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ControlWave®
I/O Expansion Rack

Quick Setup Guide

EMERSON.
Process Management

IMPORTANT! READ INSTRUCTIONS BEFORE STARTING!

Be sure that these instructions are carefully read and understood before any operation is attempted. Improper use of this device in some applications may result in damage or injury. The user is urged to keep this book filed in a convenient location for future reference.

These instructions may not cover all details or variations in equipment or cover every possible situation to be met in connection with installation, operation or maintenance. Should problems arise that are not covered sufficiently in the text, the purchaser is advised to contact Emerson Process Management, Remote Automation Solutions for further information.

EQUIPMENT APPLICATION WARNING

The customer should note that a failure of this instrument or system, for whatever reason, may leave an operating process without protection. Depending upon the application, this could result in possible damage to property or injury to persons. It is suggested that the purchaser review the need for additional backup equipment or provide alternate means of protection such as alarm devices, output limiting, fail-safe valves, relief valves, emergency shutoffs, emergency switches, etc. If additional information is required, the purchaser is advised to contact Remote Automation Solutions.

RETURNED EQUIPMENT WARNING

When returning any equipment to Remote Automation Solutions for repairs or evaluation, please note the following: The party sending such materials is responsible to ensure that the materials returned to Remote Automation Solutions are clean to safe levels, as such levels are defined and/or determined by applicable federal, state and/or local law regulations or codes. Such party agrees to indemnify Remote Automation Solutions and save Remote Automation Solutions harmless from any liability or damage which Remote Automation Solutions may incur or suffer due to such party's failure to so act.

ELECTRICAL GROUNDING

Metal enclosures and exposed metal parts of electrical instruments must be grounded in accordance with OSHA rules and regulations pertaining to "Design Safety Standards for Electrical Systems," 29 CFR, Part 1910, Subpart S, dated: April 16, 1981 (OSHA rulings are in agreement with the National Electrical Code).

The grounding requirement is also applicable to mechanical or pneumatic instruments that include electrically operated devices such as lights, switches, relays, alarms, or chart drives.

EQUIPMENT DAMAGE FROM ELECTROSTATIC DISCHARGE VOLTAGE

This product contains sensitive electronic components that can be damaged by exposure to an electrostatic discharge (ESD) voltage. Depending on the magnitude and duration of the ESD, this can result in erratic operation or complete failure of the equipment. Read supplemental document S14006 for proper care and handling of ESD-sensitive components.

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Chapter 1 – Introduction

The I/O capacity of the ControlWave Process Automation Controller can be increased by the addition of one or more ControlWave I/O Expansion Racks.

The ControlWave process automation controller is referred to as the **host** of the I/O expansion racks. Communication between the I/O expansion rack and its host ControlWave is via Ethernet. The I/O racks can be part of their own IP sub-net, or they can sit on the wider Ethernet network, depending upon the requirements of your particular application.

More than one ControlWave can reference a single I/O Rack (necessary for redundant configurations) however, only one ControlWave can use an I/O rack at any one time.

Note: The I/O expansion rack can be distinguished from the process automation controller by looking for the Run/Remote/Local key switch. On the I/O rack, there is no key switch, simply a plug where the keyhole would appear.

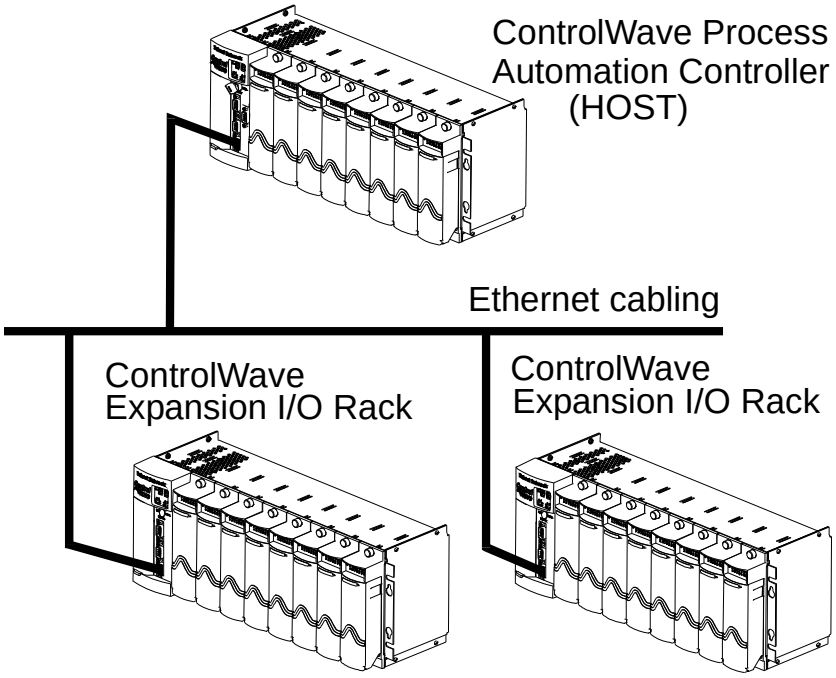


Figure 1-1. ControlWave Process Automation Controller with Two I/O Expansion Racks

The configuration process for the I/O expansion rack is divided up into three chapters:

Setting up the Hardware (CH2)

Chapter 2 gives you a quick overview of how to unpack the I/O expansion rack, install the modular components, set the switches, and connect the cable between the rack and the PC. References are included to the hardware manual for details of the individual steps.

Setting Configuration Parameters (CH3)

Chapter 3 describes how to establish communications with the rack using LocalView, NetView, or TechView, and how to use the Flash Configuration Utility to specify an Ethernet Port for the rack. This section also discusses how to set up certain IP and application parameters.

Setting up the Host to Reference the I/O Expansion Rack (CH4)

Chapter 4 shows how to use the I/O Configuration Wizard in ControlWave Designer to modify the ControlWave Project in the host controller, so that it can make use of the boards in the I/O expansion rack.

Chapter 2 – Setting up the Hardware

Hardware setup involves unpacking the ControlWave I/O expansion rack hardware, mounting the chassis, installing I/O modules, wiring I/O terminations, making proper ground connections, connecting a communication cable to the PC workstation and setting switches.

1. Remove the chassis from its carton and install it at its assigned work site. (See *Section 2.2.1* of the *ControlWave I/O Expansion Rack* instruction manual).

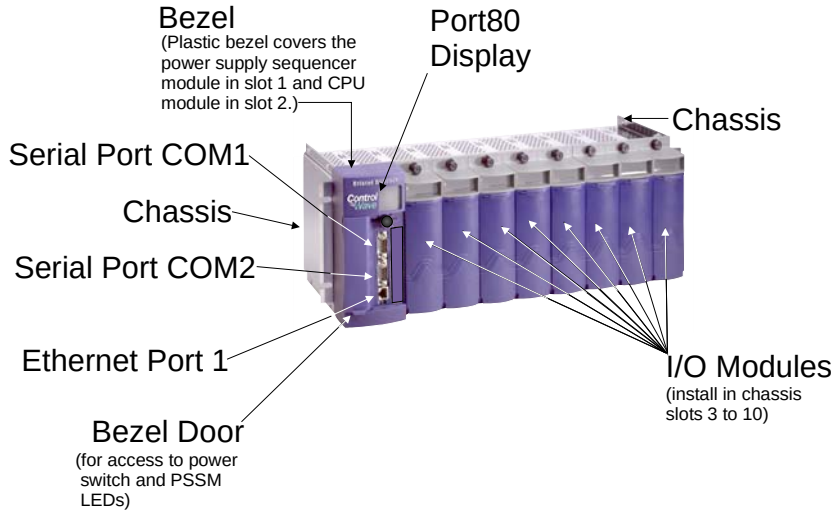


Figure 2-1. ControlWave I/O Expansion Rack (Shown Without Secondary Comm. Board)

2. The Power Supply Sequencer Module (PSSM) from its carton and install it into chassis slot 1, which is the first slot from the left end of the installed unit. (See *Section 2.3* of the *ControlWave I/O Expansion Rack* instruction manual).
3. Remove the CPU module from its carton and install it into chassis slot 2, i.e., the second slot from the left end of the installed unit. CPU module DIP switches may be configured before or after the module has been installed into the chassis. (See *Section 2.4.1* of the *ControlWave I/O Expansion Rack* instruction manual.) Depending upon whether the CPU you purchased has a secondary communication board (SCB), you may have two or four serial ports and one or three Ethernet ports.
4. For the initial configuration activities described in this manual, we recommend you leave **most** of the CPU switch settings in their default positions, as set at the factory:
   - Switch bank **SW1: all switches** in the **ON** position, **unless** this I/O rack is part of a **redundant** pair. [A

redundant pair would require two I/O expansion racks, hooked through a ControlWave Redundant I/O Switcher (CWRED I/O) to the host ControlWave unit(s).]

- If this I/O rack is part of a redundant pair, set switch SW1-6 and SW1-7 as shown in the table, below:

For These Switches:	If this I/O Expansion Rack is part of a redundant pair, set as follows:
SW1-6	Set to **OFF**.
SW1-7	Set **SW1-7 ON** if this is the **A** I/O rack in the redundant pair. Set **SW1-7 OFF** if this is the **B** I/O rack in the redundant pair.

- Switch bank **SW3**: all switches in the **OFF** position, **except SW3-4**, which you will want to set to the **ON** position to enable the backup battery when the I/O expansion rack is ready to be put into service. If the rack is **not** going to be put into service for an extended period of time, leave this OFF to avoid draining the battery.

5. For the configuration activities, described in this manual, we will use serial communication port 2 (COM2) on the rack, which is configured by default for 9600 baud. (For more information on communication ports see *Section 2.4.2* through *Section 2.4.4* of the *ControlWave I/O Expansion Rack* instruction manual.)

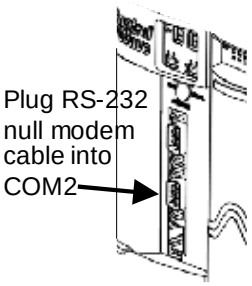


Figure 2-2. Connecting the Null Modem Cable to COM2

- Plug one end of an RS-232 null modem cable into one of your PC communication ports.
- Plug the other end of the RS-232 null modem cable into serial communication port 2 (COM2) of the I/O expansion rack.

Note: For a wiring diagram of an RS-232 null modem cable, see the *ControlWave I/O Expansion Rack* instruction manual.

6. Remove I/O modules from their cartons and install them into the Chassis. I/O modules reside in slots 3 through 6 or 3 through 10 for units supporting 4 or 8 I/O modules respectively. Install I/O wiring to each I/O module. (See *Section 3.3* of the *ControlWave I/O Expansion Rack* instruction manual.)
7. Install a ground wire between the chassis ground lug and a known good Earth ground. (See *Section 2.2.4* of the *ControlWave I/O Expansion Rack* instruction manual.)
8. Install watchdog /MOSFET redundancy switch wiring, if required for your application. (See *Section 2.3.7* of the *ControlWave I/O Expansion Rack* instruction manual.)
9. Connect bulk DC power and field power to the PSSM module. (See *Section 2.3.5* of the *ControlWave I/O Expansion Rack* instruction manual.)

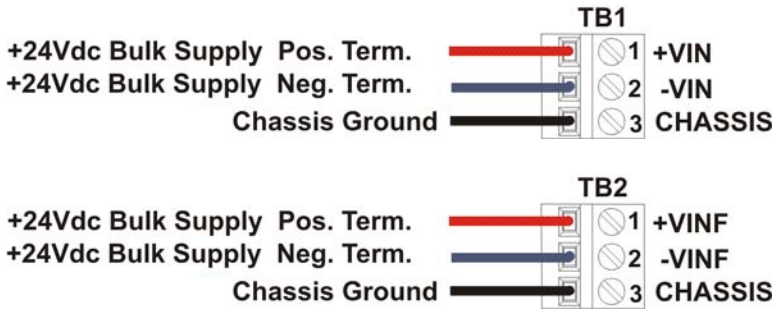


Figure 2-3. Wiring Bulk Power (TB1) and Field Power (TB2)

10. Install the bezel so that it covers the PSSM and CPU modules. (See *Section 2.5* of the *ControlWave I/O Expansion Rack* instruction manual.)
11. Plug an Ethernet connection from your network into the Ethernet port of the I/O rack.

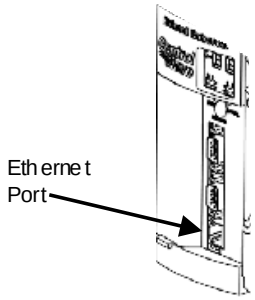


Figure 2-4. Connecting to the Ethernet Port

12. Open the bezel door, and apply power to the I/O expansion rack by setting the power switch on the PSSM module to the '1' position.

13. When the ControlWave I/O expansion rack completes its power-on sequence, the Port 80 display should be blank.

Chapter 3 – Setting Configuration Parameters

Note: This chapter assumes you already have a communication cable connected between the OpenBSI workstation and the ControlWave I/O expansion rack.

Now that you've created a project and downloaded it successfully, it's time to learn more about configuring the ControlWave I/O rack. The configuration in this part is performed using the Flash Configuration Utility.

We're going to talk about using the Flash Configuration Utility to set your rack's soft switches, configure its communication ports, set IP parameters, and configure security accounts for its users.

3.1 Starting the Flash Configuration Utility

The way you start the Flash Configuration Utility varies depending upon whether you use LocalView, NetView, or TechView to communicate with the ControlWave I/O expansion rack.

