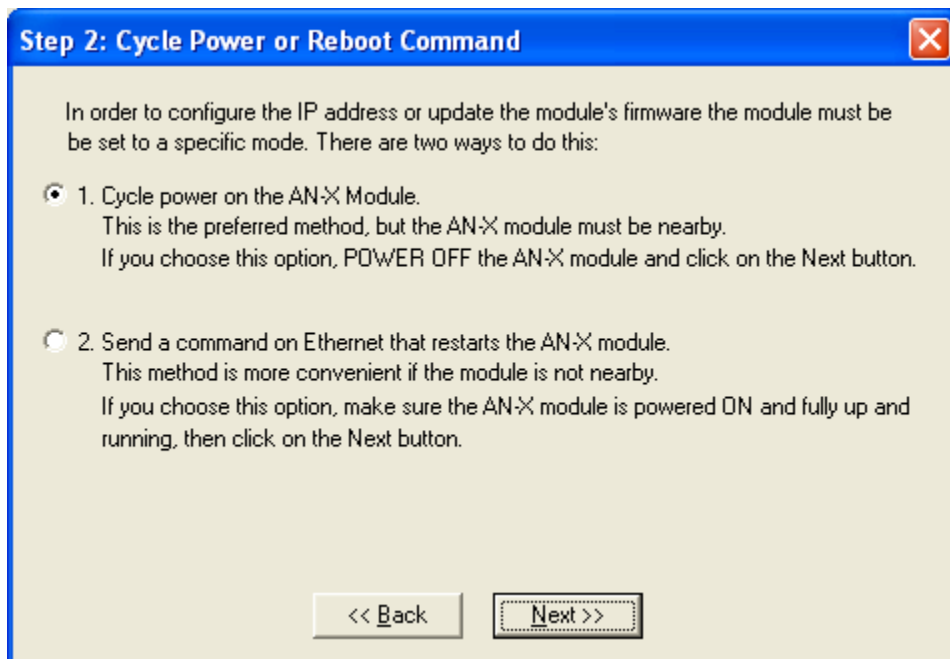
192 . 168 . 0 . 10

Next >> Exit

1. Select the Ethernet adapter that's connected to the AN-X. In most cases there will be just one Ethernet adapter in the computer. The AN-X must be on the same subnet as the computer.
2. Enter the MAC address of the AN-X you are configuring. This is printed on the AN-X label. It consists of six pairs of hexadecimal digits, separated by hyphens. In the example above, it's 00-0c-1a-00-00-0a.  
If the AN-X is already online, you can obtain its MAC address using the *Utilities/Locate All AN-X Modules* command.
3. Enter the IP address you intend the AN-X to use.

## Step 2

In step 2, you choose a method of restarting AN-X to put it in boot mode.

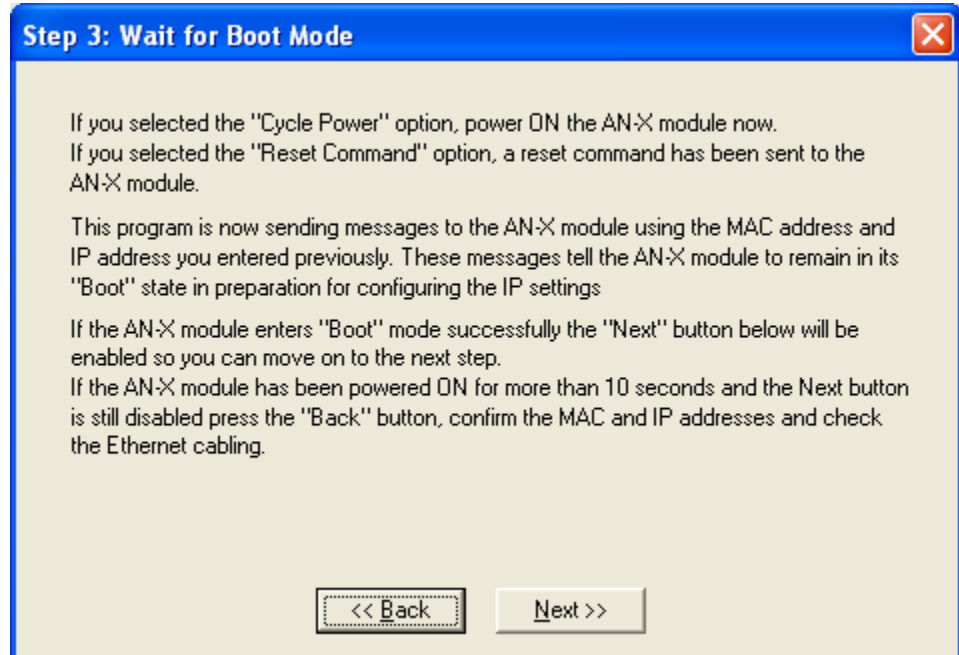


The preferred method is to cycle power on the AN-X. Select the first option on the screen and click the *Next >>* button.

The second method, useful if the AN-X is not easily accessible, is to send it a command over Ethernet. The AN-X must be powered on and completely running for this method to work. For example, if this is the first time you are configuring a new AN-X, allow sufficient time for it to acquire an IP address from a DHCP server or to time out and use its default IP address (about 3 minutes). Select the second option on the screen and click the *Next >>* button.

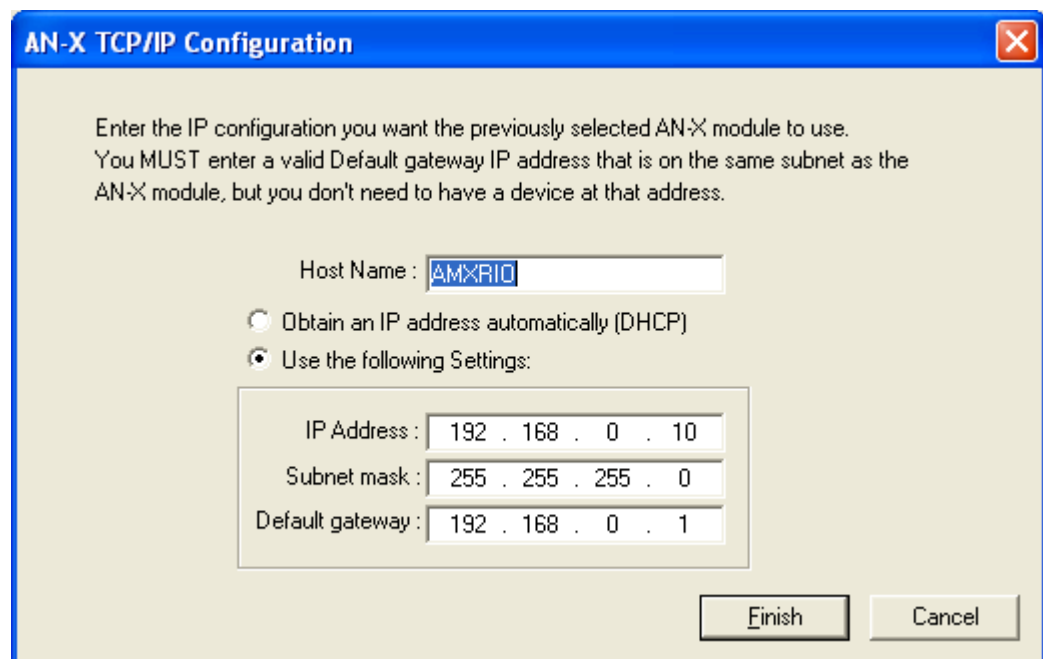
**Step 3:**

Wait for AN-X to enter boot mode. While AnxInit is waiting, the *Next>>* button will be disabled. When AN-X is in boot mode, the *Next>>* button will be enabled.



If the AN-X does not enter boot mode within about 10 seconds, return to the previous screens and check the entries.

The AN-X TCP/IP Configuration dialog appears.



Enter a *Host Name* for the AN-X. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 31 characters long.

To configure the AN-X to obtain its IP address from a DHCP server on the network, select *Obtain an IP address automatically (DHCP)*

To configure the AN-X to use a static IP address, select *Use the following Settings* and enter:

- the desired IP address for the AN-X.
- the Subnet mask for the AN-X
- the default gateway for your network.

You must enter a valid default gateway address even if there is no device at the gateway address on the network.

Click OK to complete the configuration.

If you Cancel the *Configuration/AN-X IP Settings* command, AN-X is left running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X.

You can also reconfigure the AN-X IP parameters from the web interface. Refer to page 49.

## Example: Standalone Computer

Since you are connecting directly from the computer to AN-X, use a crossover Ethernet cable.

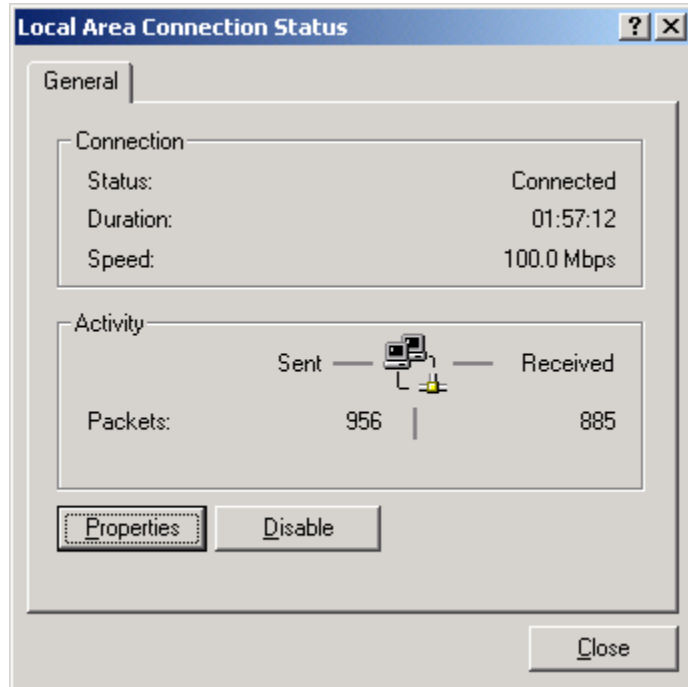
The following instructions assume Windows 2000. The procedures for Windows NT and Windows XP are very similar. They also assume that an Ethernet network card has been installed in the computer and that AnxInit has been installed on the computer.

### TIP

The parameters in this example will work when you set up any standalone computer to work with AN-X.

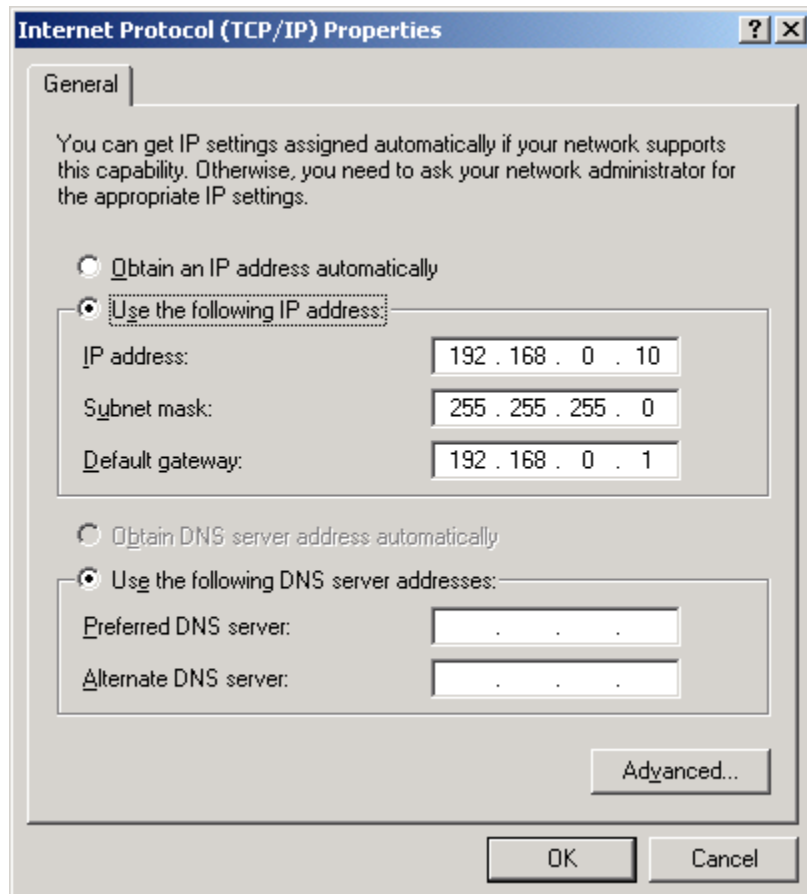
First configure the computer to use a static IP address. From the Windows Start menu, select *Start/Settings/Network and Dialup Connections*. Double click on *Local Area Connection*.





Click the *Properties* button.

Double click on *Internet Protocol (TCP/IP)*.



