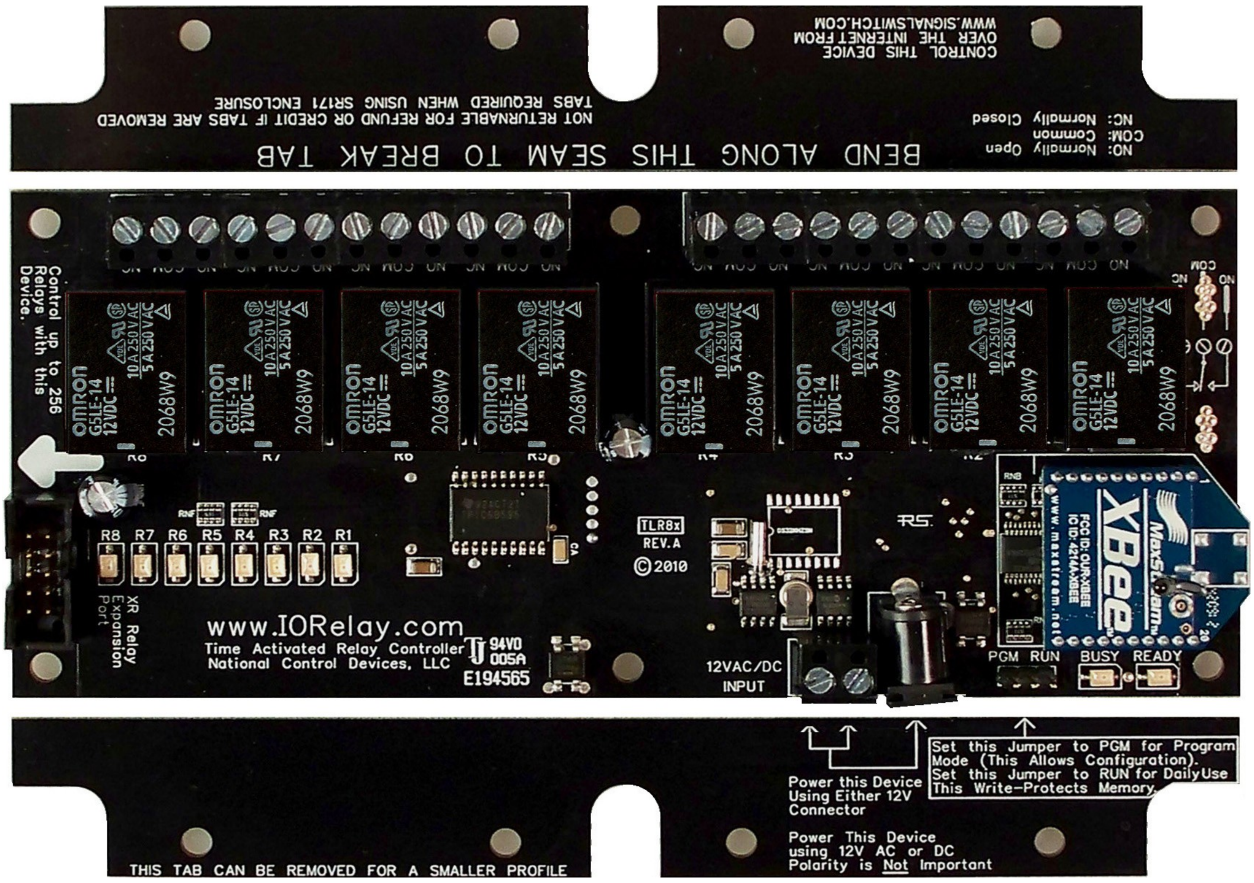

CONTROL THIS DEVICE
OVER THE INTERNET FROM
WWW.SIGNALSWITCH.COM
TABS REQUIRED WHEN USING SR171 ENCLOSURE
NOT RETURNABLE FOR REFUND OR CREDIT IF TABS ARE REMOVED
BEND ALONG THIS SEAM TO BREAK TAB
NC: Normally Closed
COM: Common
NO: Normally Open
Control up to 256 Relays with this Device.
XR Relay Expansion Port
R8 R7 R6 R5 R4 R3 R2 R1
www.IORelay.com
Time Activated Relay Controller
National Control Devices, LLC
TLR8x
REV.A
©2010
12VAC/DC
INPUT
PGM RUN
BUSY READY
Set this Jumper to PGM for Program Mode (This Allows Configuration).
Set this Jumper to RUN for Daily Use This Write-Protects Memory.
Power this Device Using Either 12V Connector
Power This Device using 12V AC or DC Polarity is Not Important
THIS TAB CAN BE REMOVED FOR A SMALLER PROFILE

Page 1 Required Reading

the TARALIST™

RELAY series

TIME ACTIVATED RELAY CONTROLLERS

NOTICE: Portions of this Manual REQUIRE Internet Access

This manual will guide you through the setup and use of all Taralist Series relay controllers. Following this manual in the sequence outlined is absolutely essential to proper understanding and use of Taralist Series Controllers. Please review the entire manual BEFORE contacting NCD technical support. NCD technical support staff will direct your questions to this manual when applicable.