3.1.1 Method 1: Starting from within LocalView

1. Click as follows: **Start** > **Programs** > **OpenBSI Tools** > **LocalView**
2. Choose **Local** for the mode, enter a name for the LocalView file, and click **Create.**

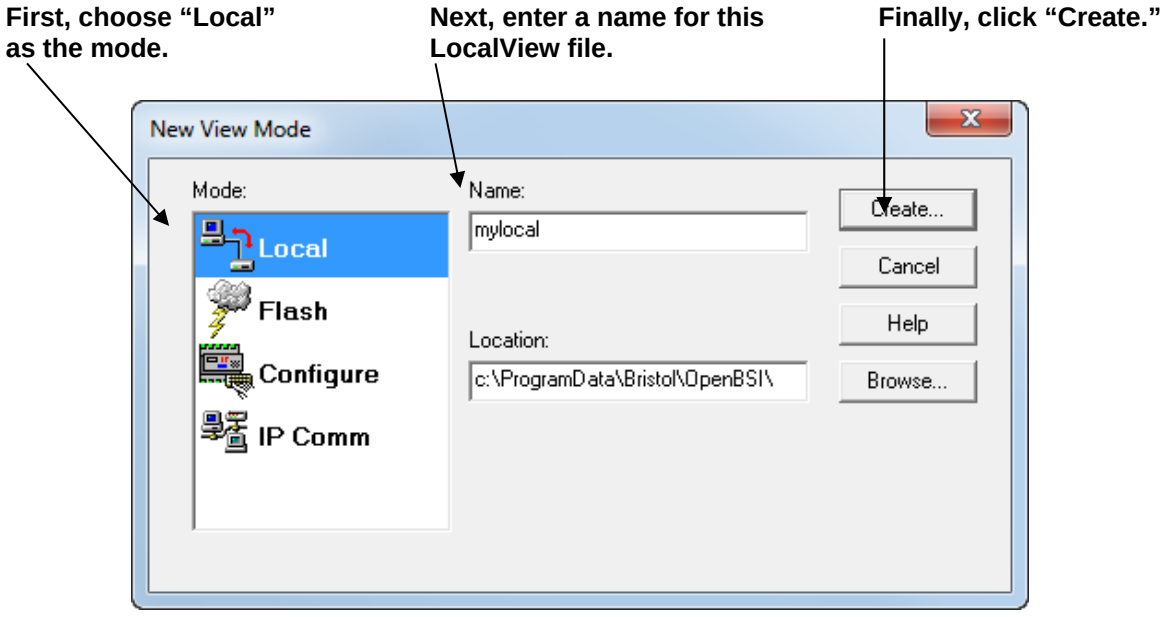


Figure 3-1. LocalView Local Mode

3. Choose the communication port **on the PC workstation** which you will use to communicate with the ControlWave I/O expansion rack. Then, specify the baud rate for that port, and click **Next**.

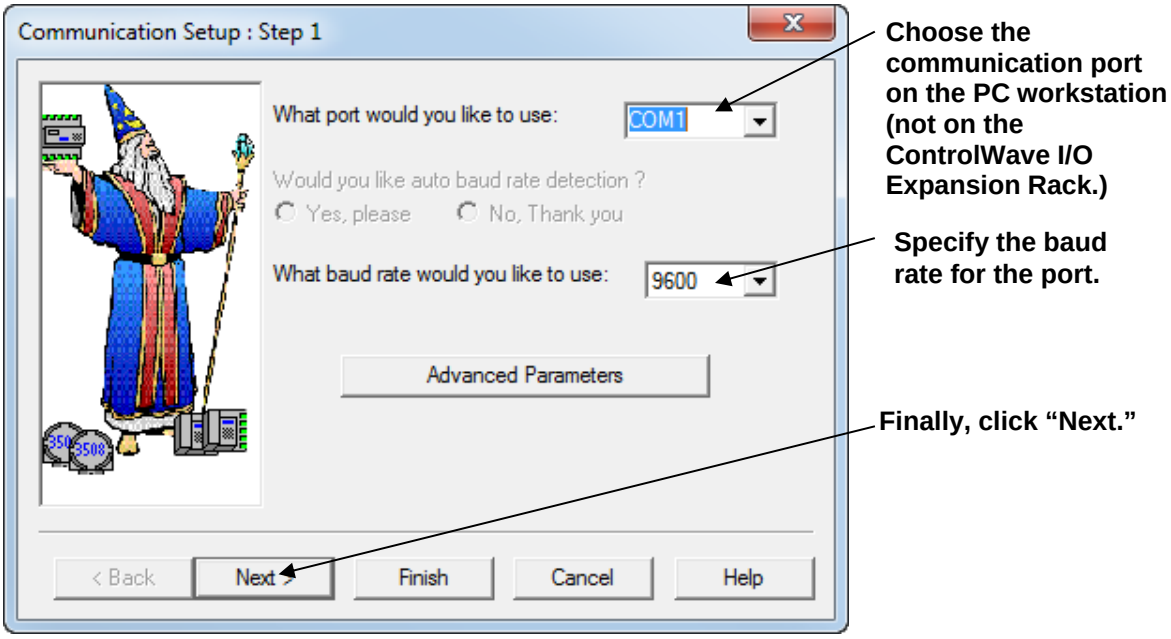


Figure 3-2. Communication Setup in LocalView

4. Turn off auto local address detection by answering **No** to the question. Then specify **1** as the local address, and **CWave_RIO** as the RTU type. Finally, click **Finish**.

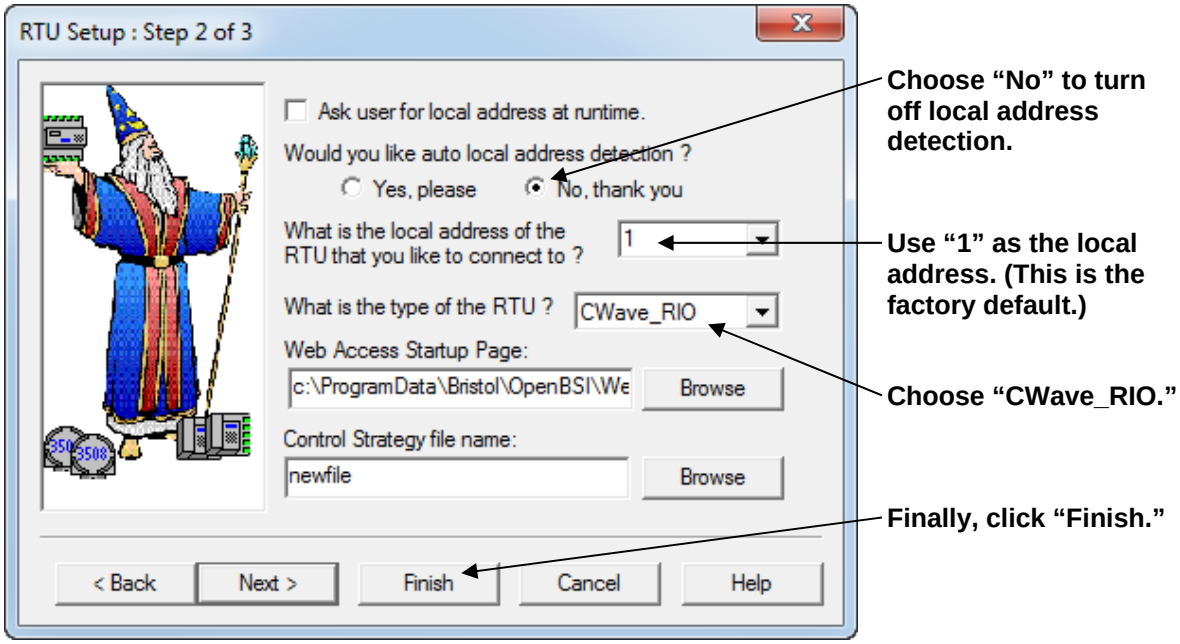


Figure 3-3. Specifying Local Address and RTU Type

5. At this point, LocalView creates a temporary network with a single node called, generically, "RTU." **Right**-click on the icon, then choose **RTU> RTU Configuration Parameters** from the pop-up menus.

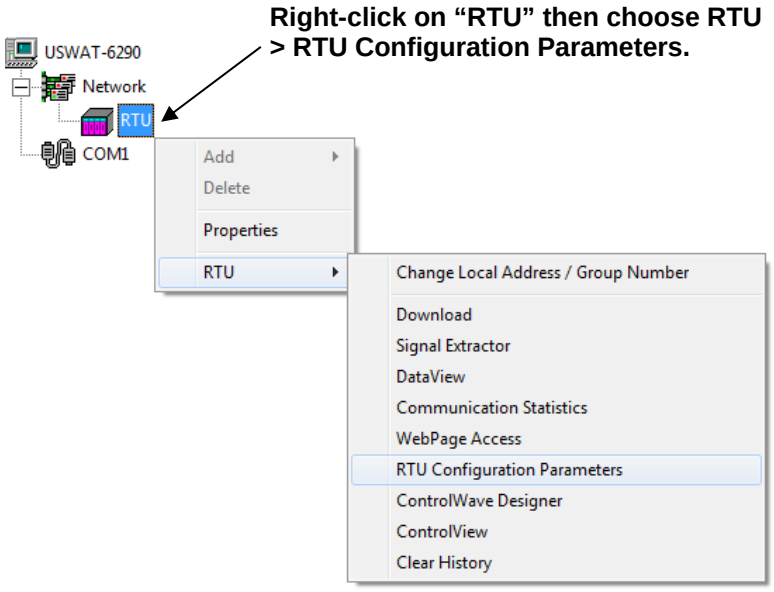


Figure 3-4. Calling Up the Flash Configuration Utility

6. The Flash Configuration Utility opens. See *Using the Flash Configuration Utility* later in this chapter.

3.1.2 Method 2: Starting from within NetView (ControlWave I/O Expansion Rack Already in a Network)

Note: This method assumes that the ControlWave I/O expansion rack already exists underneath a ControlWave host in an OpenBSI network within the NetView program, and that it is configured to communicate over that network's communication line as described in the *OpenBSI Utilities Manual* (D5081).

1. Click as follows: **Start > Programs > OpenBSI Tools > NetView**.
2. **Right**-click on the ControlWave icon, in the NetView network tree, and choose **RTU > RTU Configuration Parameters** from the pop-up menus.

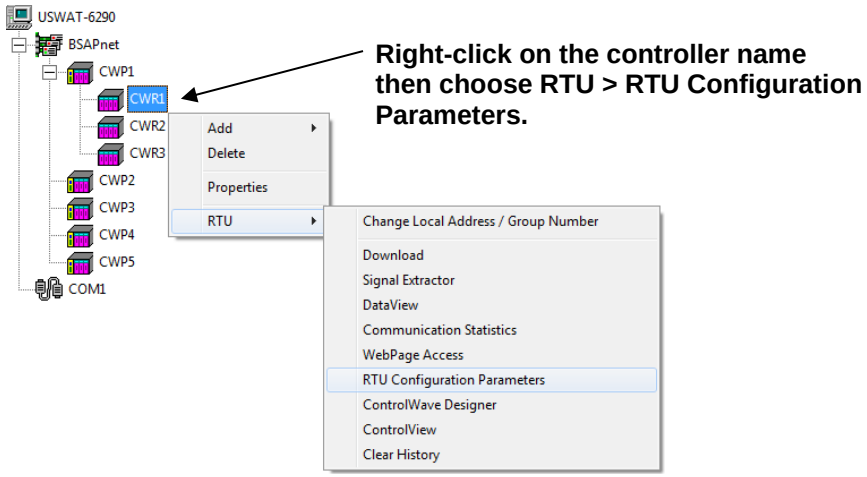


Figure 3-5. Calling Up the Flash Configuration Utility

3. The Flash Configuration Utility opens. See *Using the Flash Configuration Utility* later in this chapter.

3.1.3 Method 3: Starting from within TechView

1. Click as follows: **Start > Programs > OpenBSI Tools > TechView.**
2. Specify a name for the session file. The default, if you have no session files is **temp.tvs**. Click **Save**.

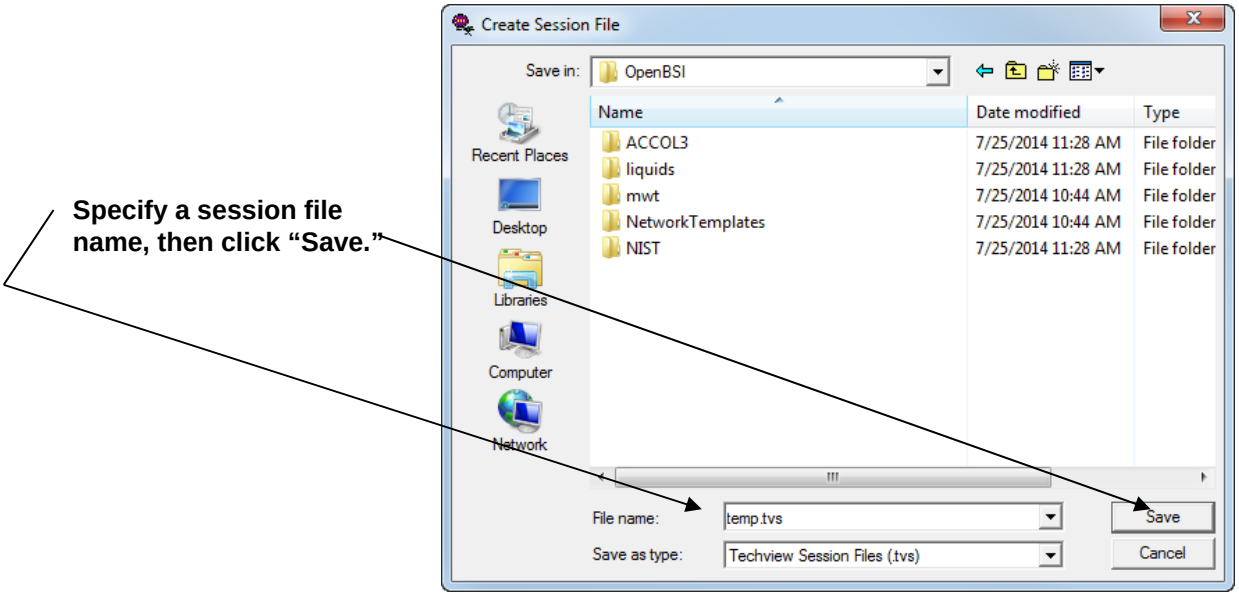


Figure 3-6. Create Session File dialog box in TechView

3. In the Communication Setup dialog box, choose **BSAP** as the communication protocol, and use the default local address of **1.** Specify the COM port on the PC workstation, and the baud rate used to communicate with the ControlWave I/O rack serial port. When you finish, click **Next**.