In this example, we will assign the computer an IP address of 192.168.0.10

Set the Subnet mask to 255.255.255.0 (standard mask for the Class C network address of 192.168.0.x).

Set the Default gateway to 192.168.0.1 (this address does not exist on the Ethernet network but AN-X requires a valid default gateway entry).

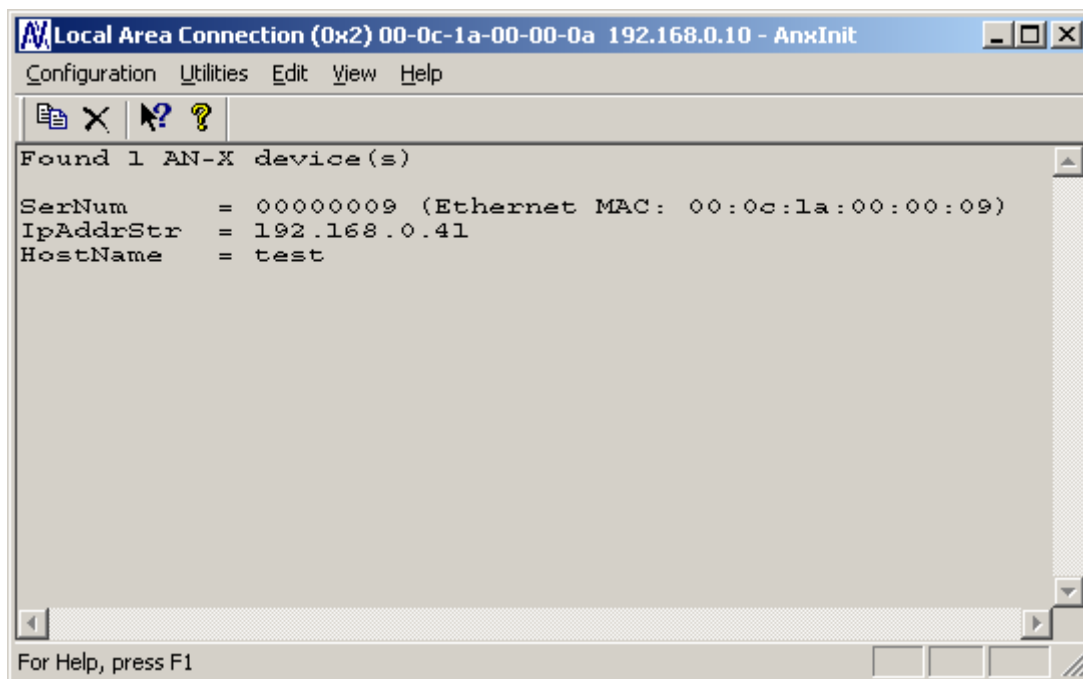
Click OK to accept the settings

Connect the computer to AN-X using the crossover cable.

If this is the first time you have used the AN-X module, it will look for a DHCP server on the network. It waits about three minutes, then reverts to a default IP address of 192.168.0.41

Power up the AN-X and wait for the search for a DHCP server to time out. When the search for a DHCP server times out, AN-X will flash the SYS LED red three times followed by a pause repeatedly.

Run AnxInit. Select *Utilities/Locate All AN-X Modules* and confirm that the AN-X is found.



Select *Utilities/Select An AN-X* and enter the MAC Address and IP address.

Set Ethernet & IP Address

Adapter : Local Area Connection

Ethernet MAC Address : 00-0c-1a-00-00-09

IP Address : 192 . 168 . 0 . 41

OK Cancel

Click *OK* to accept the setting.

Select *Utilities/AN-X IP Configuration*.

AN-X TCP/IP Configuration

Enter the IP configuration you want the previously selected AN-X module to use.  
You MUST enter a valid Default gateway IP address that is on the same subnet as the AN-X module, but you don't need to have a device at that address.

Host Name : test

Obtain an IP address automatically (DHCP)

Use the following Settings:

IP Address : 192 . 168 . 0 . 20

Subnet mask : 255 . 255 . 255 . 0

Default gateway : 192 . 168 . 0 . 1

Finish Cancel

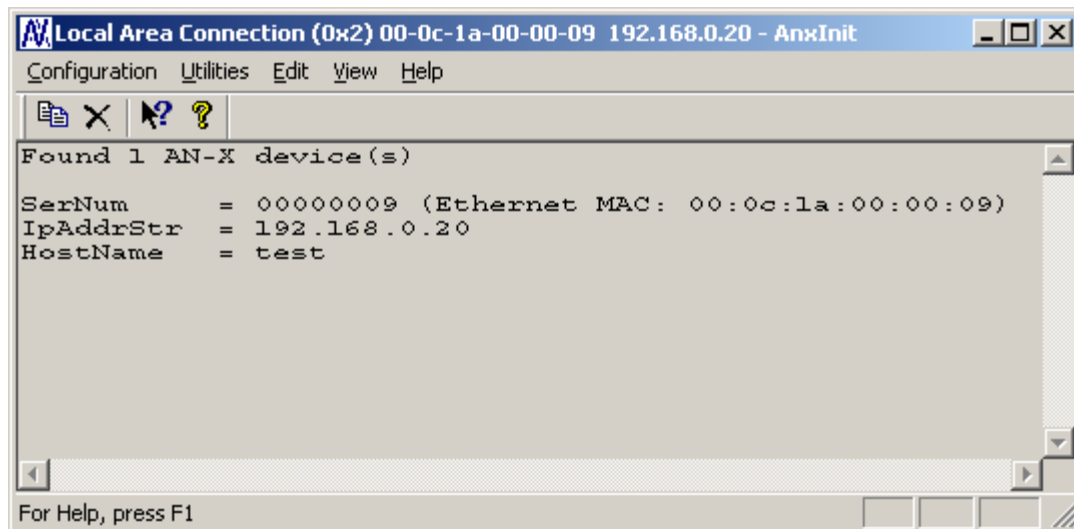
Enter an IP Address. In this case we chose 192.168.0.20

Enter the same Subnet mask and Default gateway that you entered for the computer. The default gateway address does not exist on the network but AN-X requires that the field have a valid entry.

Click *Finish* to accept the settings.

Select *Utilities/Restart AN-X* to restart AN-X with the new parameters.

When the AN-X has restarted (SYS LED is solid green), select *Utilities/Locate All AN-X Modules* and confirm that the AN-X is found with the new parameters.



## Reconfiguring an AN-X from an Unknown State

It sometimes happens that an AN-X has been previously configured with an IP address that causes it to be inaccessible on the current Ethernet network. To reconfigure it to a known state, run the command *Configuration/AN-X IP Settings* to start the AN-X IP Configuration Wizard and reconfigure AN-X.



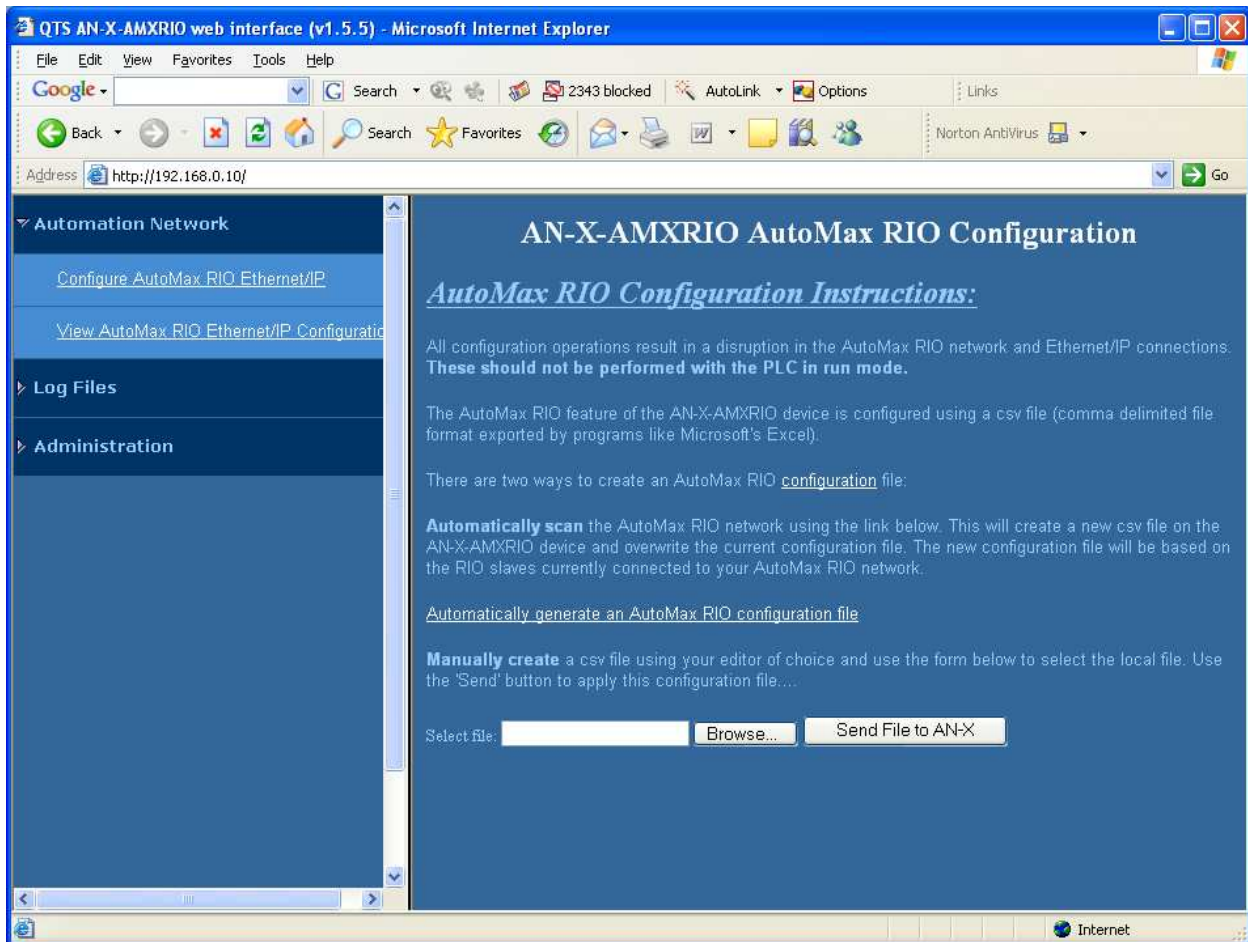
## AutoMax Remote I/O Configuration

You set the remote I/O configuration using the web interface.

The remote I/O network must be connected to the AN-X-AMXRIO. The ControlLogix with the exclusive owner connection must be in program mode.

Start your web browser and enter the AN-X IP address as the address.

Select *Configure AutoMax RIO Ethernet/IP*.



Click on the link *Automatically generate an AutoMax configuration file*. The AN-X-AMXRIO module reads the current network configuration and stores it.

When the autoconfiguration is done, the web interface displays a summary of the network found and displays the message *Automatic configuration done*. Click the *Back to configuration page* link.

To view the configuration file that has been created, click the *View AutoMax RIO Ethernet/IP Configuration* link. The configuration is displayed either in a spreadsheet or as a text file.

**TIP**

To view the current configuration, it may be necessary to refresh the displayed configuration once or twice, as the browser may use a previously cached version of the file.

To save the configuration file, right click the *View AutoMax RIO Ethernet/IP Configuration* link and select *Save Target as...* Save the file and edit offline if you wish to make changes.

To download a configuration file to the AN-X-AMXRIO, browse or type in the file name in the web interface and click the *Send File to AN-X* button.

## Configuration File Format

The configuration file is a comma separated variable (CSV) text file. You can edit or view it with either a spreadsheet such as Excel or a text editor such as Windows Notepad.

Typically you would create the file using autoconfiguration in the web interface, then edit it offline, and finally upload it to the AN-X using the web interface.

Lines beginning with a semicolon are comments and are ignored by the AN-X-AMXRIO firmware when it reads the configuration.

The file consists of several sections.

### AN-X Export Name

The line

```
ClxExp,ANX
```

defines the AN-X name used in RSLogix 5000. It is used only when you use the configuration file to create tags for import into RSLogix 5000. Refer to page 32 for details.

### Drop Definitions

Each drop is defined by a line in the configuration file. The format is different for racks and heads.

#### Racks

A rack definition consists of:

- a drop identifier, for example, Drop1. This identifies the drop being defined and should not be edited.

- the export name, for example AmxRack1, used by the program that creates tags for import into RSLogix 5000. Refer to page 32 for details. You can change this to something appropriate for your system.
- the rack adapter part number, for example 419451-001A
- the starting output and input offsets in the ControlLogix scheduled data for the drop. Drops must start on even word boundaries.
- 16 pairs of output and input slot masks for each slot in the rack. Each slot mask consists of 16 bits. The bit is set if the corresponding register in the slot is an input or output and is 0 otherwise.