Introduction

The Taralist Series relay controllers represent a significant advancement in the evolution of the NCD product line. The Taralist Series controllers represent many foundation technologies that will significantly strengthen our product offerings in the years to come.

The Taralist Series of controllers are the first time controlled devices we have ever developed. This new architecture allows powerful computer-based configuration without writing a single line of code. Taralist controllers are the first to offer a Autonomous time controlled mode of operation in addition to a computer-override mode of operation. This allows users to take over the relay controller at any time, and even change settings in the configuration through a direct USB connection or using a wireless 802.15.4 or ZigBee Mesh Interface. The Taralist Series are manufactured using Surface Mount Technology. A Break-Away design has been implemented to service the needs of customers who need an enclosure AND to customers who need the smallest possible size. Break Away tabs allow the user to "break" off the outer edges of the circuit board for a smaller profile. This type of controller in conjunction with several other "no programming required" devices represent the future direction of National Control Devices.

Who's Qualified to Use the Tera List Series?

Anyone. The Taralist Series Controllers are one of the most consumer friendly devices we have ever manufactured. Whether you are an electronics engineer or home hobbyist, anyone is qualified to use the Teralist Series controller provided this manual is carefully studied.

How do the Tera List Series Controllers Work?

The Taralist Series Relay Controllers are configured using a computer (either using wireless or a direct USB connection). Once configured, a Taralist controller will operate without a computer. At any time, a computer may monitor the Taralist Device, Activate Relays, or Change Configuration settings. A computer can take over a Taralist or a Taralist can operate autonomously (without a computer). The NCD Configuration Utility provides 1000 User Configurable events where a relay or group of relays can be turned on or off. Its that easy.

Once a Taralist is configured it will run through the list of events stored in its on board memory every second to look for a match with the current time. If a match with the current time and a configured event is discovered it will execute the event.

Order of Operations

There is a general process to learning and using a Teralist Series relay controller, this manual will follow two sequences, covering the Learning Cycle and the Usage Cycle. Optionally, users may want to consider exploring the Advanced Applications to unlock some of the most powerful features

Learning Cycle

1) Hardware Reference (getting to know the hardware)
2) Communications
3) Configuration Overview
4) Building a Custom Configuration Profile
5) Loading and Saving Configuration Profiles
6) Understanding Relay Control
7) Testing a Taralist Controller
8) Controlling Devices with a Taralist Controller
9) Troubleshooting a Taralist Controller

Usage Cycle

1) Configuration
2) Testing
3) External Device connection

Advanced Application

1) Remote Configuration
2) Using a Computer to Take Over a Relay
3) Giving Relay Control Back to Taralist Logic
4) Changing the Time Compensation
5) Using the Midnight Buffer

Getting Started

There is no better place to start than from the beginning. This manual will lead you through the understanding and use of your Taralist Series relay controller in a sequence that will help get you started from the ground up.

Please refrain from contacting NCD technical support unless it is absolutely necessary. Most questions will be covered in this manual and NCD technical support staff has been instructed to direct your questions to this manual when appropriate. Please take advantage of the efforts we have invested in building a complete and comprehensive product manual. This will save you time and allow our technical support engineers to focus on product development.

Hardware Reference

There are many versions of the Taralist Series relay controllers. It is not practical to photograph an outline every version in this manual. But there are many common elements that are shared among controllers. Most notably, the Taralist CPU is identical whether you are using a 1-Channel Ethernet Taralist or a ZB Mesh 8-Channel Taralist. All Taralist controllers share the exact same firmware with absolutely NO differences in firmware revisions. This greatly reduces manufacturing time and troubleshooting while allowing our customers a migration path to more complex communication technologies as required.

Some Taralist Controllers have a ZigBee Mesh Interface, others have XSC or a 802.15.4 Interface. The versions mentioned above require a USB modem (which we will discuss later). The above versions may also be adapted to USB using our ZUSB module/cable (which will also be discussed later in this manual). Taralist Controllers will also be available with an Ethernet interface. The CPU that holds the Taralist firmware is 100% full. It is not possible to add features to the existing CPU. For this same reason, a Bluetooth version is not available at this time (Bluetooth versions require more CPU space).