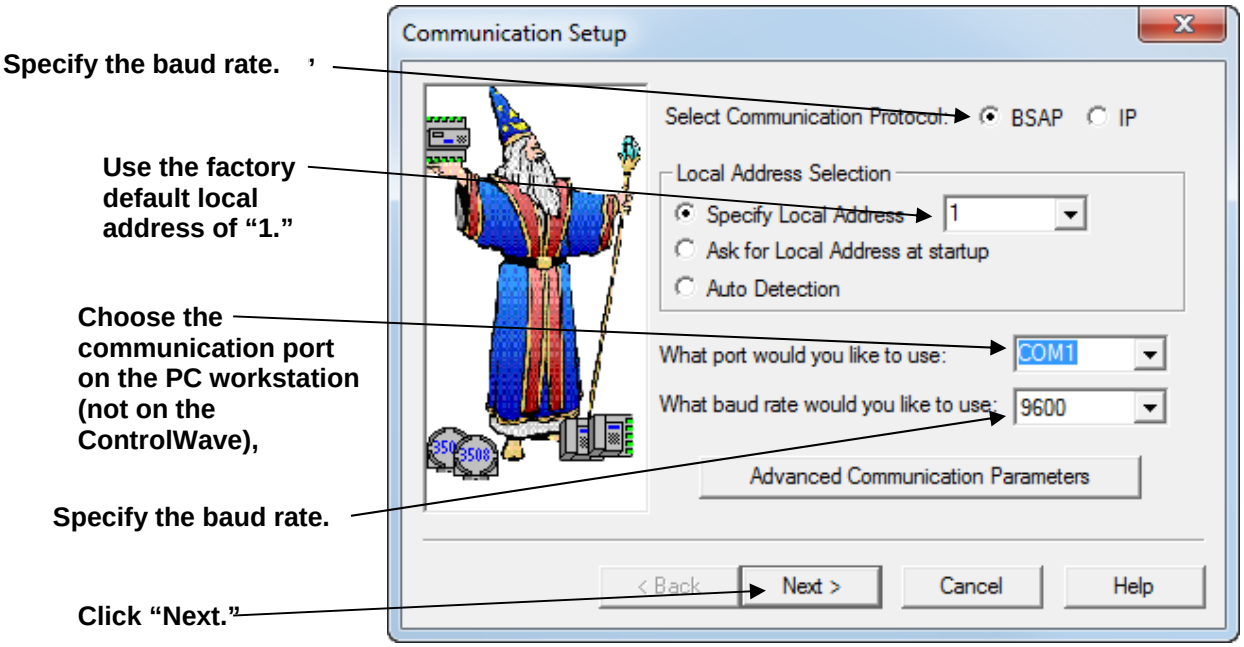


Figure 3-7. Communication Setup in TechView

4. Choose **ControlWave** as the **Node Type** then click **Next**.

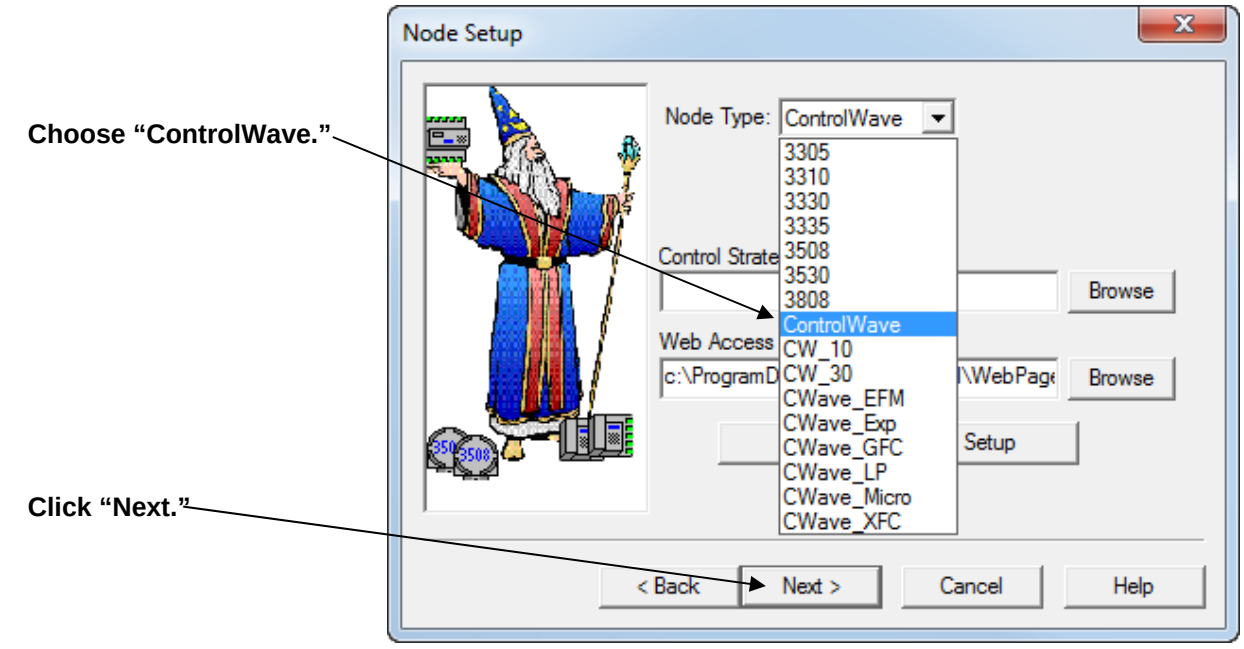


Figure 3-8. TechView Node Setup dialog box

5. In the Calibration Setup dialog box, specify **"1"** for the number of transmitters (TechView assumes you have at least one transmitter). Then click **Finish**.

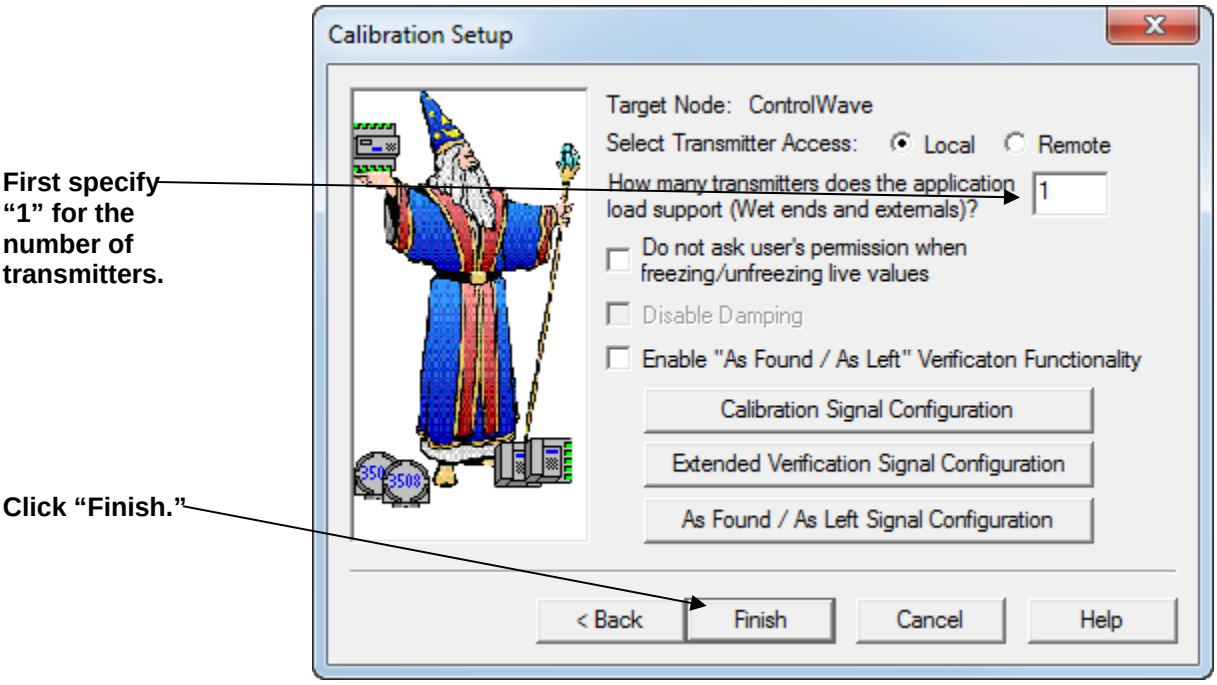


Figure 3-9. Calling Up the Flash Configuration Utility

6. Now log into the ControlWave I/O rack with your **Username** and **Password**.

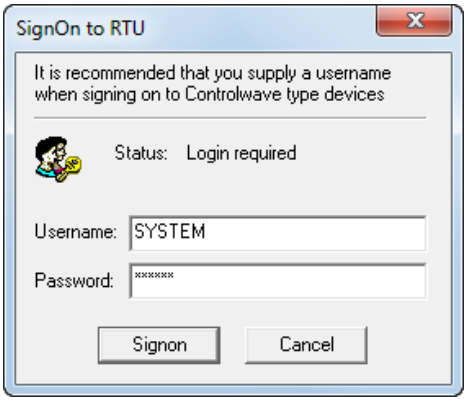


Figure 3-10. Logging onto the ControlWave

7. Within TechView, click the "Access Flash" icon to start the Flash Configuration Utility.

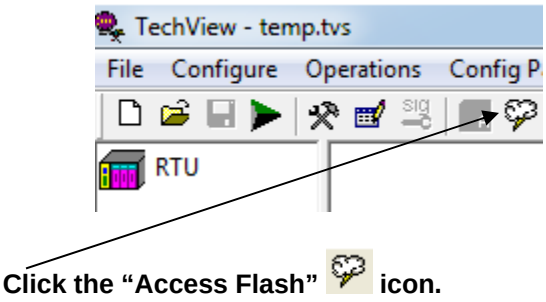


Figure 3-11. Access Flash

The Flash Configuration Utility opens. See *Using the Flash Configuration Utility*.

3.2 Using the Flash Configuration Utility

You can start the Flash Configuration Utility through NetView, LocalView, or TechView. It allows you to specify all the major configuration parameters for the ControlWave I/O expansion rack. As part of this manual, we will only discuss those parts of the Flash Configuration Utility which are important for a first-time user to know in order to get a ControlWave rack "up and running." The *OpenBSI Utilities Manual* (D5081) includes more detailed instructions for using the Flash Configuration Utility.

Certain options in the Flash Configuration utility don't require you to establish communications with the I/O rack, for example, writing flash data to the NETDEF file. If while the utility begins to establish communications you decide you want to use the utility offline, you can click **Cancel Initialization and Continue** to do that. If, for some reason, the utility cannot establish communications, you can shut down the utility if you click on **Cancel Initialization and Abort**.

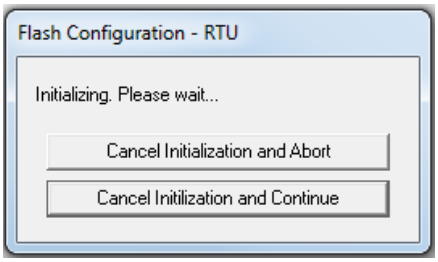


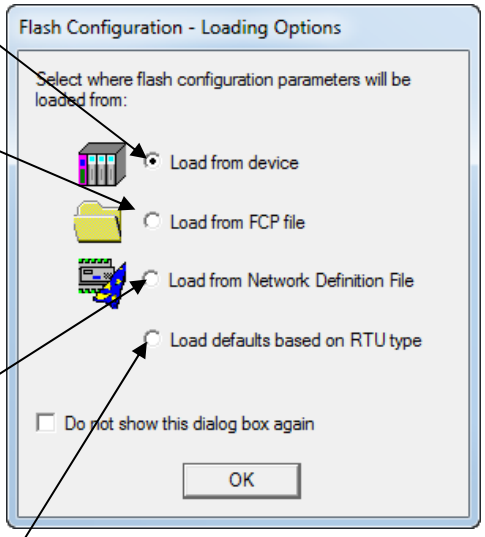
Figure 3-12. Cancel Initialization dialog box

Once the Flash Configuration utility establishes communication with the I/O rack, you can optionally specify the source for the initial parameters displayed in the utility (see *Figure 3-13)*.

This prompts you to log into the I/O rack. The utility then loads the current parameters from the rack into the Flash Configuration utility pages.

This prompts you to specify the location and filename of a Flash Configuration Profile (FCP) file. FCP files are files you can use to store flash parameters on the OpenBSI workstation. This simplifies your configuration because once you store these parameters in an FCP file you can optionally re-use the FCP file to load the same flash parameters into a different rack. That way, you don't have to re-enter everything for each rack.

This choice causes the utility to load flash parameters from the current NETDEF file into the pages of the utility. Note: Only choose this option if you start the Flash Configuration utility from within NetView or TechView, or LocalView in Configure mode with a specific NDF – don't choose this if you are running LocalView in other modes (Local, IP Comm, Flash) because LocalView uses its own temporary NETDEF file in those modes which only exists during the LocalView session.



This choice causes the utility to copy some basic flash parameters into the pages of the Flash Configuration utility. These basic parameters are based on default settings for the rack.

Figure 3-13. Flash Configuration Loading Options dialog box

After you click **OK**, the utility loads initial parameters from your chosen source.

The Flash Configuration utility includes different pages for different types of parameters. To access them, click on the tab for a particular page.