Example:

```
Drop1,AmxRack1,419451-001A, 0, 0, 0xFFFFFFFF, 0x00000000,  
0x00000000, 0xFFFFFFFF, ...
```

## Heads

A head definition consists of:

- a drop identifier, for example, Drop2
- the export name, for example AmxHead2, used by the program that creates tags for import into RSLogix 5000. Refer to page 32 for details.
- the head adapter part number, for example 419451-103A
- the starting output and input offsets in the ControlLogix scheduled data for the drop. Drops must start on even word boundaries.
- port definitions.

For the newer 57C328 heads, there are four pairs of output and input port definitions. The output port definition defines the state of the four possible registers for each port, O if it's an output, x otherwise. The input port definition defines the state of the four possible locations for each port, I if it's an input, x otherwise.

Example:

```
Drop2,AmxHead2,419451-103A,2,2, xxOx, Ixxx, xxxx, Ixx, xxxx, IIIx,  
xxxx, IIxI
```

For the older 57C330 heads, there are four port definitions. The port definition defines the state of the four possible registers for each port, O if it's occupied, x otherwise. The AN-X-AMXRIO module determines whether it's an input or output from data the head sends at runtime.

Example:

```
Drop6,DropName6,419451-101A,200,200,OOxx,OxxO,Oooo,OxxO
```



**Input and Output Sizes**

At the end of the configuration file created by autoconfiguration are two comment lines that give the output and input sizes. You can use these sizes to set the scheduled output and input sizes in RSLogix 5000.

If you edit the configuration file, the sizes from autoconfiguration will no longer be valid.

Example

```
;OutLen,InpLen
```

```
;64,64
```

## ***Scheduled Data with a ControlLogix***

AN-X-AMXRIO exchanges scheduled data with a ControlLogix processor.

It supports:

- up to 248 registers of output data
- up to 250 registers of input data
- 24 registers of status input data

The terms input and output are from the point of view of the ControlLogix.

The ControlLogix processor sends output data to the AN-X-AMXRIO and the AN-X sends it out on the AutoMax Remote I/O network.

The AN-X receives input data from the AutoMax remote I/O network and sends input and status input data to the ControlLogix.

There are two possible types of scheduled connections from the ControlLogix processor to the AN-X-AMXRIO:

- Exclusive owner connections, which contain input, output and status input data
- Input-only connections, which contain input and status input data

There can be only one exclusive owner connection to an AN-X module, but there can be more than one input only connection to an AN-X.

To configure scheduled data exchange:

1. Configure AN-X in RSLogix 5000
2. Configure the remote I/O network in AN-X-AMXRIO
3. Use the tag conversion utility provided to create a tag file from the I/O configuration
4. Import the tags into RSLogix 5000

### **Requirements**

- RSLogix 5000 version 12 or above
- ControlLogix processor with version 12 or above firmware
- 100 Mbit Ethernet network and modules

### **Reference**

Allen-Bradley publication *EtherNet/IP Media Planning and Installation Manual*, publication ENET-IN001A-EN-P

**WARNING!**

Do not use the web interface to monitor data on the AN-X-AMXRIO while the AN-X is exchanging scheduled data with a ControlLogix processor in a production environment, because this affects the Ethernet IP update times.

## Configuring AN-X in RSLogix 5000

You configure the module in RSLogix 5000 to set the module type, how much scheduled data to transfer and how often to transfer it.

There can be a maximum of 248 words of output data and 250 words each of input and status input data.

To configure the module in RSLogix 5000, you must be offline.

1. If you are creating a new project, select *File/New* to create a new project, give the processor a name, and enter the slot it occupies in the ControlLogix rack.
2. Right click on I/O configuration and select *New Module...*
3. Select a module of Type ETHERNET-MODULE, Description Generic Ethernet Module from the list and Click OK. RSLogix 5000 displays the Module Properties dialog box.

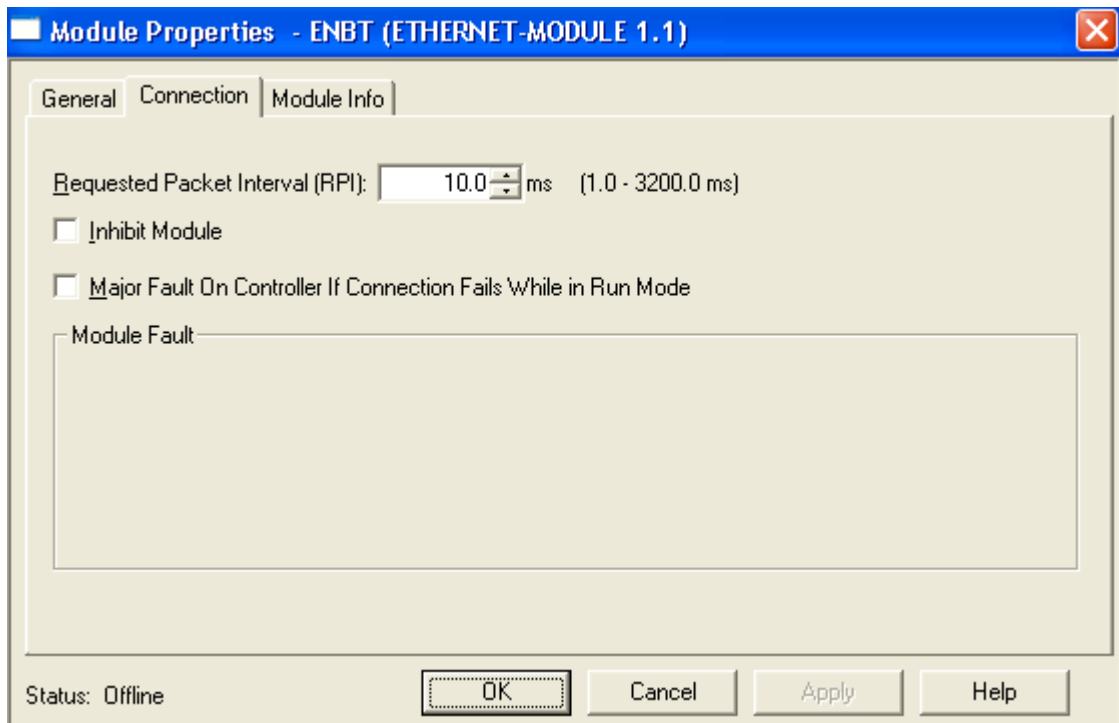
The screenshot shows the 'Module Properties' dialog box for an ENBT (ETHERNET-MODULE 1.1) module. The 'General\*' tab is selected. The 'Type' is 'ETHERNET-MODULE Generic Ethernet Module', 'Vendor' is 'Allen-Bradley', and 'Parent' is 'ENBT'. The 'Name' field contains 'AMXRIO'. The 'Description' field is empty. The 'Comm Format' is set to 'Data - INT - With Status'. Under 'Address / Host Name', the 'IP Address' radio button is selected with the value '192 . 168 . 0 . 10'. The 'Status' is 'Offline'. The 'Connection Parameters' section is expanded, showing a table of parameters:

	Assembly Instance:	Size:	
Input:	1	250	(16-bit)
Output:	2	248	(16-bit)
Configuration:	4	0	(8-bit)
Status Input:	5	26	(16-bit)
Status Output:	6		

Buttons at the bottom include 'OK', 'Cancel', 'Apply', and 'Help'.

4. Assign the module a *Name* and optionally a *Description*.
5. Set the *Comm Format* to Data – INT – with Status.

6. Set the *IP Address* to match the address of the AN-X module.
7. Set the *Input Assembly Instance* to 1. Normally you set the size to the maximum allowed, 250 words. You can set it to a smaller value but it should be large enough to allow all the input data to pass.
8. Set the *Output Assembly Instance* to 2. Normally you set the size to the maximum allowed, 248 words. You can set it to a smaller value but it should be large enough to allow all the output data to pass.
9. Set the *Configuration Assembly Instance* to 4. Set the size to 0.
10. Set the *Status Input Assembly Instance* to 5. Set the size to 26, since the AN-X-AMXRIO produces 26 words of status input data.
11. Set the *Status Output Assembly Instance* to 6. You cannot set the size.
12. Click *Next >* to display the second Module Properties dialog box



### Connection Parameters

13. Set the module *Requested Packet Interval (RPI)*. This is how often the module's scheduled data is updated in the processor. The value can range from 5.0 to 3200.0 ms.
14. Click *Finish >>* to complete the module configuration.

## Configuring Input-Only Connections

In a ControlLogix system, multiple processors can receive inputs from a module. Only one processor can control the outputs. To configure an input-only connection to the AN-X module:

1. Right click on I/O configuration and select *New Module...*
2. Select a module of Type 1756-ETHERNET, Description Generic Ethernet Module from the list and click OK. RSLogix 5000 displays the Module Properties dialog box.

**Module Properties - ENBT (ETHERNET-MODULE 1.1)**

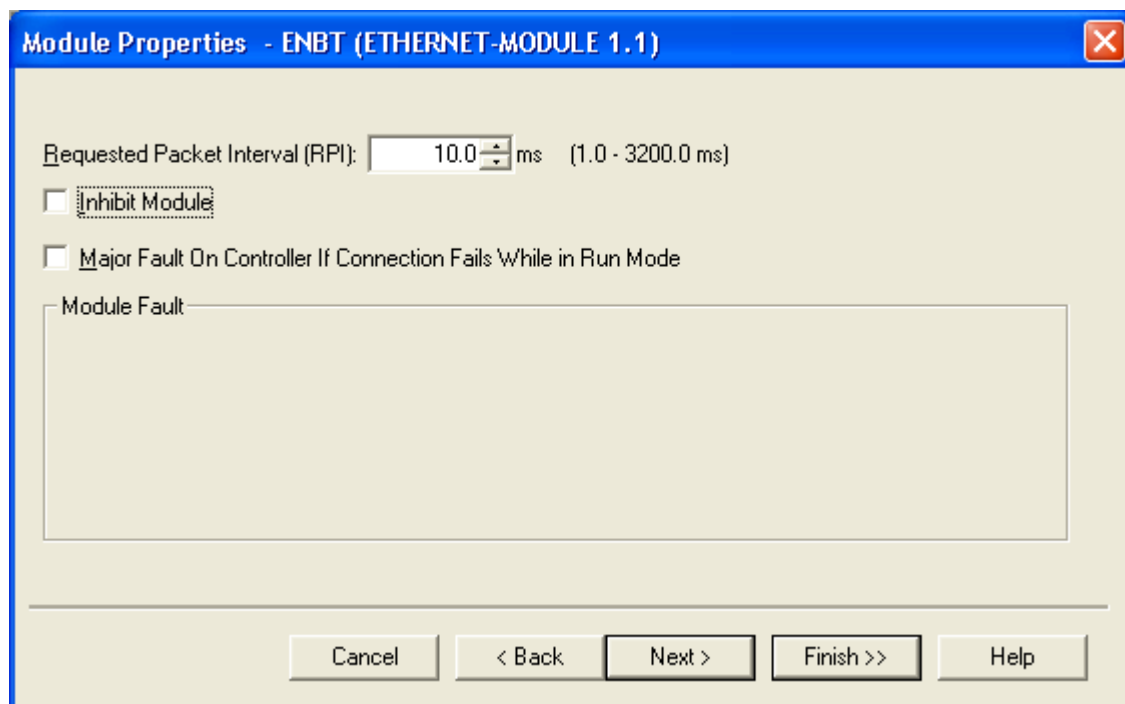
Type: ETHERNET-MODULE Generic Ethernet Module  
 Vendor: Allen-Bradley  
 Parent: ENBT  
 Name: AMXRIO  
 Description:   
 Comm Format: Input Data - INT - With Status  
 Address / Host Name  
 IP Address: 192 . 168 . 0 . 10  
 Host Name:   
 Connection Parameters  

	Assembly Instance:	Size:	
Input:	1	250	(16-bit)
Output:	3	0	
Configuration:	4	0	(8-bit)
Status Input:	5	26	(16-bit)
Status Output:	6		

Buttons: Cancel, < Back, Next >, Finish >>, Help

3. Assign the module a *Name* and optionally a *Description*.
4. Set the *Comm Format* to Input Data – INT – With Status.
5. Set the *IP Address* to match the IP address of the AN-X module.
6. Set the *Input Assembly Instance* to 1. Normally you set the size to the maximum allowed, 250 words. You can set it to a smaller value but it should be large enough to allow all the input data to pass. If there is also an exclusive owner connection, then the size should match the exclusive owner size.
7. Set the *Output Assembly Instance* to be 3. You cannot set the size.
8. Set the *Configuration Assembly Instance* to 4. Set the size to 0.
9. Set the *Status Input Assembly Instance* to 5. Set the size to 26.
10. Set the *Status Output Assembly Instance* to 6. You cannot set the size.

11. Click *Next >* to display the second Module Properties dialog box.



### Connection Parameters

12. Set the module *Requested Packet Interval (RPI)*. This is how often the module's scheduled data is updated in the processor. The value can range from 5.0 to 3200.0 ms.