Power Requirements

Taralist controllers require a 12VAC or 12VDC power supply to power the logic and relays of the controller. The PWR12 is our stock power supply suitable for use with ALL Taralist Series controllers. While it is possible to operate from an automotive 13.8V power supply, higher voltages are not recommended. Additional power filtering may be required for proper operation in automotive electrical systems. The absolute minimum recommended operating voltage is 11VAC or 11VDC. Taralist controllers require approximately 100ma for standby and 60ma for each activated relay. ZigBee Mesh or 802.15.4 equipped Taralist Controllers may require an additional 240ma of current to sustain normal operation.

Ethernet versions should ONLY be powered from the included power supply, as their operating tolerances are more strict. The power supply (included with Ethernet controllers) is rated at 12VDC, 1.25A. This power supply is a computer grade regulated supply and should NOT be substituted.

Power polarity is not important on the Taralist Series controllers. There is no positive and negative terminal. Simply apply power to the controller as it is convenient to make wired connections. The Taralist controller will rectify your power supply and attempt to filter noise to safe levels for proper operation.

Temperature Requirements

Certain components of a Taralist controller may run at temperatures exceeding 120° Degrees Fahrenheit when certain options are installed. This is normal for a Taralist controller and does not indicate a defect.

The recommended operating temperature for all Taralist controllers is –25 to 80° C. This temperature rating is based on temperature specifications of the components used to build a Taralist controller, and is not based on actual testing.

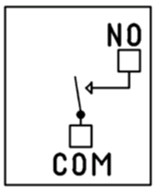
Status LEDs indicate which relays are currently active.

For most daily applications, the PGM/RUN jumper should be set to RUN. Only during configuration should the jumper be changed to PGM mode. RUN mode protects internal memory from accidental changes while PGM mode allows configuration changes.

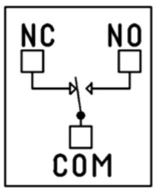
The BUSY/READY LEDs indicate CPU activity. Under normal operation you will see the BUSY LED flash as it computes Reactor logic and processes computer commands.

Reactor Controllers are equipped with 1, 2, 4, or 8 Relay Outputs. Relays are simply switches. They DO NOT provide a voltage output, but they will switch the voltage you apply to the relay connections. Please Click Here to see a list of relays and ratings that are commonly supported by the NCD product line (note: not all relays may be supported at this time, relay support will grow as the Reactor product line grows).

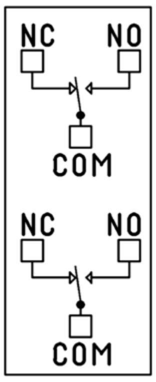
Relays have 2, 3, or 6 connections per relay depending on configuration. SPST, SPDT, and DPDT relays will be supported. Please see the following article for a detailed explanation of these relay types.



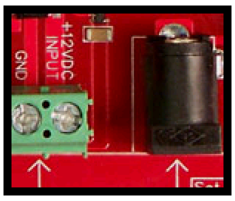
SPST Relay



SPDT Relay



DPDT Relay



Reactor Controllers include a 2.1mm Barrel Connector AND a 2-Position Screw Terminal. Use either connector to provide 12V power to the Reactor Controller. Reactor controllers are compatible with 12V AC or DC power supplies with a actual voltage output of 11 to 13.8V. Polarity is corrected by the Reactor controller, therefore a Positive and Negative terminal are NOT labeled on the board (it is not possible to connect power backwards to a Reactor controller, the Reactor will automatically correct polarity).

This manual will guide you through the setup and use of all Taralist Series relay controllers. Following this manual in the sequence outlined is absolutely essential to proper understanding and use of Taralist Series Controllers. Please review the entire manual BEFORE contacting NCD technical support. NCD technical support staff will direct your questions to this manual when applicable.

On Board Battery Backup

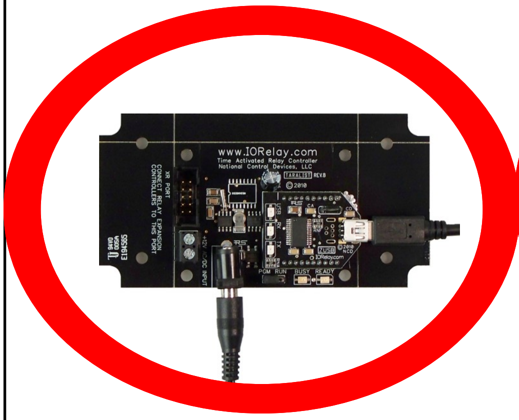
Lithium Ion Battery Backup

Each Taralist controller has a battery installed on it. This batteries main purpose is to keep the Taralist clock running if power is disconnected, otherwise every time you unplug and move the controller you would have to reset the time in it. This battery will keep the Taralist clock running for up to two months, but there are some things you need to know.