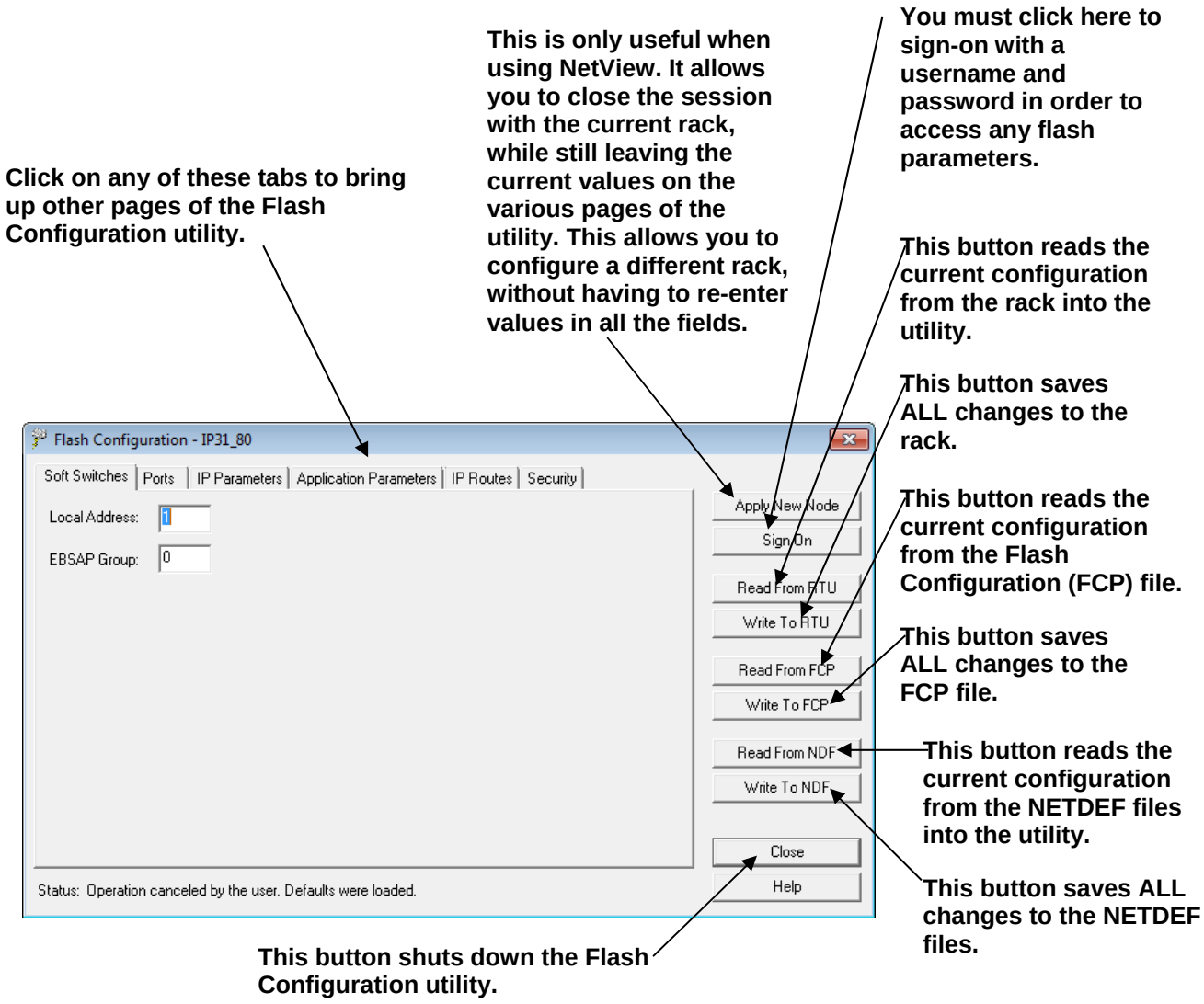
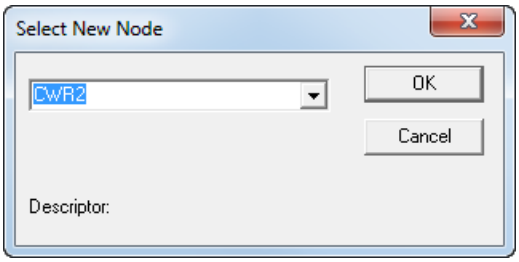
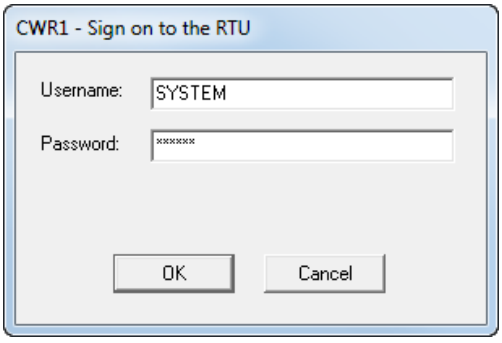


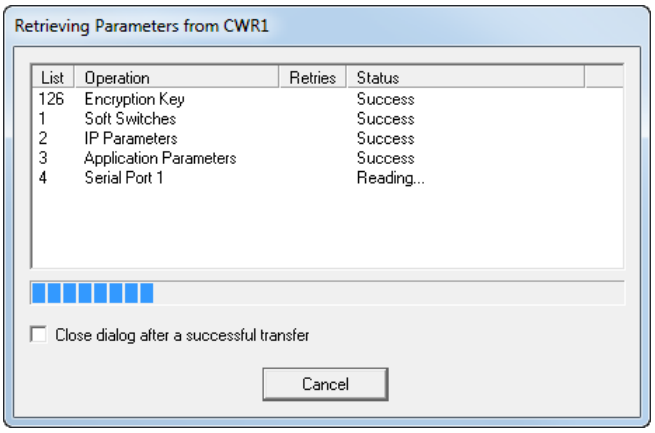
Figure 3-14. Flash Configuration Utility - ControlWave

3.2.1 Flash Configuration Utility Buttons

The Flash Configuration utility contains several buttons, primarily for read/write file operations. Some of these operations prompt you to sign on to the ControlWave I/O rack before you can proceed. The Flash Configuration utility buttons include:

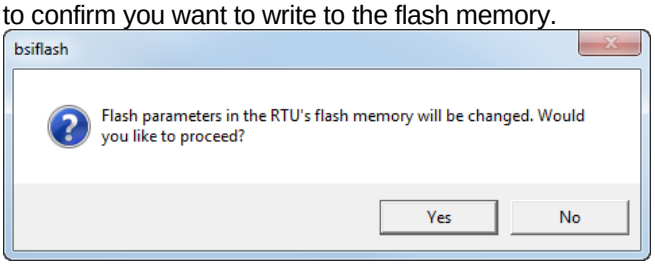
Button	Description
Apply New Node	Use this button only when you start the Flash Configuration utility from within NetView (since you cannot access other nodes in the Select New Node dialog box within LocalView or TechView).  This option allows you to close the session with the current rack, and then select a **different** rack for configuration, in the Select New Node dialog box, without reinitializing the values in the pages of the utility. A definition for the new rack must exist within the NETDEF files. One application of this is for you to open a session with a new node, and then load configuration information from the NETDEF file(s) for a **different** node (via **Read From NDF**). This is useful if you want multiple nodes to share similar configurations; you can load the common configuration into the utility, and then you only need to modify the portions unique to each individual unit.
Sign On	You must use this to sign-on to the rack with a username and password prior to reading or writing flash parameters. 

Button	Description
	Note: If you do **not** sign on, the first time you attempt a read/write operation with the rack, the system prompts you to sign on.
Read From RTU	Click here to read the current configuration characteristics directly from the rack, and copy them into the pages of the Flash Configuration Utility. You can subsequently store these in the NETDEF using the **Write To NDF** button, to avoid the need to re-enter the same configuration details inside NetView.

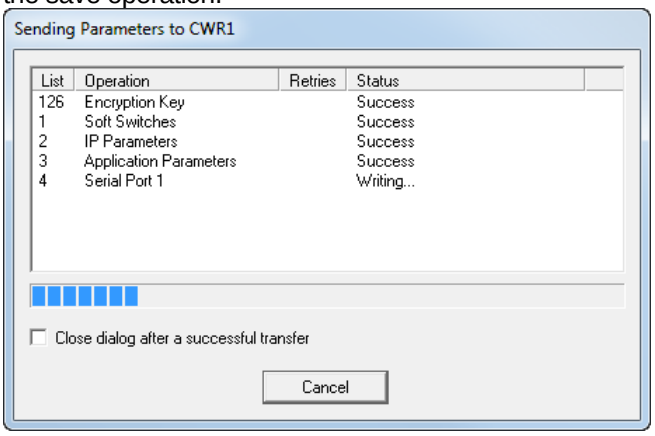


Note: LocalView prompts you to sign on when you click this button, if you did not sign on previously.

Write To RTU	Click here to save all entries in all pages of the Flash Configuration Utility to the rack. The utility prompts you to confirm you want to write to the flash memory.



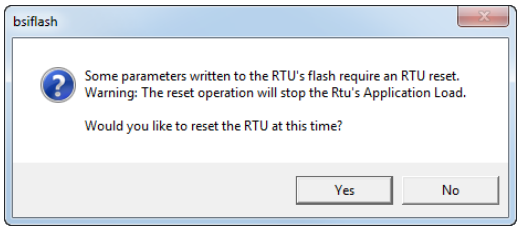
The Flash Configuration Utility displays the progress of the save operation.



Button	Description
	After the write operation to the ControlWave I/O rack completes, the Flash Configuration Utility assesses whether or not the changes require you to reset the ControlWave. If the utility determines that you must reset it prompts you to do so.

Warning

During the reset process, your controller performs no measurement or control of your process. Ensure you have backup control mechanisms in place during the reset process. Failure to take such precautions could result in injury to persons or damage to property



Click **Yes** for OpenBSI to stop any currently running project and reboot the ControlWave rack immediately; changes then take effect. Click **No** if you want to manually reboot the unit later; changes do not take effect until the reboot.

Read From FCP	Click here to read the current configuration of this rack, as specified in a Flash Configuration Profile file (*.FCP), and copy it into the pages of the Flash Configuration Utility. You can then subsequently copy the configuration into the rack using the **Write To RTU** button.

Caution

The Flash Configuration utility does not perform any validation checks on an FCP file when it opens it. Therefore, we recommend you do NOT attempt to edit the FCP file manually with a text editor, because you could corrupt the profile file. Recommended best practice is to edit the FCP only through the Flash Configuration utility.

Write To FCP	Click here to copy all entries made in the Flash Configuration Utility for the current rack into the Flash Configuration Profile file (*.FCP).
Read From NDF	If you click here, the utility reads the current configuration of this rack as specified in NetView's NETDEF files, and copies it into the pages of the Flash Configuration Utility. This can be particularly useful in a situation where the CPU board of a rack fails, and you need to configure a replacement board. This option allows you to call up the configuration from the NETDEF, and subsequently copy it into the rack using the **Write To RTU** button.

	Note: Only choose this option if you start the Flash Configuration utility from within NetView or TechView, or if you specify an NDF file in LocalView Configure mode Don't choose this if you are running LocalView in other modes (Flash, IP Comm, Local) because LocalView uses its own temporary NETDEF file which only exists during the LocalView session and disappears on program exit.
Write To NDF	If you click here, the utility copies all entries you made in the Flash Configuration Utility for the current rack into the current NETDEF file. This avoids the need to re-enter the same configuration information in NetView. **Note:** Only choose this option if you start the Flash Configuration utility from within NetView or TechView, or if you specify an NDF file in LocalView Configure mode. Don't choose this if you are running LocalView in other modes (Flash, IP Comm, Local) because LocalView uses its own temporary NETDEF file which only exists during the LocalView session and disappears on program exit.
Close	Click here to shut down the Flash Configuration Utility.

The various configuration settings are separated into different pages of the utility. You can access them by clicking on the tab for a particular page. The different pages include:

- **Soft Switches** - the most important of these is the BSAP local address of the rack.
- **Ports** - this includes all communication ports on the ControlWave - up to four serial ports (COM1 through COM4), and up to three Ethernet IP ports. **Note:**The number of ports varies depending upon the type of CPU module you purchased.
- **IP Parameters** - if this controller performs IP communications, certain parameters such as the IP address of the Network Host PC (NHP), UDP socket numbers, and the address of the default gateway must be configured. Some of the parameters on this page are outside the scope of this manual.
- **Application Parameters** - Most of these are "tuning" parameters which govern how the ControlWave I/O rack handles failures.
- **IP Routes** - Dynamic IP routes allow messages which cannot successfully reach a particular destination address, to be re-routed through a different path in the IP network. A discussion of this subject is outside the scope of this manual.
- **Security** - This page allows configuration of user accounts and privileges.

3.3 Setting Soft Switches

The ControlWave I/O rack, unlike earlier Network 3000 controller models, does **not** have physical DIP switches for setting the BSAP local address or EBSAP group number. Instead, you configure these from the **Soft Switches** tab of the Flash Configuration Utility.

Field	Description
Local Address	The default **Local Address** for a ControlWave I/O rack, when it ships from the factory, is **1**. Local addresses are integer values from 1 to 127, and OpenBSI uses them to identify the location of a rack in a network. The local address of a particular rack must be unique within the network. The local address you enter here must match the local address you define in NetView. **Note:** If you change the local address, be sure to make note of the new address because you will need to know it to communicate with this rack in subsequent communication sessions, and if you want to include this rack in a BSAP network. If you're just setting up a single ControlWave I/O rack to experiment with, you should leave the local address at the default of **1**. If the I/O rack communicates via MODBUS, the local address serves as the MODBUS slave address.
EBSAP Group	Leave the **EBSAP Group** number at **0**, **unless** your network is configured for Expanded Node Addressing (EBSAP). EBSAP adds a level of complexity to network configuration, and is only necessary in very large networks where more than 127 slave controllers are defined underneath a given master controller, and for whatever reason, BSAP communication is required, instead of IP communication. For more information about Expanded Node Addressing, see the *ControlWave Designer Programmer's Handbook* (D5125).