13. Click *Finish >>* to complete the module configuration.

All connections to the module must have the same lengths and RPIs.

### Selecting the RPI

When you create an exclusive owner or input only connection to the AN-X-AMXRIO, you must select a requested packet interval (RPI), the period at which the data updates.

Consider the AutoMax remote I/O network time when selecting an RPI. There's no advantage in selecting an RPI that's much faster than the network update time, since the network data won't update as fast as the scheduled connection. In addition, it will just add ControlLogix backplane and Ethernet traffic.

### Locating the Data

The data that is exchanged between the AN-X and the ControlLogix processor is defined in a comma-delimited text file.

## Input and Output Data

The tag file contains the location of the scheduled input and output data for all I/O modules and registers. When you import the tag file into RSLogix 5000, you can use the tags to refer to I/O data.

Refer to page 32 for detailed information on the tag file format.

## Status Input Data

The status input data consists of the following diagnostic data.

Offset	Description
0	Drop status, 1 = good, 0 = bad or not present Bit 1 = drop 1, bit 7 = drop 7, etc
1	Drop 1 extended status 0 = OK, 1 = No response, 2 = Configuration mismatch, 3=Length error, 4 = mask error
2	Drop 2 extended status
3	Drop 3 extended status
4	Drop 4 extended status
5	Drop 5 extended status
6	Drop 6 extended status
7	Drop 7 extended status
8	Transmit count
9	Receive count
10	Receive protocol errors
11	Receive noise
12	Receive timeout
13	Receive CRC error
14	Receive overrun
15	Receive abort
16	ControlLogix output average update time for previous 100 updates
17	ControlLogix output minimum update time for previous 100 updates
18	ControlLogix output maximum update time for previous 100 updates
19	ControlLogix output maximum update time since connection opened

Offset	Description
20	Reserved
21	ControlLogix input average update time for previous 100 updates
22	ControlLogix input minimum update time for previous 100 updates
23	ControlLogix input maximum update time for previous 100 updates
24	ControlLogix input maximum update time since connection opened
25	Reserved

The update times are given in units of 0.1 ms. For example, a value of 287 corresponds to 28.7 ms. Times are reset when the connection is closed and reopened.

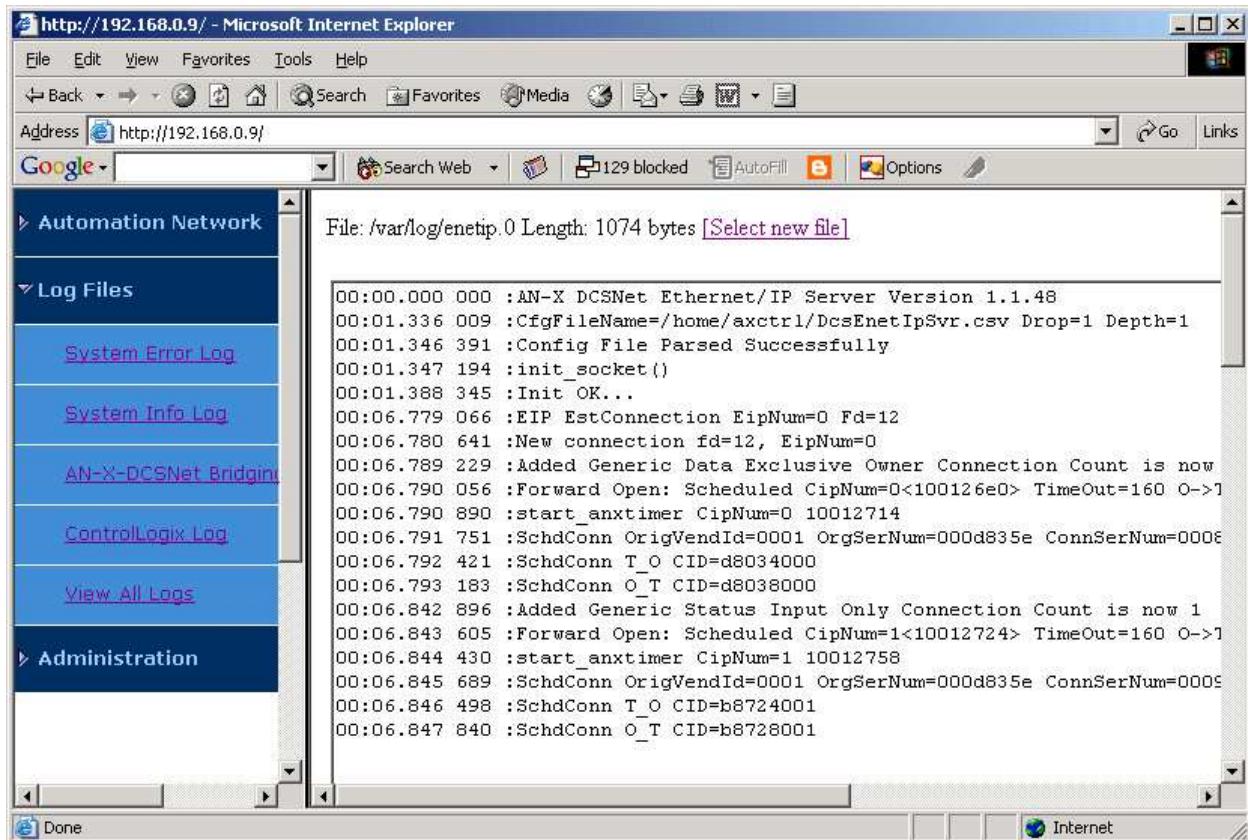
The update times refer to the exclusive owner connection to the AN-X-AMXRIO.

## Error Log

Errors that occur during configuration of scheduled data or during operation of scheduled data are logged in the AN-X.

You can view the log using the AN-X web interface. Select *Log Files/ControlLogix Log* to view the log.





If the log overflows, AN-X closes the log file (enetip.0) and opens a second log file (enetip.1) and continues to alternate between the two log files as each one fills up. Use View All Logs to view both log files.

## Using RSLogix 5000 to Diagnose Problems

You display the Module Properties dialog by right clicking on the module while online with RSLogix 5000. This may help diagnosing some problems, especially connection errors.

The following information is based on version 12.00 of RSLogix 5000.

### General Tab

The Type should be ETHERNET MODULE Generic Ethernet Module

The Vendor should be Allen-Bradley (since it's configured as a generic module)

The name and description are whatever you set when you configured the module.

Comm Format, IP Address and Connection Parameters should match what you set when you configured the module.

## Connection Tab

The *Inhibit Module* checkbox inhibits the module. It should not be checked for normal operation.

The *Major Fault on Controller if Connection Fails While in Run Mode* checkbox causes the module to fault the processor if the connection between the ControlLogix processor and the module fails.

If there are any problems connecting to the AN-X-AMXRIO module, there will be an error message in the module fault area.

## Creating ControlLogix Tags

Use the AmxRioTagExport utility to create tags that can be imported into RSLogix 5000.

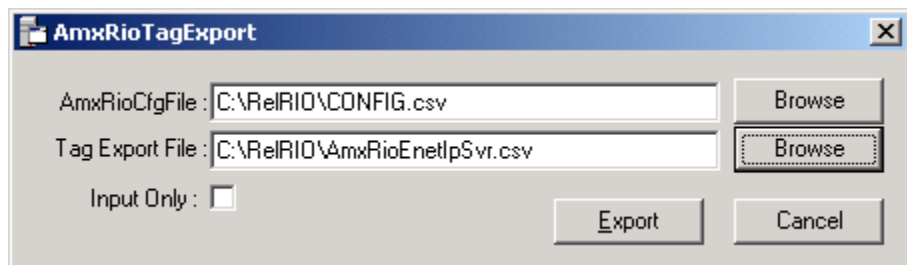
These tags are created as aliases. The alias name is based on the I/O address of the remote I/O data.

If you create your ControlLogix program using these aliases and change the I/O configuration by adding drops or modules, the offsets of the data in the AN-X-AMXRIO scheduled data will change, but you can import a new tag file and the new aliases will point to the new offsets. It will not be necessary to change the control program.

### Creating the Tag File

To create the tag file:

1. Use the web interface to upload the configuration file from the AN-X-AMXRIO and store it on your hard disk.
2. Edit the stored configuration file and change the module name (ModName) to match the AN-X name in RSLogix 5000.
3. Run AmxRioTagExport.



4. Type or browse in the names of the configuration file (AmxRioCfgFile) and the *Tag Export File*.
5. If you are exporting tags for import into an input only connection, check the *Input Only* checkbox.
6. Click *Export* to create the tag file.

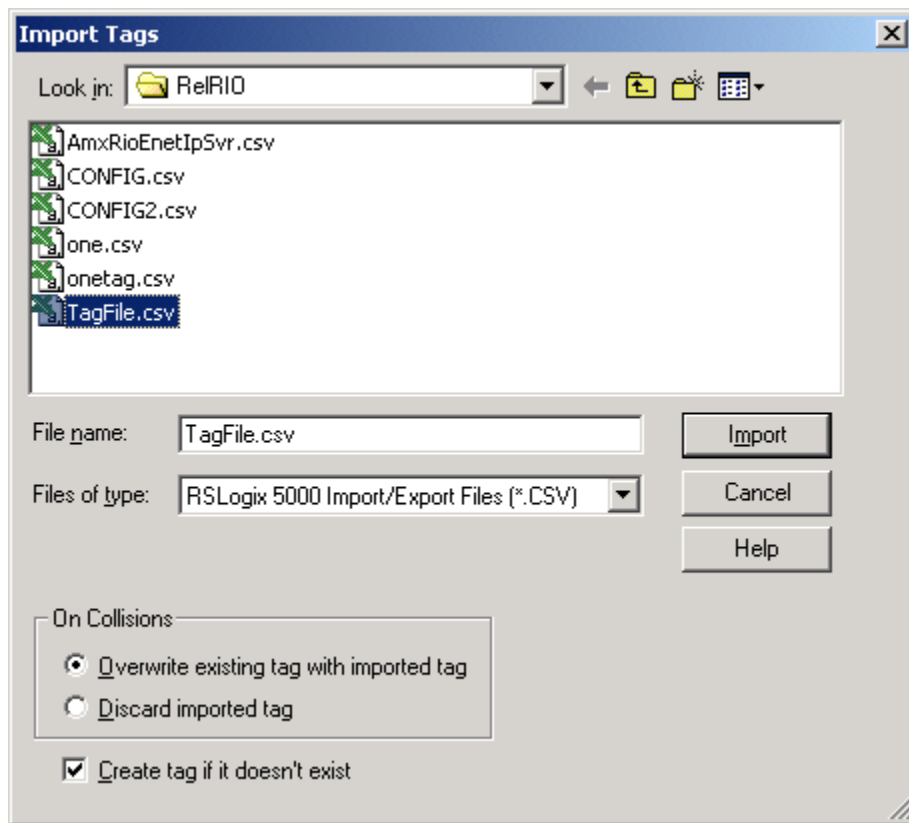
#### TIP

Upload the modified configuration file to the AN-X-AMXRIO. The next time you perform an autoconfiguration, the AN-X will preserve the modified module name and drop names in the new configuration file it creates.

## Importing the Tag File into RSLogix 5000

You must be offline to import tags into RSLogix 5000.

To import the file into RSLogix 5000:



1. Select *Tools/Import Tags*.
2. Browse or type in the tag file name and click *Import*.

## Tag File Format

Tags created by AmxRioTagExport consist of six fields. They have the following format:

TYPE,SCOPE,NAME,DESCRIPTION,DATATYPE,SPECIFIER

ALIAS,"","AmxRack1\_I\_00\_00","","","ANX:I.Data[0]"

ALIAS,"","AmxRack1\_O\_04\_16","","","ANX:O.Data[0]"

ALIAS,"","AmxHead2\_O\_0\_2","","","ANX:O.Data[2]"

ALIAS,"","AmxHead2\_I\_0\_0","","","ANX:I.Data[2]"

The Type is always ALIAS.

The SCOPE is always "" (blank).

The NAME is made up of the drop name from the configuration file and the address on the AutoMax Remote I/O network. The address consists of I or O for input or output, followed by the slot and offset. For example, the name AmxRack1\_O\_04\_16 corresponds to rack 1 output, slot 4, offset 16.

You can edit the configuration file and change the default name (AmxRack# or AmxHead#) in the ExpName field before you create the tag file.

The DESCRIPTION is created as "" (blank). You can edit this field in a spreadsheet or text editor to create an appropriate description.

The DATATYPE is "" and should not be changed.

The SPECIFIER is the data address. Do not change it.