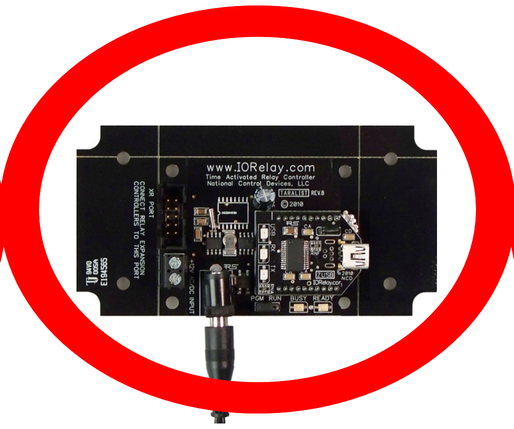
The Taralist on board battery back up is used to run the Taralist clock only, it will not allow the controller to function and process events. You will not be able to run the controller on this battery alone, an external power source is required for processing events and controlling relays.

Charging the on Board Battery

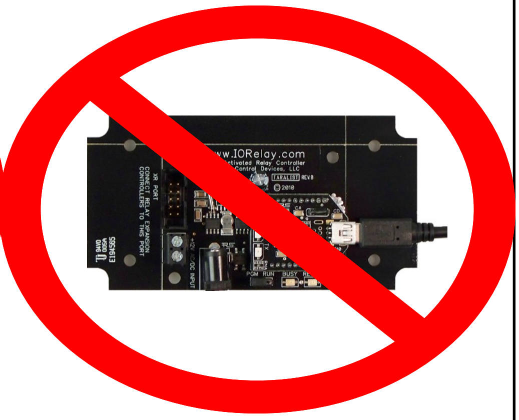
The onboard Battery is charged when the device is attached to a power source. You can control how fast the battery is charged by Editing Protected Data (Page 16). This is very useful as you can charge the battery very fast or very slow. Charging the battery slow will increase the batteries life so whenever possible we recommend leaving the Charge level to 1.



Power + USB



Power Only



USB Only

Getting the Best Life out of the Battery

It is recommended to charge the battery slowly. Also make sure you have a power source plugged into the controller when a USB cable is connected to the device. If a USB cable is attached to the device but no power supply is connected this will drain the battery very fast as the controller will not be able to properly enter sleep mode.

Hardware Reference: Understanding Outputs

On the previous page, we introduced you to the Anatomy and power requirements of the Taralist controllers. The subject of Taralist Logic will take a little more time to explain, and in this section, we will continue our focus on the Hardware portion of the Taralist controller, which brings us to our next topic: Understanding Outputs.

Taralist Controllers are capable of controlling up to 256 Relays from only one Taralist CPU. These controllers are available with 1, 2, 4, 8, 16, 24, and 32 relays on a printed circuit board as well as a small controller with only an XR expansion port instead of relays. XR Expansion Relays may be added to the XR Expansion Port at any time giving you as many relays as you need (up to 256)

A relay is similar to a switch. The only difference between a switch and a relay is the actual mechanism for changing the on/off status of the switch. On a switch, you manually push on a piece of metal or plastic to operate the switch. On a relay, an electric current is used to operate the switch. Though a relay resembles the characteristics of a switch, it cannot be controlled by touching it with your finger. So from now on, we will use the word “Relay” to indicate a switch that is controlled by the Taralist controller (instead of your finger).

Relays do NOT provide a voltage output. They provide a contact closure output, exactly like the terminals found on a light switch at your local hardware store. Wiring to a relay will be slightly different depending on the model of Taralist controller you choose.

Some relays, such as the 5A and 10A versions have screw terminals that can accept 12 Gauge or smaller wire. Other versions such as the 20A and 30A relays have a .250” Quick Connect terminal (the appropriate mating connector can be found at any hardware or automotive supply store). Our 20A HP series relays will accept wires as large as 10 Gauge.

Again, relays do not provide a voltage output. They ONLY switch whatever voltage you supply into the relay.

Relays are available in SPST, SPDT, and DPDT configurations. In addition, both Mechanical and Solid State relays will be supported by the Taralist series. If you are unfamiliar with the different versions of relays available, you can review the following article, which explains these relay types in great detail.