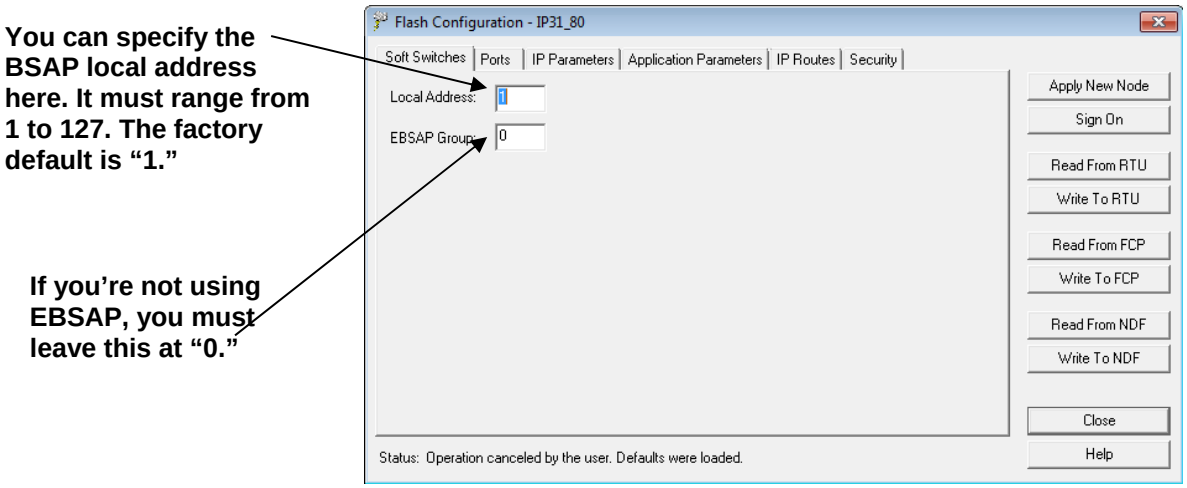


Figure 3-15. Soft Switches tab

3.3.1 Saving Changes When You Finish

Click **Write To RTU** and the utility sends the new configuration parameter values to FLASH memory in the ControlWave I/O rack. Depending upon which parameters you change, you may need to reset the unit for the changes to take effect.

3.4 Setting Up an Ethernet Port

A ControlWave I/O rack can contain one or three Ethernet Ports, depending upon whether or not you purchased the CPU with a secondary communication board.

1. Click the **Ports** tab, if you haven't already.
2. Choose one of the Ethernet ports.
3. Specify an **IP ADDR A** and **IP MASK** for this port. IP addresses must be **unique** within your network. Conversely, IP masks are typically the same for all devices in the same portion of a network. Together, the IP Address and IP Mask define a range of addresses to which this port can send messages. (See *3.4.1 Recommended Ranges for IP Addresses*.) Basically, a non-zero value in any of the **IP MASK** fields indicates that the corresponding **IP ADDR A** field is specifying a portion of the IP address which must be identically matched with every destination IP address to which this port will send messages. A zero value in any of the **IP MASK** fields means that this communication port can send messages to addresses in which any integer from (0 to 255) is considered valid **for that corresponding portion** of the destination IP address.

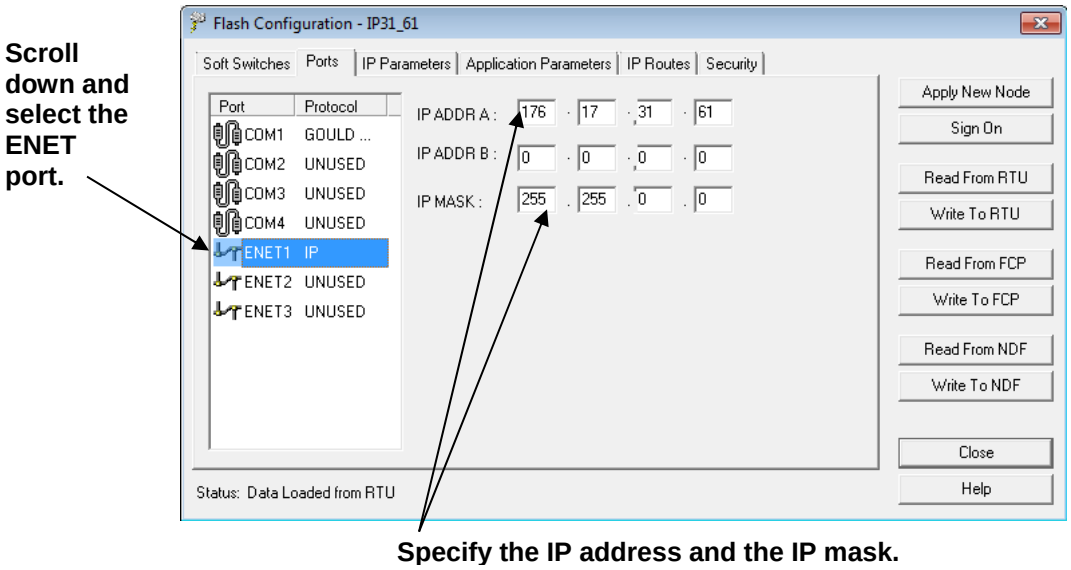


Figure 3-16. Setting the IP Address and Mask for the Ethernet Port

In *Figure 3-16*, the **IP ADDR A** for the port is 10.23.19.1 and the **IP MASK** is 255.255.0.0. This means that this port can send to any address in the format 10.23.*y*.*z* where *y* and *z* are any integer from 0 to 255. So, 10.23.127.76 and 10.23.35.93 would be valid destinations, but 24.1.1.1 would not because the 255 in the **IP MASK** indicates that the corresponding portion of the **IP ADDR A** must be 10.

Notes:

- **IP ADDR B** is used in redundant configurations.
- There are other restrictions, for example, the non-zero mask entries must be all be in contiguous fields, and must begin in the left-most portion of the address. More details on these subjects are included in the *OpenBSI Utilities Manual* (D5081).
- In newer ControlWave units, all Ethernet ports are pre-programmed at the factory with initial IP addresses and masks. The default IP addresses and masks for these are:
  - ETH1 IP Address: 10.0.1.1 IP Mask: 255.255.255.0
  - ETH2 IP Address: 10.0.2.1 IP Mask: 255.255.255.0
  - ETH3 IP Address: 10.0.3.1 IP Mask: 255.255.255.0

  Because each unit shipping from the factory has these initially pre-programmed, you should only use these addresses for "bench" testing and configuration. **You must change these addresses before putting the ControlWave unit on an actual network, since an address conflict would exist as soon you place the second ControlWave unit online.**

4. At this point, you can proceed to configure other ports, or go to other pages of the Flash Configuration Utility.

3.4.1 Recommended Ranges for IP Addresses

If you are intend to connect your controller network directly to the global world-wide Internet, you must obtain a range of IP addresses from your Internet service provider (ISP) or from an Internet governing body such as the Internet Assigned Numbers Authority (IANA).

If you have no plans to connect your network to the global Internet, there is no restriction on your choice of IP addresses, however, the Internet Engineering Task Force recommends that IP addresses for private networks should be assigned from the following ranges:

- 10.0.0.0 to 10.255.255.255
- 172.16.0.0 to 172.31.255.255
- 192.168.0.0 to 192.168.255.255

Note: For information on the Internet Engineering Task Force recommendation see Rekhter, et al, Best Current Practice memo - "Address Allocation for Private Internets", Internet Engineering Task Force, RFC 1918, February, 1996. The full text of this memo is available at http://www.ietf.org.

These particular ranges of Internet addresses are reserved for private networks. Most Internet Service Providers (ISP) recognize any messages coming from these addresses as coming from private networks, and filter these messages out. This helps avoid addressing conflicts should an accidental connection occur between a private network, and the global Internet.

Devices (e.g. controllers, workstations) in our controller networks always use fixed IP addresses. This causes certain complexities if you choose to use Dynamic Host Configuration Protocol (DHCP) in your network. Because DHCP assigns IP addresses dynamically, as they are needed, you must examine your DHCP server to determine the addresses which have been assigned for each controller or workstation, and then **manually** enter those addresses in NetView. You should then specify the longest possible lease time for the addresses, to help prevent the loss of a given address through a device failure.

It is also strongly recommended that you configure the DHCP server so that the addresses reserved for the controllers are permanently reserved (by tying them to the RTU MAC addresses within the DHCP configuration or by having them in a totally different address range). You should do the same when you

configure RAS servers or other machines capable of providing dynamic addressing information. Otherwise, you could accidentally have duplicate IP addresses on your network.

3.4.2 Saving Changes When You Finish

Click **Write To RTU**, and the utility sends the new configuration parameter values to FLASH memory in the ControlWave. Depending upon which parameters you change, you may need to reset the unit for the changes to take effect.

3.5 Setting IP Parameters

IP parameters determine how the ControlWave I/O rack communicates over an IP (Internet Protocol) network.

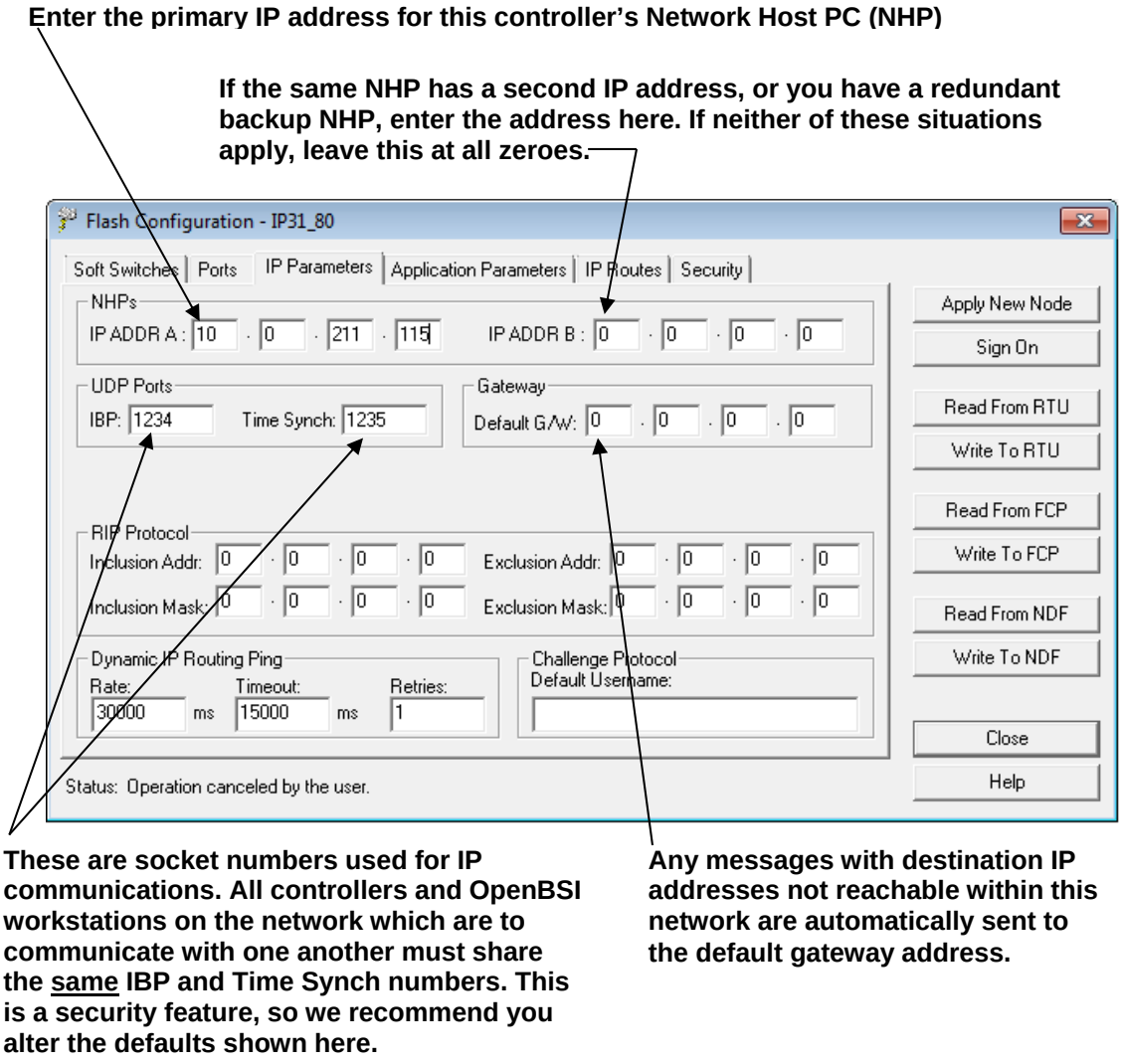


Figure 3-17. Specifying IP Parameters

Field	Description
NHPs	The **Network Host PC (NHP)** is any PC workstation running OpenBSI (Version 3.0 or newer) which has a network of one or more controllers. A controller on an IP network will only accept time synchronization messages, node routing tables (NRT), and alarm destinations, from its NHP's IP addresses.
IP ADDR A	This is the primary IP address of the Network Host PC (NHP) which has the network which includes this controller.

IP ADDR B	If the NHP identified above (in IP ADDR A) has a second IP address, that address may be entered here, in case the primary connection is broken. Alternatively, if there is a redundant backup NHP, its address should be entered here. If neither of these cases apply, **"IP ADDR B"** should be left at all zeroes.
UDP Ports	UDP ports (sometimes referred to as sockets) have nothing to do with physical communication port hardware. They actually refer to entry points within the UDP communication protocol software (which is an industry standard Internet Protocol). The underlying details of UDP are beyond the scope of this document, but the parameters are included here as a security feature.
IBP	IBP is the UDP port used by the IP driver software. Every OpenBSI Workstation and controller in a given network, which need to communicate via IP, must share the same IBP UDP socket number. For security purposes, we recommend you change the IBP port number to something other than the default value shown. This is particularly important if your network has a connection to the world-wide Internet.
Time Synch	This is the UDP port used to send time synchronization messages to controllers. Every OpenBSI Workstation and controller in a given network, which needs to communicate via IP, **must** share the same time synch UDP socket number. For security purposes, it is recommended that you change the IBP port number to something other than the default value shown. This is particularly important if your network has a connection to the world-wide Internet.
Gateway	
Default G/W	If this controller receives any messages for which it cannot locate a direct route to a destination address, it sends them to the default gateway's IP address, as specified in this field. A default gateway is a device (PC workstation, remote process controller, router) which receives these messages, and attempts to route them to their destination.