## ***Using AnxInit***

AnxInit is a 32-bit Windows application supplied with AN-X to perform the following functions:

- Locate and identify AN-X modules on the Ethernet network
- Select a specific AN-X for configuration
- Set the IP address and other network parameters for an AN-X
- Restart an AN-X
- Display information about the selected AN-X
- Read the kernel parameters for the selected AN-X
- Update the flash (low level firmware) on the selected AN-X
- Update the firmware on the selected AN-X
- Patch the firmware on the selected AN-X

In addition, it can be used to:

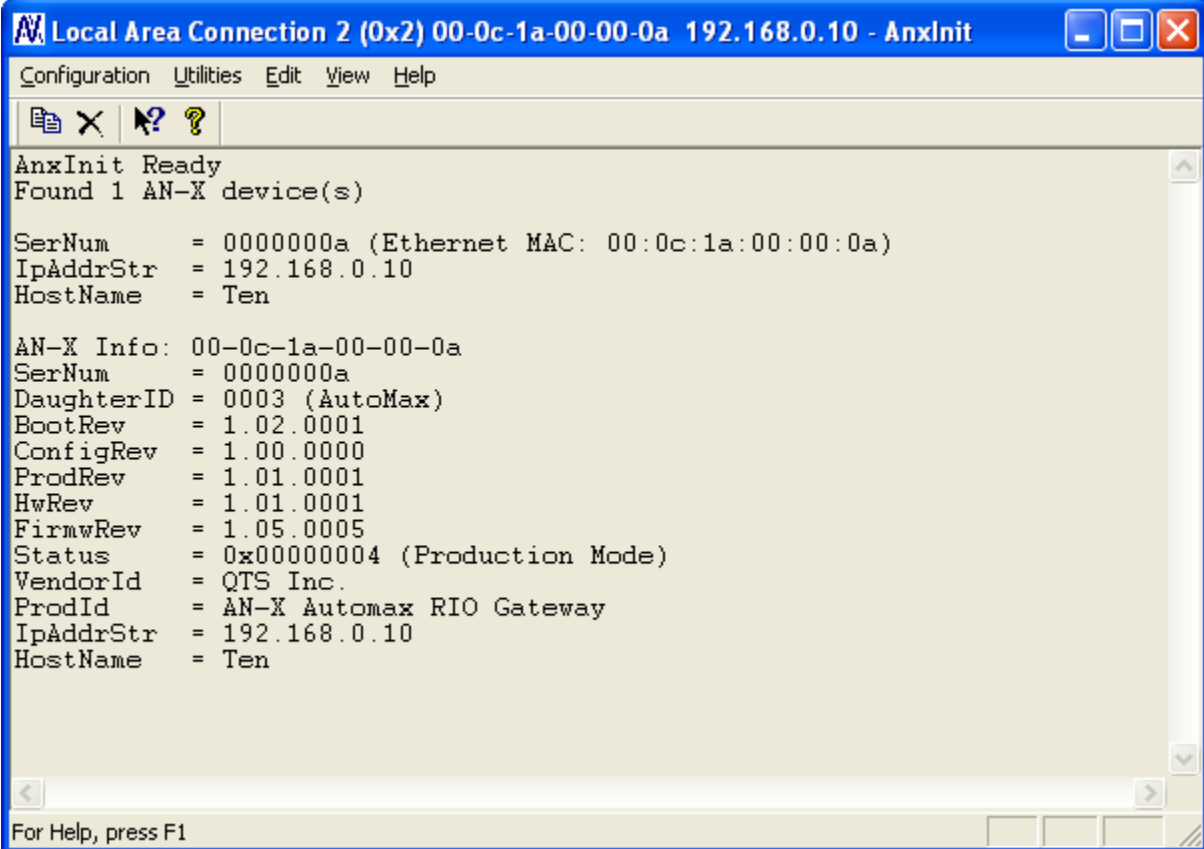
- clear the AnxInit log
- copy the contents of the log to the clipboard for use by another application. This is often useful for technical support

### **AnxInit Log**

AnxInit logs messages in its main window. These messages are often useful for determining the cause of errors or for technical support.

To clear the log, select *Edit/ClearLog*.

To copy the contents of the Log to the Windows clipboard so that they can be pasted into another application, select *Edit/Copy*.



The screenshot shows a window titled "Local Area Connection 2 (0x2) 00-0c-1a-00-00-0a 192.168.0.10 - AnxInit". The window contains a text-based interface with the following content:

```
AnxInit Ready
Found 1 AN-X device(s)

SerNum      = 0000000a (Ethernet MAC: 00:0c:1a:00:00:0a)
IpAddrStr   = 192.168.0.10
HostName    = Ten

AN-X Info: 00-0c-1a-00-00-0a
SerNum      = 0000000a
DaughterID  = 0003 (AutoMax)
BootRev     = 1.02.0001
ConfigRev   = 1.00.0000
ProdRev     = 1.01.0001
HwRev       = 1.01.0001
FirmwRev    = 1.05.0005
Status      = 0x00000004 (Production Mode)
VendorId    = QTS Inc.
ProdId      = AN-X Automax RIO Gateway
IpAddrStr   = 192.168.0.10
HostName    = Ten
```

At the bottom of the window, it says "For Help, press F1".

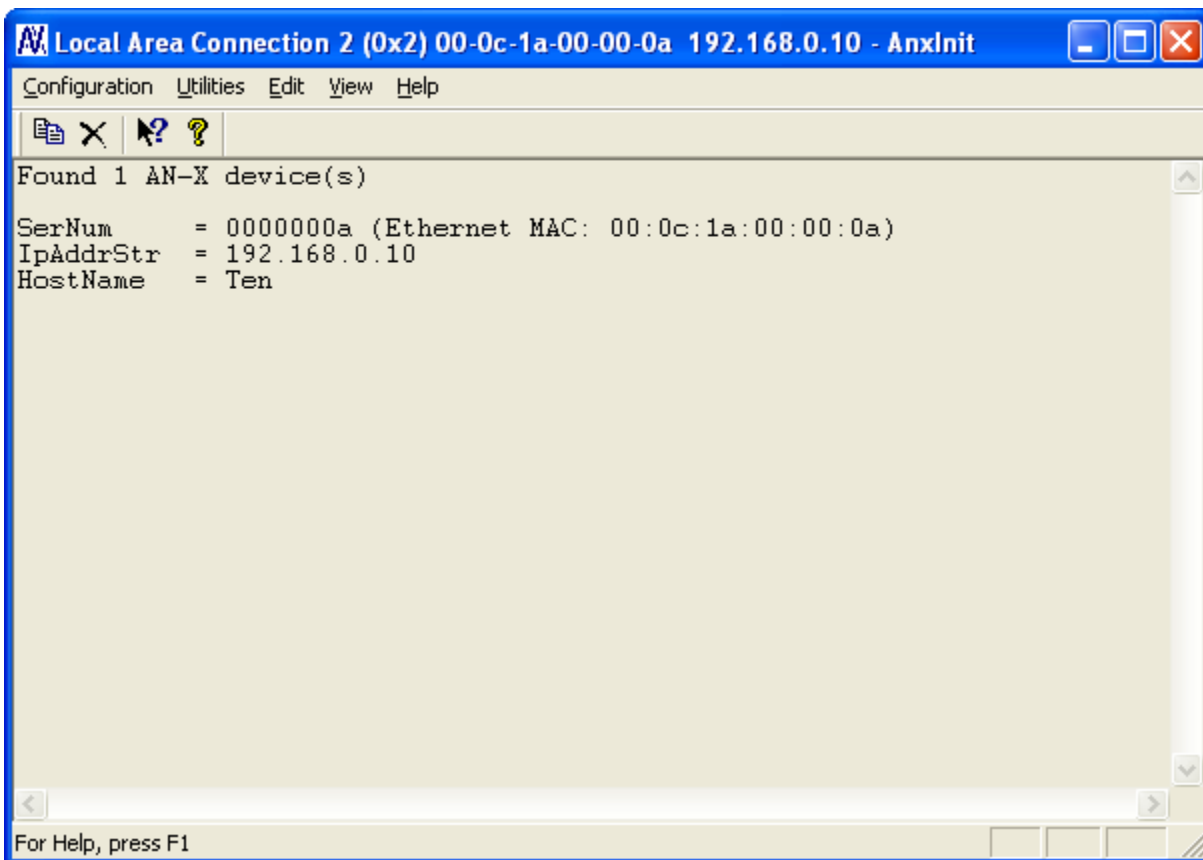
### AN-X Log

## Locating Available AN-X Modules

To locate all accessible AN-X modules on the Ethernet network, select *Utilities/Locate All AN-X Modules*.

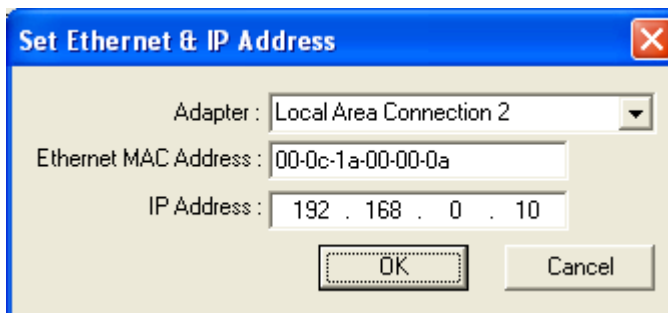
AnxInit displays a list of the AN-X modules it finds, showing their MAC IDs, IP addresses and host names.

This command is useful for determining IP addresses when they have been set by a DHCP server or for confirming that an AN-X is accessible.



## Selecting an AN-X

Before you can perform an operation on an AN-X, you must select it. Choose *Utilities/Select An AN-X* to select a specific AN-X.



From the Adapter list, select the network adapter that connects to the Ethernet network that contains the AN-X.

In the *Ethernet MAC Address* field, enter the MAC Address of the AN-X you wish to select. It can be found on the AN-X label or using the *Locate All AN-X Modules* command. The format is as shown above, six pairs of hexadecimal digits separated by hyphens.

In the *IP Address* field, enter the Ethernet IP address of the AN-X you wish to select. It can be found using the *Locate All AN-X Modules*



command. The format is as shown above, four decimal numbers each in the range 0 to 255.

Both MAC address and IP address must match the settings on the AN-X in order for communication to occur.

Click OK to select the AN-X.

The title bar of AnxInit shows the MAC Address and IP Address of the currently selected AN-X.

## Set AN-X IP Configuration

*Utilities/AN-X IP Configuration* sets the AN-X IP address and hostname.

The AN-X must be on the local Ethernet to set its IP address.

First select the AN-X using the *Utilities/Select An AN-X* command.

Next select *Utilities/AN-X IP Configuration*. The *AN-X TCP/IP Configuration* dialog appears.

**AN-X TCP/IP Configuration**

Enter the IP configuration you want the previously selected AN-X module to use. You MUST enter a valid Default gateway IP address that is on the same subnet as the AN-X module, but you don't need to have a device at that address.

Host Name : AMXRIO

Obtain an IP address automatically (DHCP)  
 Use the following Settings:

IP Address : 192 . 168 . 0 . 10  
 Subnet mask : 255 . 255 . 255 . 0  
 Default gateway : 192 . 168 . 0 . 1

Finish Cancel

Enter a *Host Name* for the AN-X. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 31 characters long.

To configure the AN-X to obtain its IP address from a DHCP server on the network, select *Obtain an IP address automatically (DHCP)*

To configure the AN-X to use a static IP address, select *Use the following Settings* and enter the following:

- the desired IP address for the AN-X.
- the Subnet mask for the AN-X

- the default gateway for your network.

You must enter a valid default gateway address even if there is no device at the gateway address on the network.

Click OK to complete the configuration.

*Utilities/AN-X IP Configuration* resets the selected AN-X. Use the *Utilities/Restart AN-X* to restart the AN-X in production mode.

If you Cancel the *Utilities/AN-X IP Configuration* command, AN-X is left running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X.

## Restart an AN-X

Use the *Utilities/Restart AN-X* command to restart the currently selected AN-X.

## AN-X Info

The *Utilities/AN-X Info* command provides information about the currently selected AN-X in the log window.

The information shown:

AN-X Info	Ethernet MAC address
SerNum	Serial number
DaughterID	Daughterboard ID, 3 for AN-X-AMXRIO
BootRev	Boot code version
ConfigRev	Configuration kernel version
ProdRev	Production kernel version
HwRev	Hardware version
FirmwRev	Firmware release version (depends on current operating mode)
Status	see below
VendorId	Vendor ID
ProdId	Product ID
IpAddrStr	IP address assigned using Utilities/AN-X IP Configuration
HostName	name assigned using Utilities/AN-X IP Configuration

In boot mode, FirmwRev, Vendor ID and Product ID and not valid, and IpAddrStr and HostName are not shown.