SNMP, RIP Protocol, Dynamic IP Routing Ping, Challenge Protocol:

These IP parameters are used in more complicated network configurations, and to meet certain special IP security requirements. Explanations are beyond the scope of this document.

3.5.1 Saving Changes When You Finish

Click **Write To RTU**, and the utility sends the new configuration parameter values to FLASH memory in the ControlWave. Depending upon which parameters you change, you may need to reset the unit for the changes to take effect.

3.6 Configuring Usernames and Passwords

The Security tab of the Flash Configuration Utility allows you to create usernames and passwords for ControlWave users, and to define privileges for the users. This allows you to restrict who has access to various features and functions of the ControlWave.

To access the Security page, click the **Security** tab.

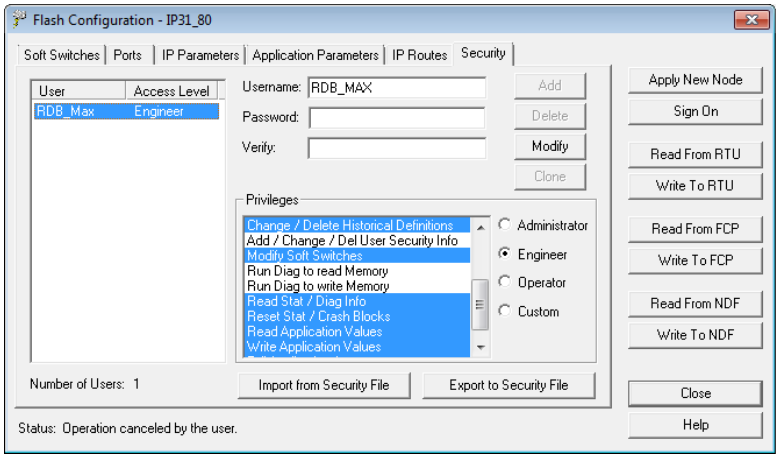


Figure 3-18. Security Tab

3.6.1 Adding a New User

A ControlWave I/O rack can support up to 240 different users. To add a user, enter the user's name (up to 16 characters long) in the **Username** field, and enter a password (up to 16 characters long) for the user in the **Password** and **Verify** fields. The password will not appear as you type it.

Note: Some OpenBSI programs such as DataView, Downloader, and others, which communicate with the ControlWave only support shorter usernames and passwords (ten characters or less for the username, six characters or less for the password) so you may want to reduce the length of each username and password to conform to these limits. Also, to communicate with this ControlWave using these programs, passwords must be UPPERCASE.

Next, select the privileges for this user by clicking **Custom** and then select the individual privileges in the **Privileges** list box, so they are highlighted. Alternatively, you can choose **Operator, Engineer** or **Administrator** for a particular user, which automatically highlights privileges associated with those user categories. The tables, on the next page, show the privileges

associated with these user categories, and list what all the various privileges mean.

When you have selected all desired privileges, click the **Add** button to add the user to the system.

Note: Every ControlWave I/O rack has a special user called **RDB_Max**. This user account defines the **maximum** privileges allowed for RDB protocol messages coming into the ControlWave rack. (Programs such as DataView, the Harvester, and others use RDB messages to communicate.) You cannot delete the RDB_Max user, or rename it, but you can change its privileges.

The table below shows the privileges associated with the Operator, Engineer, and Administrator categories:

The table, below, shows the privileges associated with the Operator, Engineer, and Administrator categories:

Table 3-1. Standard User Privileges

Privilege	Operator	Engineer	Administrator
Read Data Value	✓	✓	✓
Update Data Value	✓	✓	✓
Read Flash Files via FTP		✓	✓
Change/Del Flash Files via FTP		✓	✓
Read Historical Data	✓	✓	✓
Change Last Read Pointers in Audit Info		✓	✓
Change/Delete Historical Definitions		✓	✓
Add / Change / Del User Security Info			✓
Modify Soft Switches		✓	✓
Run Diag to read Memory			✓
Run Diag to write Memory			✓
Read Stat / Diag Info	✓	✓	✓
Read Stat / Crash Blocks	✓	✓	✓
Read Application Values		✓	✓
Write Application Values		✓	✓
Full Application Access		✓	✓

Privilege	Operator	Engineer	Administrator
Add New Historical Definitions		✓	✓

The table, below, describes the meaning of each privilege:

Table 3-2. User Privileges

Privilege	Description
Read Data Value	Allows this user to read data values from this controller.
Update Data Value	Alows this user to change data values in this controller.
Read Flash Files via FTP	Allows this user read access (using File Transfer Protocol) to files stored in this ControlWave's flash memory.
Change/Del Flash Files via FTP	Allows this user (using File Transfer Protocol) to change or delete files stored in the ControlWave's flash memory.
Read Historical Data	Not applicable for I/O rack.
Change Last Read Pointers in Audit Info	Not applicable for I/O rack.
Add New Historical Definitions	Not applicable for I/O rack.
Change/Delete Historical Definitions	Not applicable for I/O rack.
Add / Change / Del User Security Info	Allows this user to add, change, or delete security configuration information via the Flash Configuration Utility security page.
Modify Soft Switches	Allows this user to change soft switch values in the soft switches page of the Flash Configuration Utility.
Run Diag to read Memory	Allows this user to run diagnostics to read memory at the controller.
Run Diag to write Memory	Allows this user to run diagnostics to write to memory at the controller.
Read Stat / Diag Info	Allows this user to view communication statistics and other information on the Statistics web pages.
Read Stat / Crash Blocks	Allows this user to reset statistics and crash block areas on the Statistics web pages.
Read Application Values	Allows this user to read values using the ControlWave Designer OPC Server.
Write Application Values	Allows this user to modify values using the ControlWave Designer OPC Server.
Full Application Access	Allows this user full privileges to perform

Privilege	Description
	debugging operations in ControlWave Designer.

3.6.2 Modifying the Privileges of an Existing User

To change the privileges of an existing user:

1. Select the user's name from the list of **Usernames.**
2. Select / de-select privileges for that user in the **Privileges** list box.
3. When you finish making selections, click **Modify** to store the modified privileges for that user.

3.6.3 Deleting an Existing User

To delete a user from the system, select the user's name from the **Usernames** list and click **Delete**.

Note: You cannot delete the RDB_Max user. You also cannot delete any user who is currently signed into the ControlWave.

3.6.4 Saving Changes When You Finish

Click **Write To RTU**, and the utility sends the new configuration parameter values to FLASH memory in the ControlWave. Depending upon which parameters you change, you may need to reset the unit for the changes to take effect. Unlike many of the other pages in the Flash Configuration Utility, once you click **Write To RTU** the changes take effect immediately.

Note: When you have finished configuring all of your user accounts, you should make sure the default switch (SW2-3) is turned **ON**; otherwise the special default security account (SYSTEM) remains active.

3.6.5 Setting Application Parameters

There are certain application parameters which govern how the I/O expansion rack operates. Click the **Application Parameters** tab to set these.

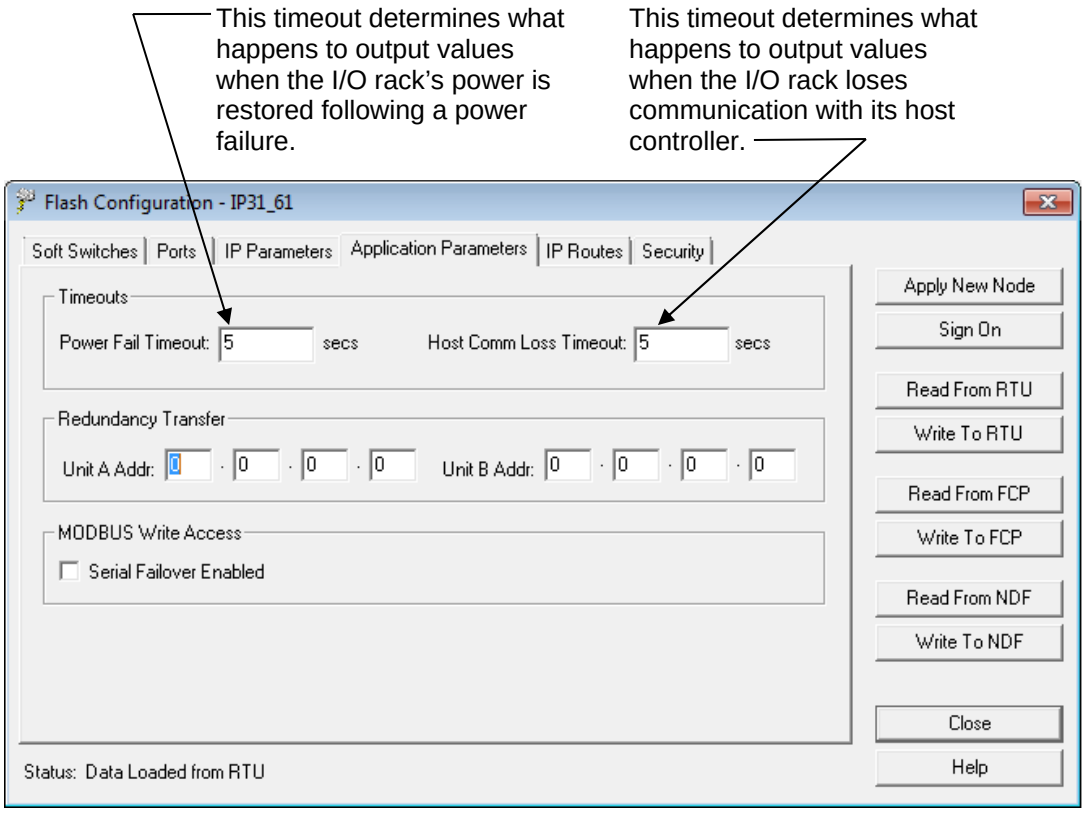


Figure 3-19. Application Parameters tab

Field	Description
Timeouts	
Power Fail Timeout	If the I/O rack loses power, and static memory is configured to RETAIN values (SW1-5 set ON), the Power Fail Timeout specifies how the I/O rack will handle output values when power is restored.

When the value of Power Fail Timeout is set to this:	The effect on outputs will be this:
0 seconds	DOs will be set to 0 (FALSE). AOs will be set to the **User Configured Output** value, if there is one.
Greater than 0 and	If the amount of time the power was off is

Field		Description
	less than 65,535 seconds	less than the specified Power Fail Timeout, outputs are set to the last state they were in prior to the power failure. If the amount of time the power was off is greater than the specified Power Fail Timeout, DOs will be set to 0 (FALSE), and AOs will be set to the **User Configured Output** value.
	65,535 seconds	The last states of outputs are stored in static memory. AOs and DOs will be set to the last state they were in prior to the power failure.

Note: In the event of a Watchdog failure (CPU failure, but power is not lost), AOs will be set to the **User Configured Output**. When the system attempts to restart, and if the restart is completed before expiration of the **Power Fail Timeout**, AOs will then be set to the last output they had prior to the Watchdog failure.

Host Comm Loss Timeout

The Host Comm Loss Timeout determines how certain outputs are affected if the I/O Rack loses communications with its host ControlWave controller. Enter a time in seconds. If you enter a value of 0 for the **Host Comm Loss Timeout**, outputs will be left unchanged in the event communications are lost with the host.

Length of time communication has been lost with the host ControlWave controller:	**Effect on outputs:**
Less than or equal to **Host Comm Loss Timeout** value	Do not change outputs
More than the **Host Comm Loss Timeout** value	DOs are set to 0 (FALSE), and AOs are set to the **User Configured Output** value.

Note: The effect on outputs (see table above) via the Host Comm Loss Timeout feature is suspended if **Serial Failover Enabled** is checked, **and** serial MODBUS communications are functioning. If communications with the host are lost **and** serial MODBUS communications fail as well, and the Host Comm Loss Timeout has expired, however, outputs will be set according to the table, above.

Redundancy Transfer	
Unit A Addr	This must be an IP address corresponding to an Ethernet port on the "A" I/O Expansion Rack in a redundant pair
Unit B Addr	This must be an IP address corresponding to an Ethernet port on the "B" I/O Expansion Rack in a redundant pair
MODBUS Write Access	
Serial Failover Enabled	Normally, should communications be lost between the host ControlWave and the I/O Expansion Rack, the I/O points are set to the "safe" state described under **Host Comm Loss Timeout**. When **Serial Failover Enabled** is checked, however, write control through serial MODBUS communications are allowed with the I/O Expansion Rack, even though communications with the host ControlWave have been lost. This allows control operations to continue via the I/O rack, until Ethernet communication with the host can be re-established. This is also true in cases where a redundant pair of I/O Expansion Racks have been configured; a failover from the on-line rack to the standby rack will **not** occur just based on a loss of communications with the host, if serial MODBUS communications are still active. In order for the **Serial Failover Enabled** feature to work, MODBUS communications must have been fully pre-configured, and ready to use when communications are lost with the host. If serial MODBUS communications fail, and the user configured **Host Comm Loss Timeout** has expired, all outputs will be set according to the **Host Comm Loss Timeout** description, above. NOTE: Serial MODBUS read requests are unaffected by the **Serial Failover Enabled** check box. Reads are always allowed. Serial MODBUS writes are only allowed when **Serial Failover Enabled** is checked. The **Serial Failover Enabled** feature requires firmware 04.00 or newer

3.6.6 Saving Changes When You Finish

Click **Write To RTU**, and the utility sends the new configuration parameter values to FLASH memory in the ControlWave. Depending upon which parameters you change, you may need to reset the unit for the changes to take effect.