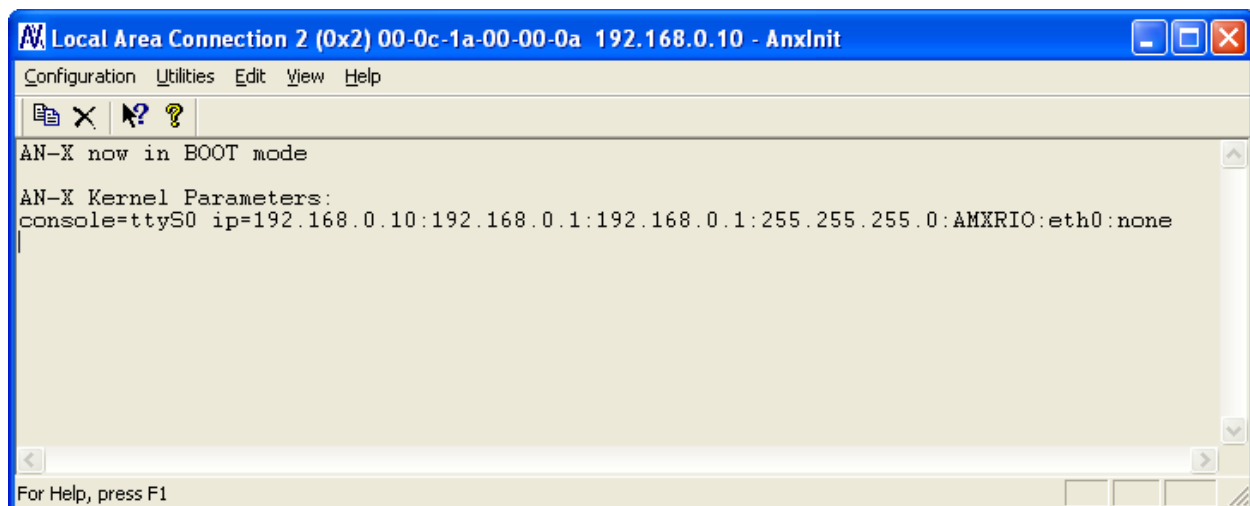
Possible status values are:

Value	Meaning
1	Boot mode
2	Configuration mode
4	Production mode

## Read Kernel Parameters

The *Utilities/Read Kernel Parameters* command displays various communications parameters for the currently selected AN-X

This command resets the AN-X. You will be warned and given the opportunity to cancel the command.



The *Utilities/Read Kernel Parameters* command leaves the AN-X running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X in production mode.

## Run Config Mode

The *Utilities/Run Config Mode* command is used to restart the currently selected AN-X in configuration mode (normally used internally for updating firmware).

This command is not used in normal operation but may be required for technical support.

When the AN-X is in configuration mode, the SYS LED flashes red twice, followed by a pause.

To exit configuration mode, use the *Utilities/Restart AN-X* command to restart AN-X in production mode.

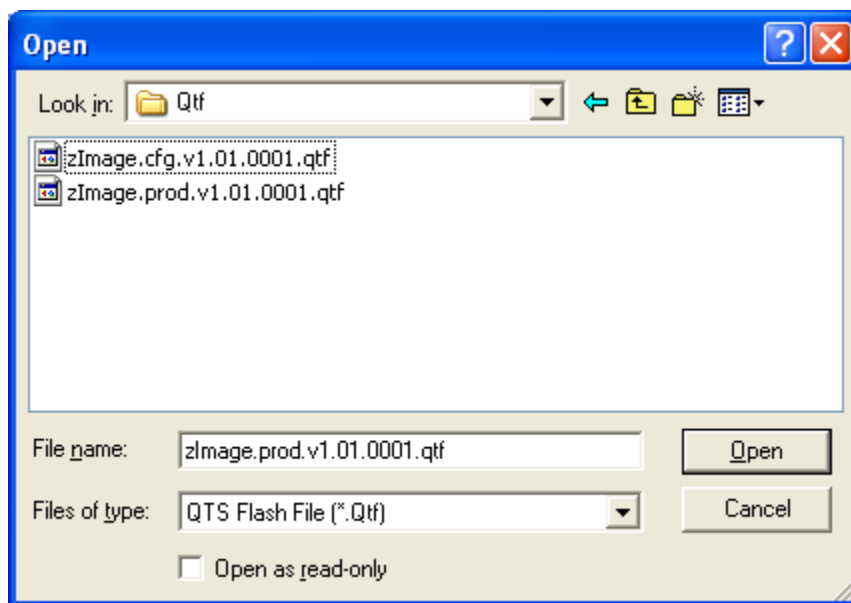
## Update AN-X Flash

The *Utilities/Update AN-X Flash* command updates the low-level firmware (configuration kernel and production kernel).

Files have extension qtf. Current AN-X kernel files are provided on the distribution CD.

This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

If you cancel at the filename dialog, the AN-X has already been reset and is in boot mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.



## Update Firmware

There are two ways to update the firmware in an AN-X module.

1. The *Configuration/Firmware Update* command starts the firmware update wizard, which takes you step by step through the firmware update process.
2. The *Utilities/Update Firmware* command updates the firmware on an AN-X you have selected using the *Utilities/Select An AN-X* command.

Firmware files have extension *bin*.

## Firmware Update Wizard

Select the *Configuration/Firmware Update* command to start the firmware update wizard.

### Step 1:

In step 1, you identify the AN-X you are configuring.

**Step 1: AN-X Selection**

Select this computer's Ethernet adapter that's on the same Ethernet subnet as the AN-X module you want to configure (you may only have one Ethernet adapter in your computer)

Local Area Connection 2

Enter the Ethernet MAC Address of the AN-X module you want to configure. You can get this from the label on the AN-X module or by selecting Utilities/Locate All AN-X Modules (if the module's current IP address is on the same subnet).

00-0c-1a-00-00-0a

Enter the IP address on the local subnet that you intend the AN-X module to use.

192 . 168 . 0 . 10

Next >> Exit

1. Select the Ethernet adapter that's connected to the AN-X. In most cases there will be just one Ethernet adapter in the computer. The AN-X must be on the same subnet as the computer.

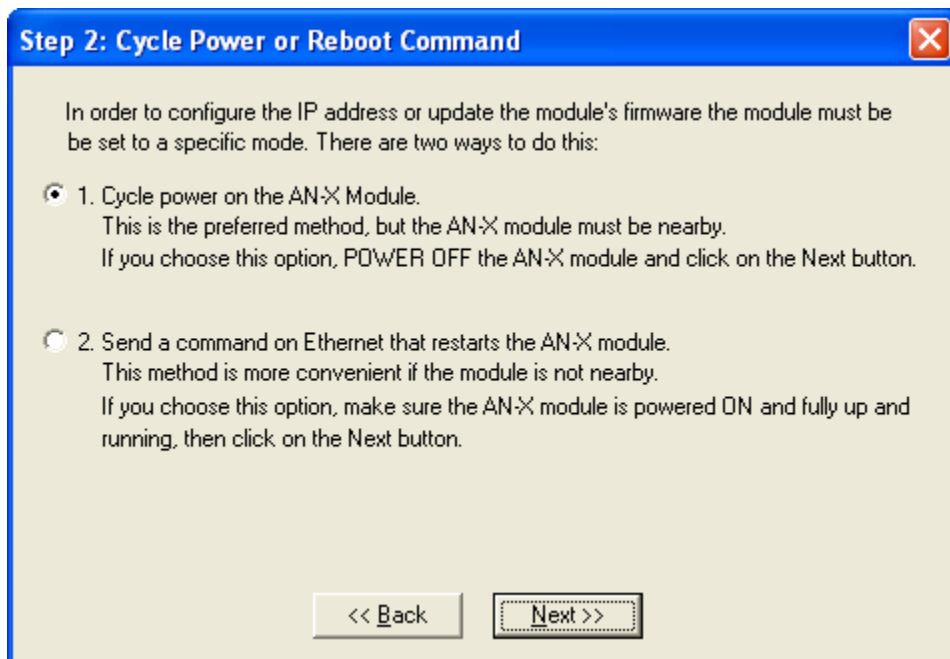
2. Enter the MAC address of the AN-X you are updating. This is printed on the AN-X label. It consists of six pairs of hexadecimal digits, separated by hyphens. In the example above, it's 00-0c-1a-00-00-09.

If the AN-X is already online, you can obtain its MAC address using the *Utilities/Locate All AN-X Modules* command.

3. Enter the IP address of the AN-X you want to update

### Step 2

In step 2, you choose a method of restarting AN-X to put it in config mode.

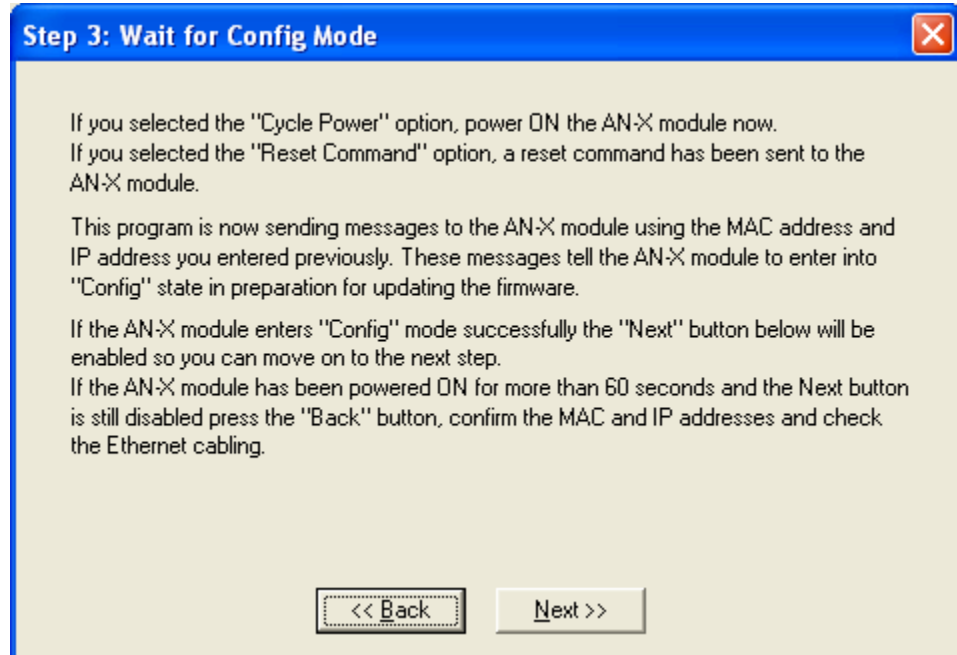


The preferred method is to cycle power on the AN-X. Select the first option on the screen and click the *Next >>* button.

The second method, useful if the AN-X is not easily accessible, is to send it a command over Ethernet. The AN-X must be powered on and completely running for this method to work. For example, if this is the first time you are configuring a new AN-X, allow sufficient time for it to acquire an IP address from a DHCP server or to time out and use its default IP address (about 3 minutes). Select the second option on the screen and click the *Next >>* button.

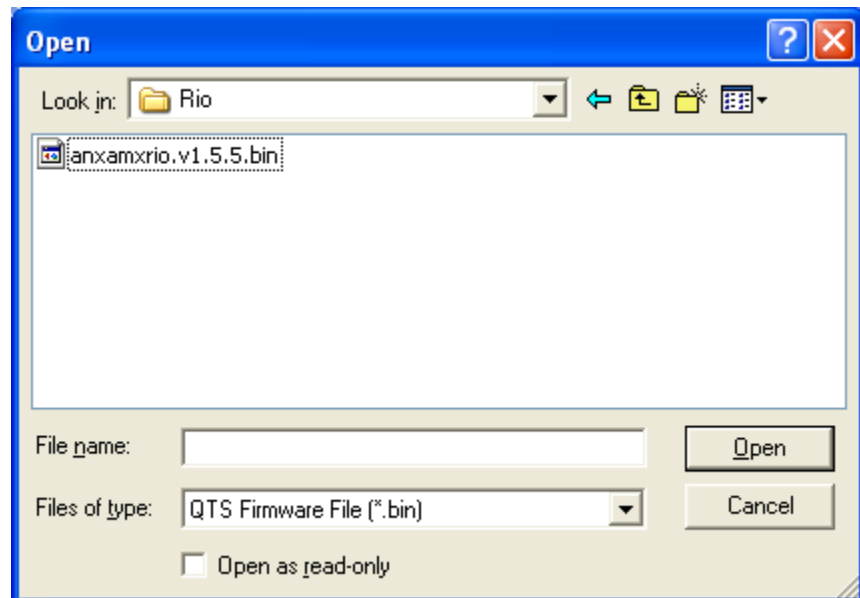
**Step 3:**

Wait for AN-X to enter config mode. While AnxInit is waiting, the *Next>>* button will be disabled. When AN-X is in boot mode, the *Next>>* button will be enabled.



If the AN-X does not enter config mode within about 60 seconds, return to the previous screens and check the entries.

Click the *Next>>* button, and select the firmware file you want to download and click *Open*.



AnxInit transfers the firmware file and restarts the AN-X.