Chapter 4 – Setting up the Host to Reference the I/O Rack

Now that the I/O Expansion Rack is configured, you must make reference to its boards in the ControlWave project of the **host** ControlWave controller.

4.1 Configuring the I/O Boards in ControlWave Designer

Notes:

- Before you begin, the host ControlWave controller must be installed and running.
- The host ControlWave must have a ControlWave project already defined.

1. Start ControlWave Designer software by clicking on **Start>Programs>OpenBSI Tools>ControlWave Tools > ControlWave Designer**
2. Open the ControlWave Project used in the Host Controller by clicking on **File → Open Project / Unzip Project**.
3. Start the I/O Configuration Wizard by clicking as follows: **View→IO Configurator**
4. Define I/O Boards in the I/O Configuration Wizard. This involves selecting the proper board(s) from a list, specifying the IP addresses and slot numbers for the boards, and defining variable names and other parameters for the individual I/O pins. (These subjects are discussed on the pages that follow.) For more details on using the I/O Configuration Wizard, see the *Getting Started with ControlWave Designer Manual* (document# D5085).
5. Once you have defined the I/O boards, and named the individual pins, you can reference those pin names as I/O variables within your control strategy. For more information on using variables see the *Getting Started with ControlWave Designer Manual* (document# D5085) and the *ControlWave Designer Programmer's Handbook* (document# D5125).
6. Compile your revised project, and download it into the ControlWave host controller. For details on compiling and downloading, see the *Getting Started with ControlWave Designer Manual* (document# D5085).

4.1.1 Select List of Boards:

Note: The I/O Configuration Wizard starts with page 2 by default; you do not need to use page 1 for this configuration.

The I/O Configuration Wizard allows the user to identify which process I/O boards are actually installed in the I/O Expansion Rack. Boards should be selected from the **Available Boards List** list box in the ascending order of their slot number in the rack.

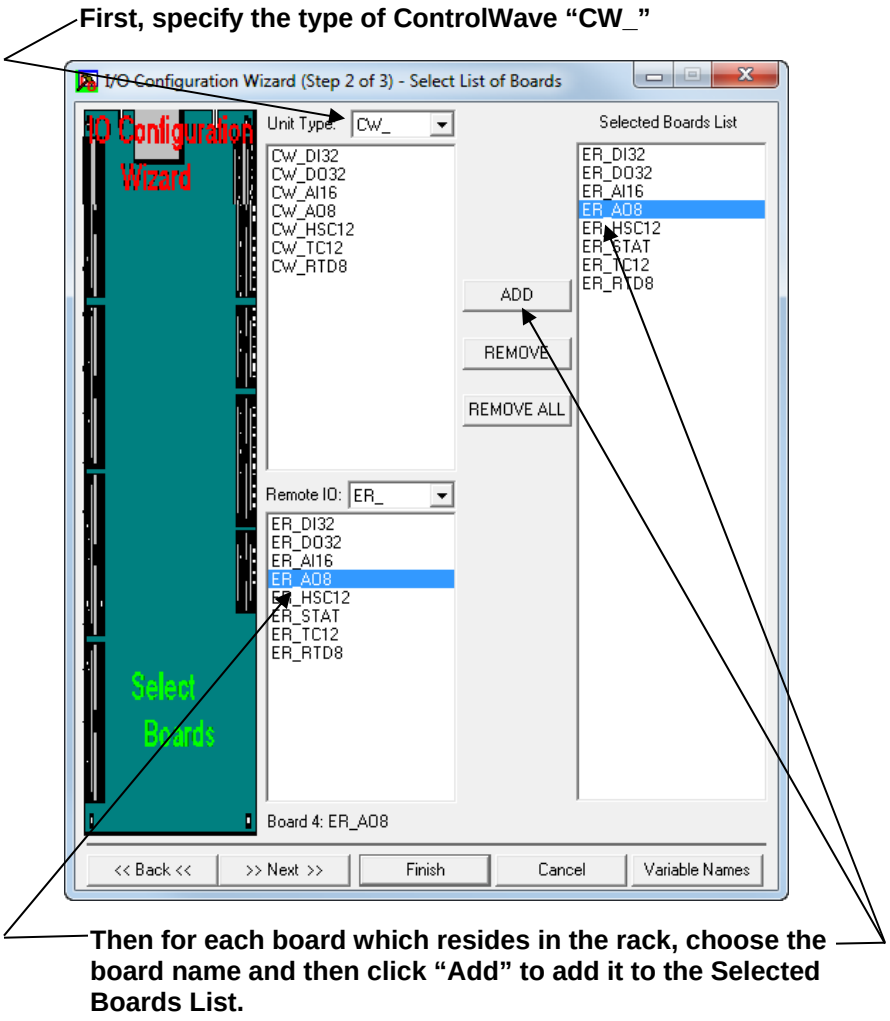


Figure 4-1. I/O Configuration Wizard

First, choose the **Unit Type**. This specifies the type of ControlWave **host** you are using. ("CW_" = ControlWave, "LP_" = ControlWave LP, "CWM_" = ControlWave Micro.).

In the **Ext Rack Boards** section, is a list of boards which can reside in the I/O Expansion Rack. The possible choices include:

ER_DI32	32 Digital Inputs (DI)
ER_DO32	32 Digital Outputs (DO)
ER_AI16	16 Analog Inputs (AI)
ER_AO8	8 Analog Outputs (AO)
ER_HSC12	12 High Speed Counter Channels (HSC)
ER_STAT	Statistics
ER_RTD8	8 Resistance Temperature Device (RTD) points
ER_TC12	12 Thermocouple points

Click on the choice which corresponds to the board in the first I/O slot of the I/O rack, then click **Add** (or just double-click on the choice). In either case the board will be added to the **Selected Boards List**. Repeat for each additional board residing in the I/O rack, in the order they reside in the rack.

Click **Next** to configure the board.

4.1.2 Configure Selected I/O Boards:

To configure a board, click on its name in the **Selected Boards List** and complete the parameters on the right hand side of the page. **Note:** It is possible to have both local I/O boards in the ControlWave host controller, and remote I/O boards in the I/O Expansion Rack.

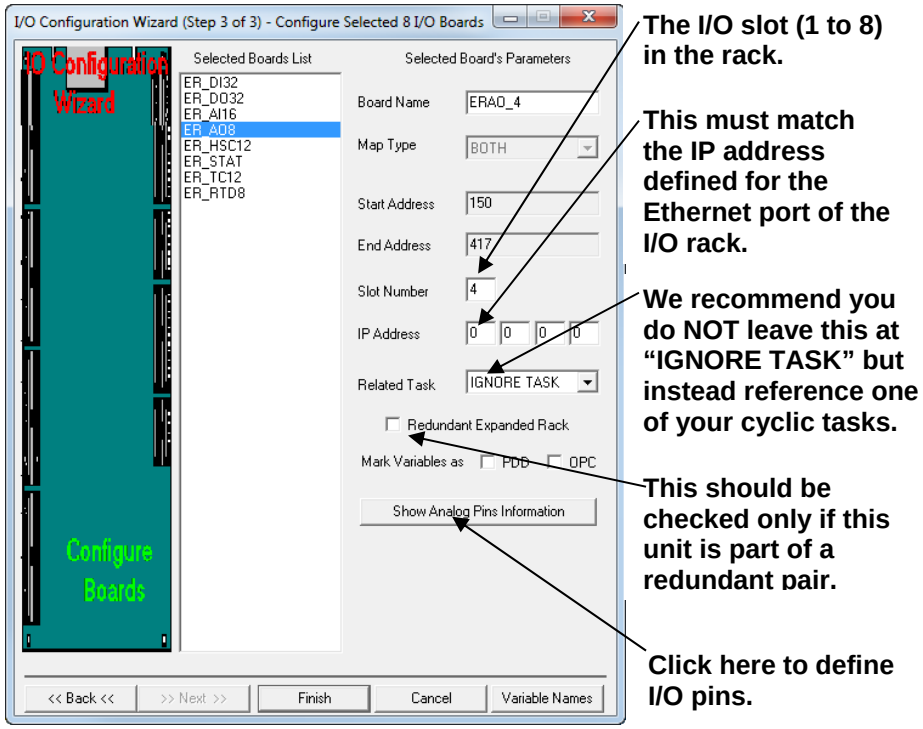


Figure 4-2. I/O Configuration Wizard Step 3

Field	Description
Board Name	You can leave this at the default name.
Map Type	You can leave this at the default.
Start Address, End Address	These display the range of memory addresses used by this board.
Slot Number	Set to the I/O slot number (1 through 8) in the I/O expansion rack which holds the corresponding board. **Note:** I/O slot 1 is equivalent to the 3rd slot in the chassis, I/O slot 2 is the 4th slot in the chassis, and so on. Also, be aware that slot numbering between I/O rack(s) and local I/O in the host controller does not conflict therefore you can have the same slot number used in multiple I/O racks, and in the host ControlWave, because the IP addresses identify them as residing in different physical devices.
IP Address	Set to the IP address for the I/O expansion rack's Ethernet port.
Related Task	Allows you to associate this board with a cyclic task in your project. It is recommended that you use the **Related Task** field to associate the board with a cyclic task in the ControlWave project **that uses data from this board**. This ensures that data will be requested from the board whenever the cyclic task using the data executes
Redundant Expanded Rack	**Redundant Expansion Rack** should only be checked if this I/O Expansion Rack is a member of a redundant pair of I/O Expansion Racks, used in conjunction with the ControlWave Redundant I/O Switcher (CWRED I/O). Checking this box causes software variables to be created which are used to support redundant operations.
Mark Variables as PDD OPC	**Mark Variables as PDD OPC** determines how values of the I/O variables associated with this board will be made available to other software programs. Checking **PDD** allows the controller to reference variables by name, which is necessary if you intend to access a variable by external software which requires “read-by-name” access, such as DataView, or one of the other OpenBSI Utilities. Checking **OPC** adds this variable to a collection list used by the OPC Server or by the OpenBSI Signal Extractor. This is necessary when data is to be extracted, and sent to a database.
Show Analog Pins Information	Click on the **Show Detail Pins Information** button to configure the I/O pins for the board. Pin configuration varies somewhat depending upon the type of board being configured. See the pages that follow for information on particular board types:

4.1.3 Analog Boards (ER_AI16, ER_AO8, ER_TC12, ER_RTD8)

Some fields only appear in the Analog Output (AO) board and are not available for the Analog Input (AI); these will be noted, below. In addition, the RTD and Thermocouple boards use many of the same fields; exceptions will be noted.

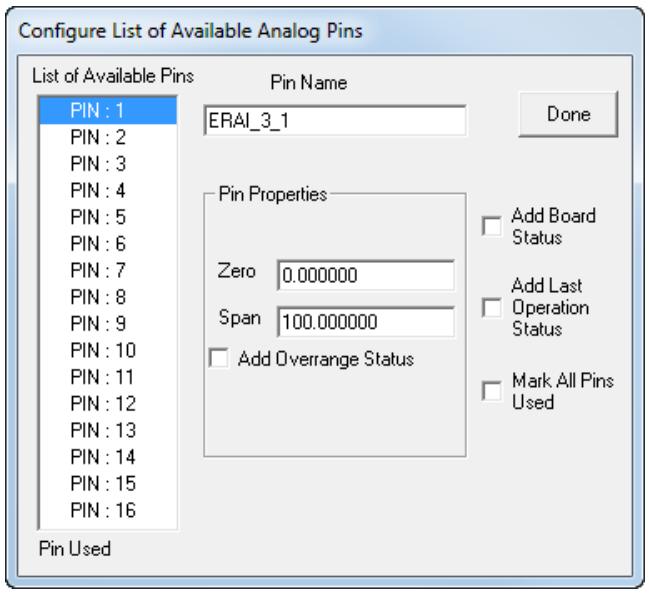


Figure 4-3. Analog Input (AI) Board Page

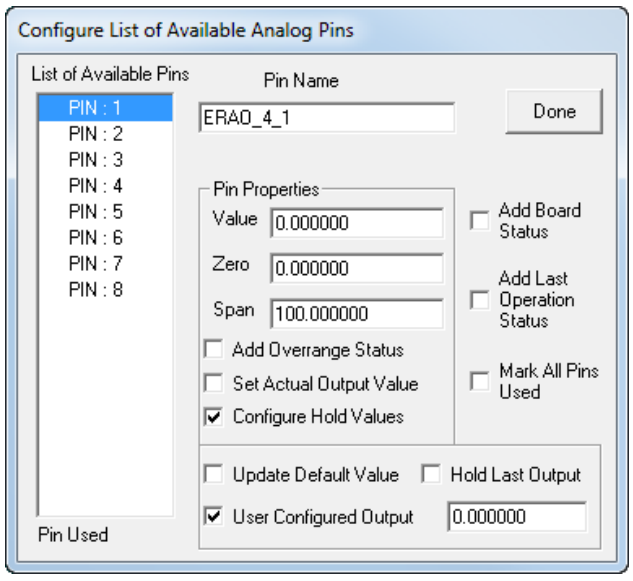


Figure 4-4. Analog Output (AO) Board Page

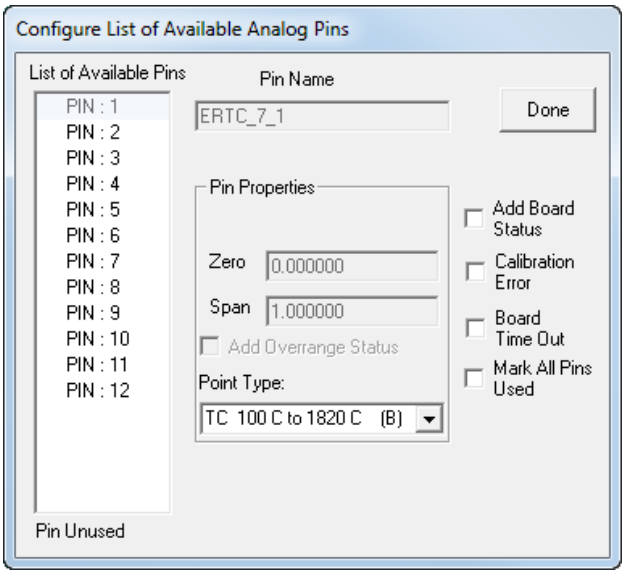


Figure 4-5. Thermocouple Board

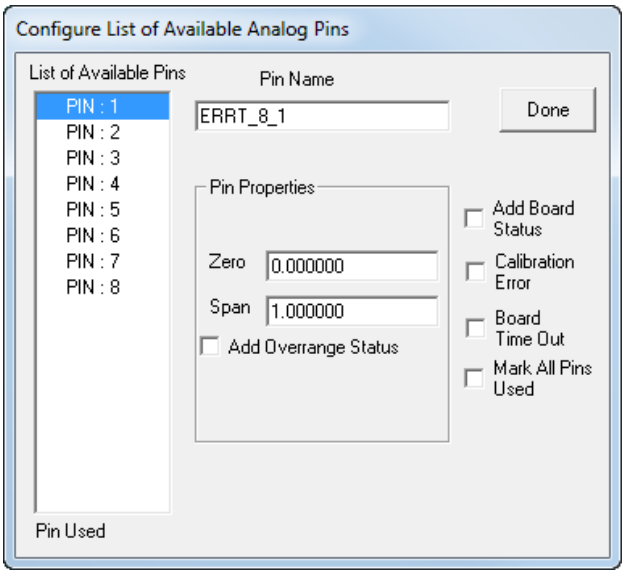


Figure 4-6. RTD Board

Field	Description
List of Available Pins	Displays a list of the individual pins (I/O points) on this process I/O board. If the pin is displayed in red, that pin is active. If the pin is left grayed out, that pin is considered unused.
Pin Name	Defines a name identifying this pin. IMPORTANT: This name is used as a variable name in your POU to reference the I/O pin.

Zero	Defines the lowest value of the range for this I/O pin. Used to scale the input/output value.
Span	Span is added to the ZERO value to define the highest value of the range for this I/O pin. Used to scale the input/output value.
Add Over Range Status	When selected, will cause a variable to be created to store the value of the overrange status bit. Over range conditions occur when an attempt is made to drive the variable associated with this pin outside the range defined by the zero and span. When this occurs, the over range status bit will be set to TRUE.
Set Actual Output Value	When selected, this will cause a variable to be created which *displays* the actual value which was written to the output pin. (AO ONLY)
Add Board Status	When selected, will cause a variable to be created to store board status information.
Add Last Operation Status	When selected, will cause a variable to be created to store the status of the last conversion operation information.
Calibration Error	When selected, will cause a variable to be created to store calibration error information.(TC, RTD ONLY).
Board Timeout	When selected, will cause a variable to be created to store board timeout information.(TC, RTD ONLY).
Value	Defines the initial value for this output pin, in floating point format. (AO ONLY)
Mark All Pins Used	When checked, will activate all pins on this I/O board. They will all appear in RED.
Configure Hold Values	When checked, enables other fields on the page for configuring a hold value for this pin. A **hold value** is the value used by the I/O card if it detects a watchdog of the CPU. The I/O board maintains this value at the pin until the unit is reset. (AO ONLY)
Update Default Value	When checked, allows the **User Configured Output** hold value to be changed on-line; otherwise the hold value can only be set in the I/O Configurator. (AO ONLY)
Hold Last Output	When checked, specifies that during a watchdog failure, the hold value for this pin will be whatever value was on the pin when the failure occurred. **Note: Hold Last Output** and **User Configured Output** are mutually exclusive. Either one may be configured for a particular pin, but **not** both. (AO ONLY)

User Configured Output	When checked, allows the user to enter a value for this pin which will be used as the hold value in the event there is a watchdog failure of the ControlWave. (AO ONLY) If the power fail timeout has been configured, please see *Section 3.6.5* for more information. **Note: Hold Last Output** and **User Configured Output** are mutually exclusive. Either one may be configured for a particular pin, but **not** both.
Point Type	Select the point type for the thermocouple. See *Table 4-1*. (TC only)

When all pins have been configured, click on **[Done]**. You can then proceed to configure **another** board.

Table 4-1. Thermocouple Point Types.

Point Type	Range
Thermocouple Type B	100° C to 1820° C
Thermocouple Type E	-270° C to 1000° C
Thermocouple Type J	-210° C to 1200° C
Thermocouple Type K	-270° C to 1370° C
Thermocouple Type R	-50° C to 1720° C
Thermocouple Type S	-50° C to 1760° C
Thermocouple Type T	-270° C to 400° C
Voltage	-10 mV to 10 mV

4.1.4 Digital Boards (ER_DI32, ER_DO32)

Some fields only appear in the Digital Output (DO) board and are not available for the Digital Input (DI); these will be noted, below:

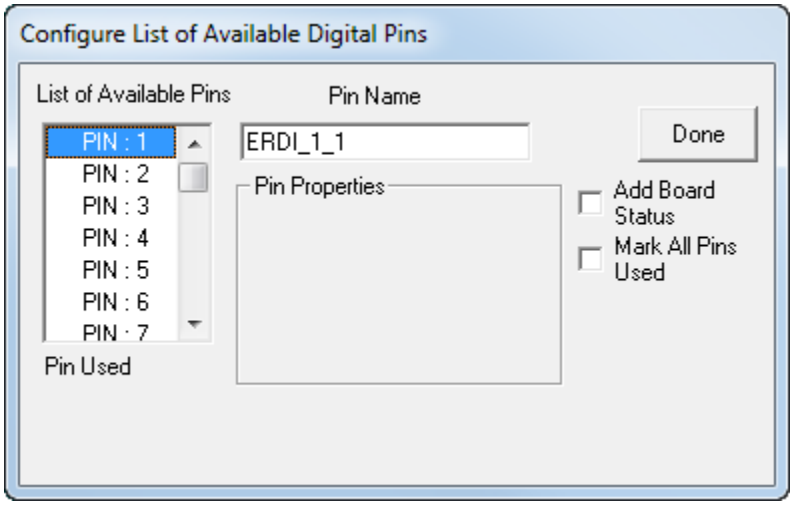


Figure 4-7. Digital Input Board Page

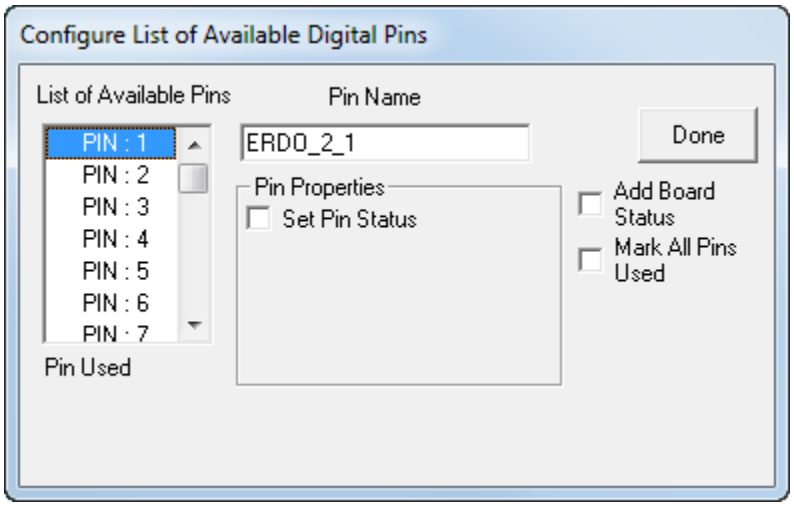


Figure 4-8. Digital Output Board Page

Field	Description
List of Available Pins	Displays a list of the individual pins (I/O points) on this process I/O board. If the pin is displayed in red, that pin is active. If the pin is left grayed out, that pin is considered unused.
Pin Name	Is a name identifying this pin. This name is used as a variable name in your POU to reference the I/O pin.
Set Pin Status	Sets the initial value for this digital output (DO). (DO ONLY).
Add Board Status	When selected, will cause a variable to be created to store board status information.
Mark All Pins Used	When checked, will activate all pins on this I/O board. They will all appear in red.

When all pins have been configured, click **Done**. You can then proceed to configure **another** board.

4.1.5 High Speed Counter (ER_HSC12) Board

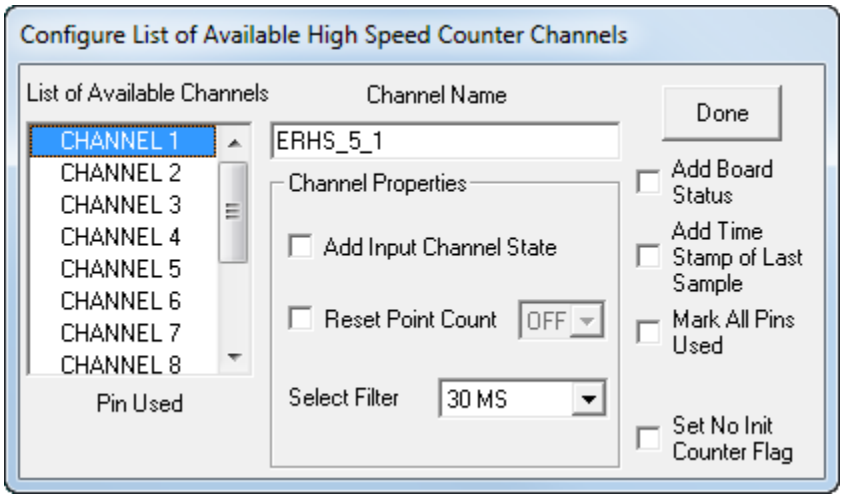


Figure 4-9. High Speed Counter Page

Field	Description
List of Available Channels	Displays a list of the individual channels (counter I/O points) on this process I/O board. If the channel is displayed in red, that channel is active. If the channel is left grayed out, that channel is considered unused.
Channel Name	Is a name identifying this channel. This name is used as a variable name in your POU to reference the channel.
Add Input Channel State	When selected, displays the TRUE/FALSE value of the channel.
Reset Point Count	When set to ON, allows the number of counts to be reset. This occurs automatically whenever the board is reset.
Select Filter	Specifies how the High Speed Counter board will operate for this channel:

Filter:	Description:
None	Defaults to 30 millisecond filtering.
30 ms	Turns on 30 millisecond filtering. Typically used for push-button debouncing.
1 ms	Turns on 1 millisecond filter. Used for low speed counter applications.
HSC Channel	High speed counter.

Add Board Status	When selected, will cause a variable to be created to store board status information.

Add Time Stamp of Last Sample	When selected, will cause a variable to be created to store the timestamp of the last sample collected by this I/O board.
Mark All Pins Used	When checked, will activate all channels on this I/O board. They will all appear in red.

4.1.6 Statistics Board

The Remote I/O Status Board does **not** have a slot number. It is a virtual board, which means there is no actual physical board. By including it within your ControlWave project, global variables will be created to store communication statistics information, and board ID strings for the ControlWave I/O Expansion Rack.

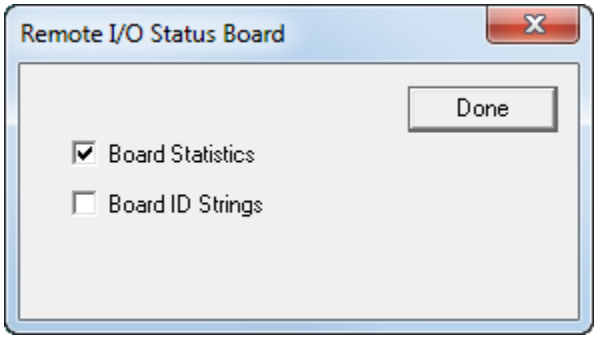


Figure 4-10. Remote I/O Status Board

To create the variables, select **Board Statistics** and/or **Board ID Strings** as desired, then click **Done**.

These variables are:

Variable	Description
ERSTAT_*x*_BOARDSTATUS	Board status code. Always present.
ERSTAT_*x*_BATSTAT	Battery status. Always present.
ERSTAT_*x*_HOTCARDSTAT	Hot Card Replacement in progress. Always present.
ERSTAT_*x*_HOTCARDCT	Count of number of hot card replacement operations
ERSTAT_*x*_DOWNTIMEUSER	User configured down time for I/O Expansion Rack
ERSTAT_*x*_DOWNTIMEACT	Actual time rack was down
ERSTAT_*x*_WRITECT	Number of writes to rack
ERSTAT_*x*_READCT	Number of reads (updates sent from rack)
ERSTAT_*x*_CONNECTS	Number of IP connections or re-connects to rack
ERSTAT_*x*_HEARTBEAT	Heartbeat count
ERSTAT_*x*_MASTER_IS_B	This is used in Redundant I/O Racks. This value is set TRUE when the “B” unit is the primary

Variable	Description
	online (master) unit.
ERSTAT_*x*_STBYVALID	This is used in Redundant I/O Racks. This value is set TRUE when the standby (backup) unit is ready to take over in the event of a failure of the primary online unit (master).
ERSTAT_*x*_FAILOVERERR	This is used in Redundant I/O Racks. This is set TRUE if an error occurs during an attempted forced failover from the online unit to the backup unit.
ERSTAT_*x*_REDUNSTAT	This is used in Redundant I/O Racks. This is a status code related to redundant operations.
ERSTAT_*x*_FAILOVER_O	This is used in Redundant I/O Racks. It may be set TRUE by the user's application to force a failover between the online rack and the backup rack. After the failover occurs, it will automatically be set FALSE. If it is set TRUE, and remains TRUE, that means a forced failover was not possible.
ERSTAT_*x*_BDSTR1 to ERSTAT_*x*_BDSTR8	ID strings for I/O cards in the rack.

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