After you run update the firmware, you must reconfigure the AN-X and restore:

- Automation network configuration

- ControlLogix configuration
- AN-X to AN-X configuration

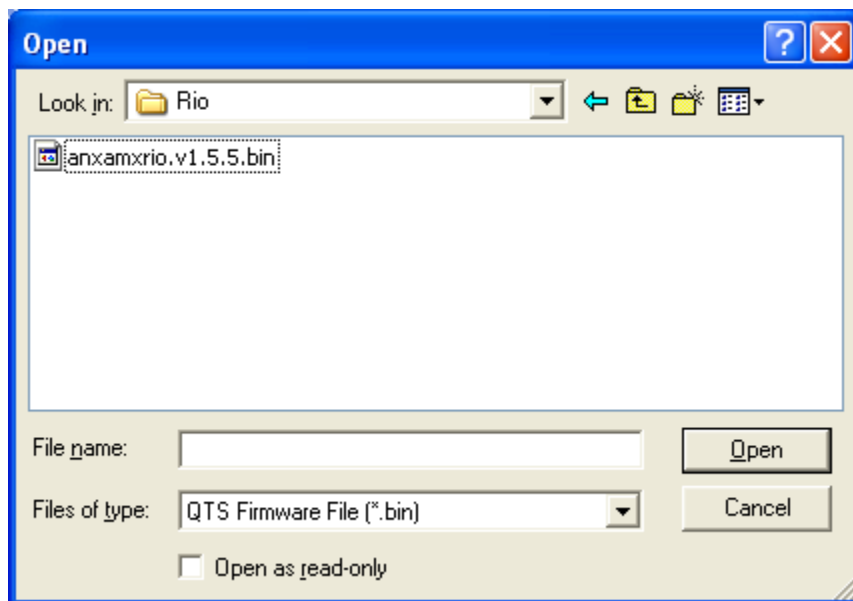
## Update Firmware Command

The *Utilities/Update Firmware* command updates all the firmware on an AN-X you have previously selected using the *Utilities/Select An AN-X* command.

This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

If you cancel at the filename dialog, the AN-X has already been reset and is in configuration mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.

Click the *Next>>* button, and select the firmware file you want to download and click *Open*.



AnxInit transfers the firmware file and restarts the AN-X.

After you update the firmware, you must reconfigure the AN-X and restore the AutoMax remote I/O configuration

## Patch Firmware

The *Utilities/Patch Firmware* command applies small patches to the firmware running on the AN-X.

These patch files files have extension *pch*.



This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

You do not have to reconfigure the AN-X after applying a patch. All configuration information will be left intact.

When the patch has been applied, AnxInit restarts the AN-X in production mode.

If you cancel at the filename dialog, the AN-X has already been reset and is in configuration mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.

## Using the Web Interface

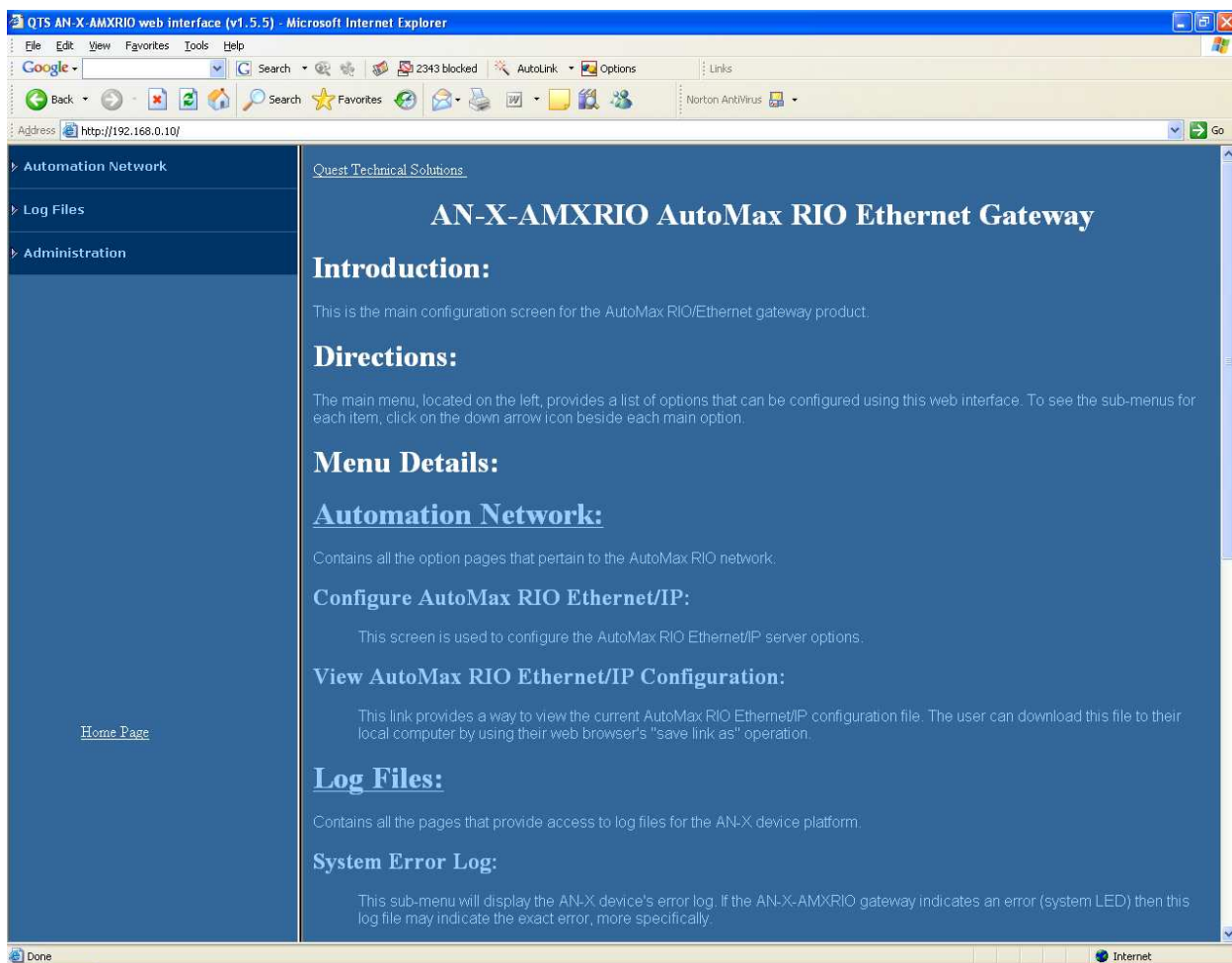
The AN-X module contains a webserver capable of communicating with standard web browsers such as Internet Explorer.

The web interface is used for:

- setting and viewing the AutoMax remote I/O configuration
- viewing AN-X logs
- changing the IP address

To use the web interface, you need to know the IP address of the AN-X. Run AnxInit and use the *Utilities/Locate All AN-X Devices* command to find all AN-X devices on the Ethernet network.

To access the web interface, start your web browser and type the AN-X IP address where you normally enter web addresses in the browser.



The left pane contains commands. Click on the arrows at the left of the main headings to expand or contract the sections.

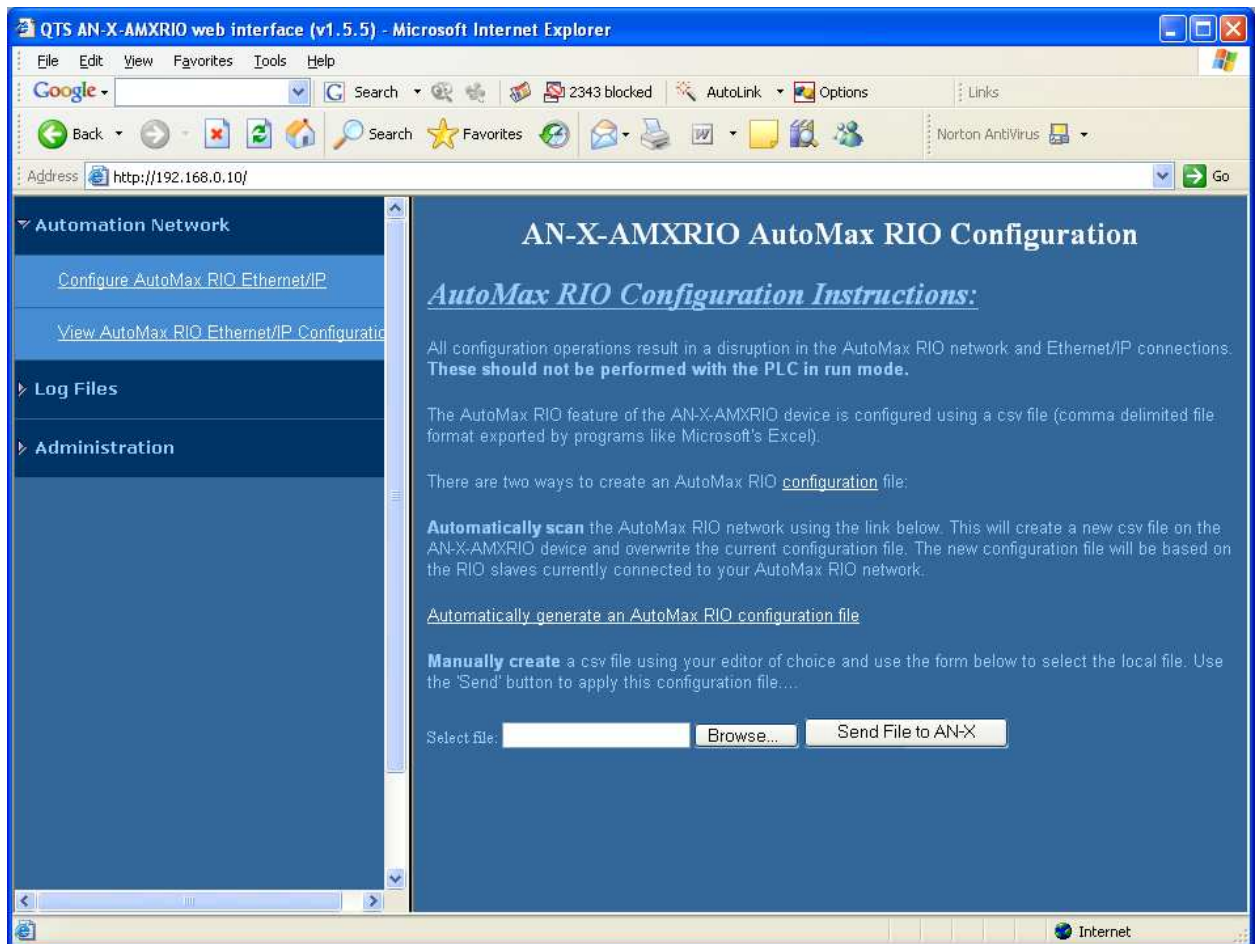
The contents of the right pane depend on the current command being executed.

## Remote I/O Configuration

To set the remote I/O configuration using the web interface, the remote I/O network must be connected to the AN-X-AMXRIO. The ControlLogix with the exclusive owner connection must be in program mode.

Start your web browser and enter the AN-X IP address as the address.

Select *Configure AutoMax RIO Ethernet/IP*.



Click on the link *Automatically generate an AutoMax configuration file*. The AN-X-AMXRIO module reads the current network configuration and stores it.

When the autoconfiguration is done, the web interface displays a summary of the network found and displays the message *Automatic configuration done*. Click the *Back to configuration page* link.

To view the configuration file that has been created, click the *View AutoMax RIO Ethernet/IP Configuration* link. The configuration is displayed either in a spreadsheet or as a text file.

**TIP**

To view the current configuration, it may be necessary to refresh the displayed configuration once or twice, as the browser may use a previously cached version of the file.

To save the configuration file, right click the *View AutoMax RIO Ethernet/IP Configuration* link and select *Save Target as...* Save the file and edit offline if you wish to make changes.

To download a configuration file to the AN-X-AMXRIO, browse or type in the file name in the web interface and click the *Send File to AN-X* button.

## Log Files

AN-X maintains various logs to record diagnostic and error messages. Use the Utilities menu in the web interface to view these logs.

### System Error Log

The System Error log records errors that occur during AN-X operation. This log is normally empty.

### System Info Log

The System Info Log records informational messages during startup and normal operation.

### ControlLogix Log

The ControlLogix Log records messages from the application that is responsible for scheduled communication with a ControlLogix processor.

These messages include normal startup messages, messages about problems with the configuration file, and runtime errors such as timeouts.

If the log overflows, AN-X closes the log file (enetip.0) and opens a second log file (enetip.1.1) and continues to alternate between the two log files as each one fills up. Use View All Logs to view both log files.

### View All Logs

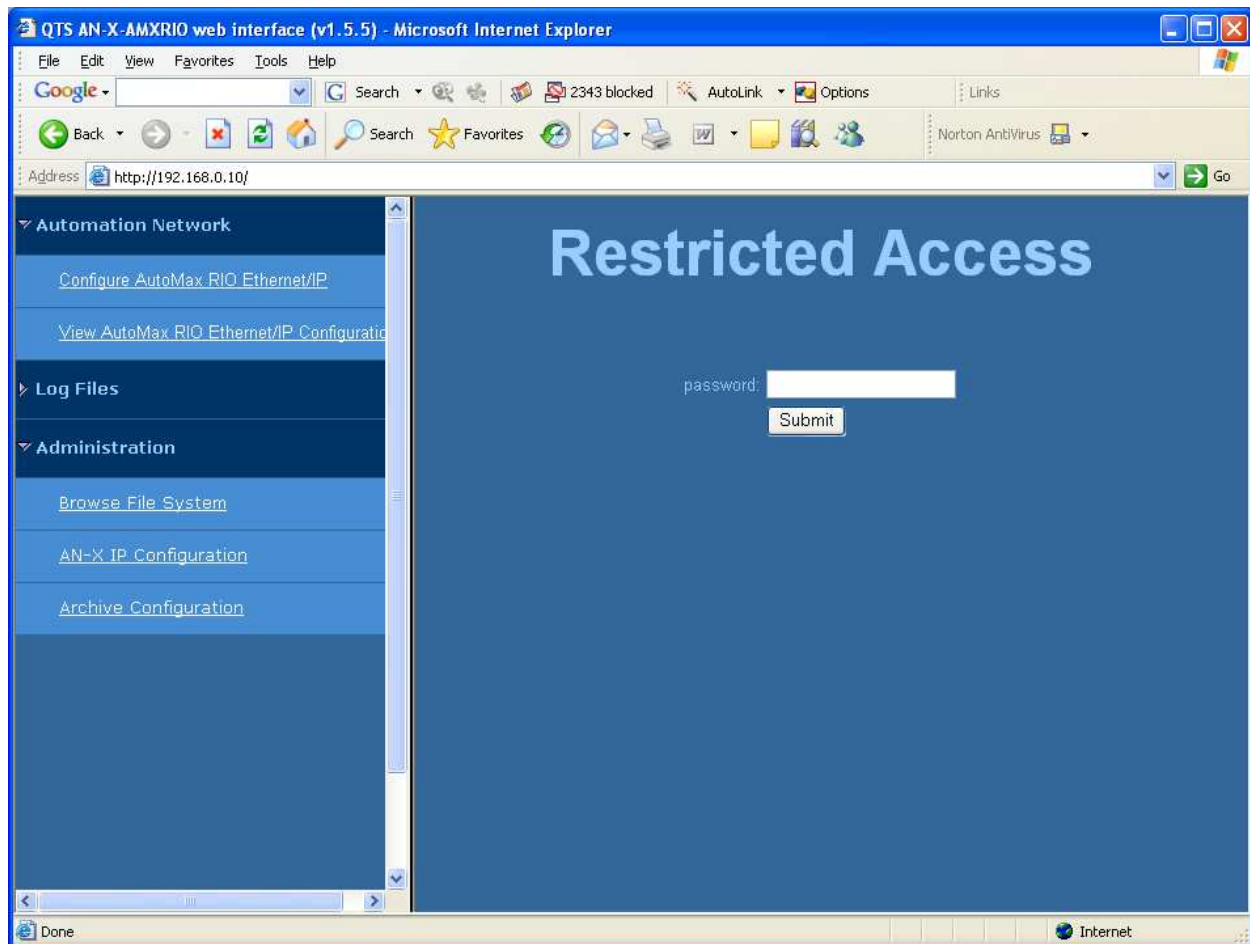
Use View All Logs to list and view all the AN-X logs. To view a log file, double click on the file name.

## Administration Menu

The Administration Menu is used to set the AN-X IP address and to view and edit files on AN-X. The file edit function is password protected and is used only for AN-X technical support.

## Browse File System

If you are required by QTS technical support to examine files on the AN-X, select *Administration/Browse File System*.

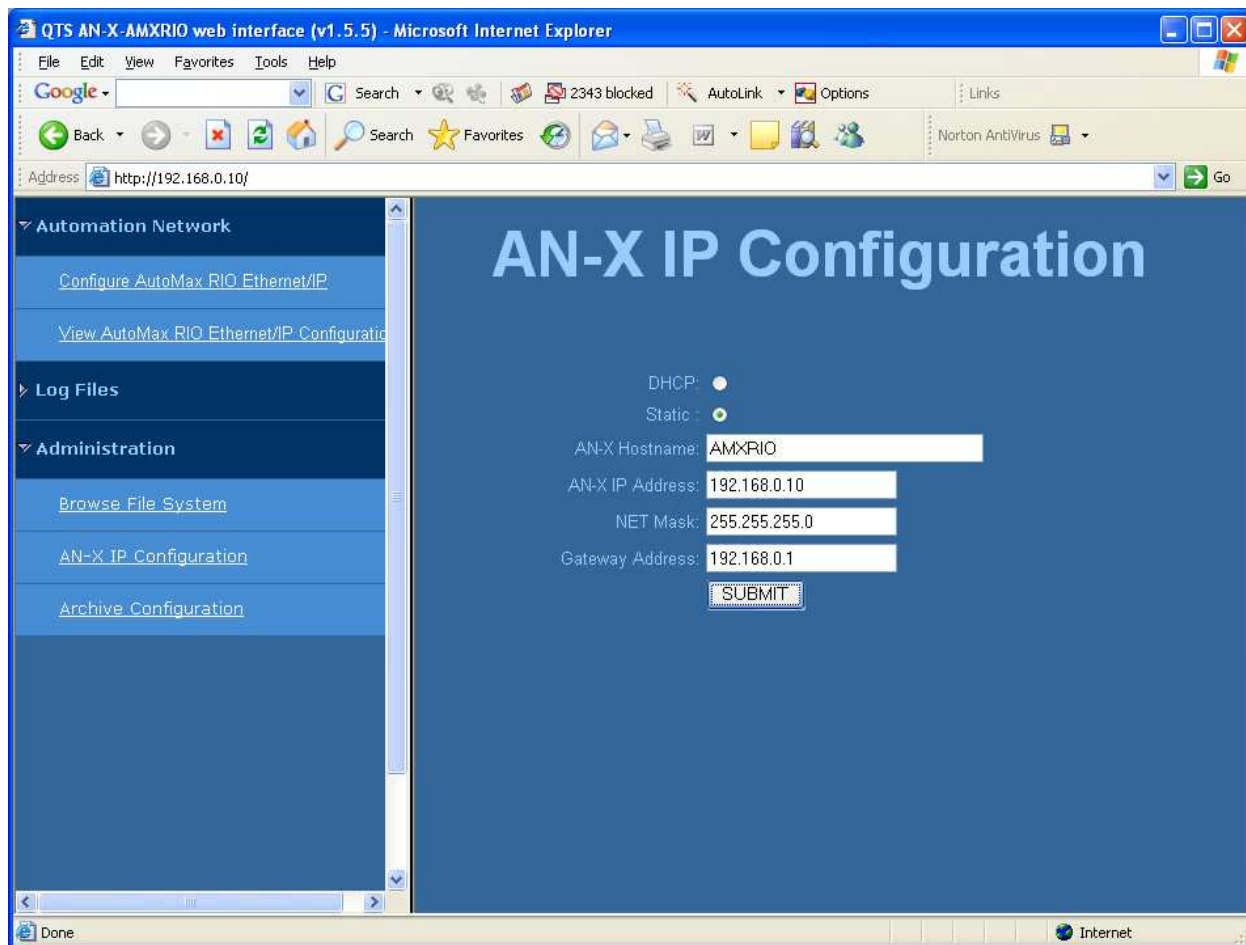


Technical support will provide the password and supply detailed information on any further steps.

## AN-X IP Configuration

You can change the AN-X IP configuration from the web interface. This requires that you already know the correct IP address and can use it to access the web interface.

Select *Administration/AN-X IP Configuration*.



You can configure the AN-X to use DHCP or to use a static IP address.

Click **SUBMIT** to set the parameters.

When prompted, click **CONTINUE** to reboot the AN-X with the new parameters.

## Archive Configuration

You can archive all the current AN-X configuration files and log files from the web interface. The archive file is a standard gzip compressed tar archive.

Select *Administration/Archive configuration*.

Click on the Archive File link and save the file. Select the destination where the file will be stored.

## Troubleshooting

### LEDs

The AN-X-AMXRIO has LEDs that indicate the state of the Ethernet connection, the connection to the AutoMax remote I/O network, and the overall module state.

### Ethernet LEDs

There are two LEDs that indicate the state of the Ethernet connection.

The orange LED, labelled 100, is on if the link is running at 100 Mb/s and is off otherwise.

The green Link/Act LED is off if the link is inactive and is on if the link is active. If activity is detected, the link blinks at 30 ms intervals and continues blinking as long as activity is present.

### SYS LED

The SYS LED indicates the state of operations performed by the application software and errors it encounters.

Errors or status indication in boot mode cause the LED to flash yellow. Otherwise, the LED flashes red.

Use the SYS LED in conjunction with the logs to locate the cause of problems.

In the following, red 3 means three red flashes followed by a pause, and so on.

SYS LED State	Possible cause
Red 2	AN-X is in config mode
Red 3	DHCP configuration failed
Red 4	Fatal application error, check logs for cause
Red 5	Application memory access violation, check logs
Red 6	Application failed, illegal instruction, check logs
Red 7	Application crashed, unknown cause, check logs
Fast red flash	Reconfiguration Configuration of ControlLogix support failed
Single red flash	ControlLogix scheduled data connection problem
Slow red flash	script or application problem during startup

At startup, the SYS LED sequence is:

- boot code starts – fast flashing red
- boot code loads a kernel – solid red
- if the configuration kernel is loaded, 2 red flashes followed by a pause
- if the production kernel loads with no errors, solid green

### **NET LED – Network Status**

The NET LED indicates the status of the AutoMax remote I/O network.

Solid green	All drops operating correctly
Solid red	One or more drops in error



## Updating the Firmware

The AN-X operating software consists of several parts:

- boot code, runs at startup
- configuration kernel, runs when you update firmware
- production kernel, runs in normal operation
- application software, for AutoMax remote I/O communication, scheduled communication with ControlLogix and unscheduled messaging

The kernels are supplied in files with extension *qtf* and are updated using the AnxInit utility. Run the command *Utilities/Update AN-X Flash* and select the file you wish to download. Refer to page 40 for details.

Firmware files contain the application programs for AN-X and have extension *bin*. They are downloaded using the command *Configuration/Firmware Update* or *Utilities/Update Firmware* in AnxInit. Refer to page 40 for details.

Occasionally individual patch files are released. They have extension *pch* and are downloaded using the *Utilities/Patch Firmware* in AnxInit. Refer to page 44 for details.

## Reading Version Numbers

To read the version numbers of the various software components:

Boot code	AnxInit – AN-X Info
Configuration kernel	AnxInit – AN-X Info
Production kernel	AnxInit – AN-X Info
Firmware	AnxInit – AN-X Info (version depends on current mode, boot, configuration or production)
Individual applications	
ControlLogix scheduled communication	Web interface, ControlLogix Log

## Obtaining the Latest Software

Version numbers and software for the most recent AN-X releases are available from the QTS website, [www.qtsusa.com](http://www.qtsusa.com)

## ***AutoMax Remote I/O Network***

The remote I/O network can contain up to 7 drops, numbered 1 to 7. Each drop can be either a rack or a head.

### **Racks**

Racks consist of slots 0-15. Each slot can have up to 32 registers. A register can be either an input register or an output register. There can be a maximum of 120 inputs and 120 outputs per rack. Input and output registers can occur in any order in a rack.

### **Heads**

Remote I/O heads have four ports. Each port can have from 1 to 4 registers.

Heads consist of up to 16 words each of input and output data, organized as drop (1-7), slot (0-3) and register.

There are two types of heads. On the older 57C330 heads, the location of inputs and outputs can be identified only at runtime. On the newer 57C328 heads, the location of inputs and outputs can be identified at configuration time.

### **Maximum Network Size**

An AN-X-AMXRIO module can scan a network of up to 250 input words and 248 output words. If your network is larger, you must split it into two or more networks, each controlled by a separate AN-X-AMXRIO.

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## Specifications

Parameter	Specification
Function	Bridge between Ethernet and AutoMax remote I/O network
Description	Processor: 100MHz IDT MIPS FLASH memory: 64M RAM: 64M
Typical Power Consumption	300 mA @ 12 VDC or 150 mA @ 24 VDC
Maximum Power dissipation	3.6W
Environmental Conditions:	
Operational Temperature	0-50°C (32-122°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5-95% without condensation

## **Support**

Technical support is available from Quest Technical Solutions.

Quest Technical Solutions

4110 Mourning Dove Court

Melbourne FL 32934

321 757-8483

website: [www.qtsusa.com](http://www.qtsusa.com)

email: [support@qtsusa.com](mailto:support@qtsusa.com)

If you need to return an AN-X module, contact QTS to obtain a return authorization number.