The above article will help you determine the best type of relay for your application, showing you the formulas for calculating relays sizes that are appropriate for your application.

If you intend to use the Taralist series relay controllers for inductive applications, the following article MUST be reviewed. An example of an inductive application is any device that involves motion. For instance, using a Taralist Controller to control a motor, a solenoid, or a valve. Other types of inductive applications include anything with a transformer such as a fluorescent light or a power transformer of any kind. Logic circuits (including those found on the Taralist Controller) may malfunction in sever conditions. The above article will show you how to safely implement these kinds of loads which greatly reduces the chances of a malfunction. Some inductive applications generate excessive noise, and may not be suitable for use with the Taralist Series Relay controllers. Solid State Taralist Relay Controllers Should be considered for these high-noise applications.

Controlling Relays

There are 2 possible ways to control the relays on a Taralist Series controller.

1) A Relay can be Directly Controlled by an Event configured into the Taralist Device.
2) A Relay can be controlled from a computer such as a ZigBee wireless interface, Ethernet Interface, or USB interface. A computer can take control of any or all relays on a Taralist controller at any time. Once taken over, the Taralist logic will not be able to switch a relay. The computer MUST return control of the relay back to the Taralist Logic for standalone operation. The default power-up status of a Taralist controllers Relays may be preset using the Midnight backup buffer.

Limitless Relay Control

A version of the ProXR firmware is used to control relays on the Taralist device. This version is called ProXR Lite. It has many of the same features as the original ProXR firmware so if customers are familiar with original ProXR controllers this device will be very easy to work with.

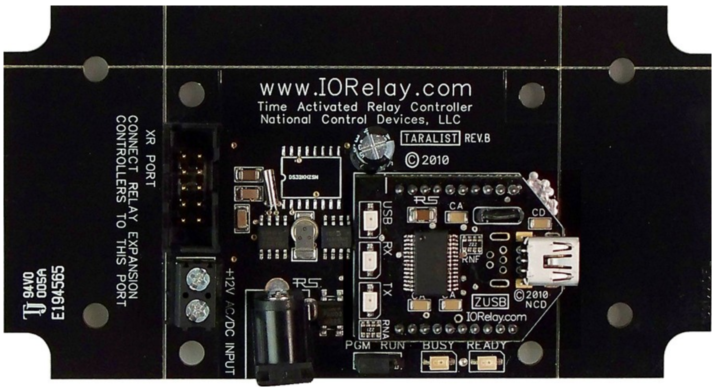
Hardware Reference: Break-Away Tabs

Physically, most Taralist controllers are actually 2 sizes. When you receive your Taralist controller, the unusual shape and size ensures the controller can fit into a standard enclosure. Optionally, you can make the controller smaller by breaking away the outer tabs. Break-Away tabs are useful in applications where space may be a concern. This allows your Taralist controller to offer the same functionality in the smallest possible profile. Break-Away tabs are unique to the NCD product line and are a standard option for most devices released in 2010 and later.

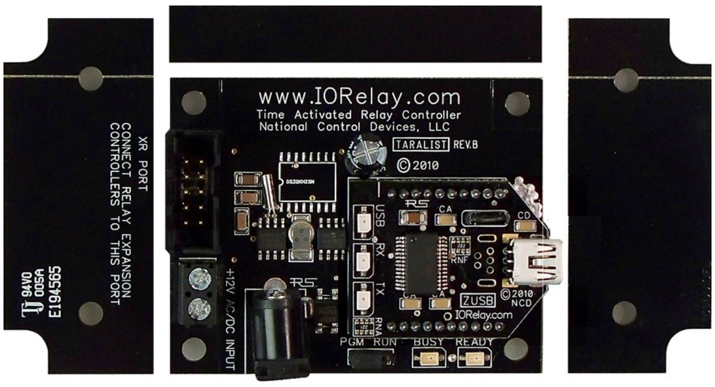
Before breaking the tabs on your controller, please be advised that your Taralist controller will not be returnable for refund or credit if the Break-Away Tabs have been removed.

To break away the tabs, gently but firmly grab each break-away tab with a pair of pliers and bend the tab back and forth until it breaks away from the main circuit board. This will NOT damage the controller in any way.

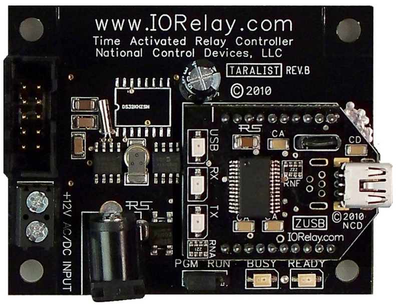
Breaking the Tabs from a controller DOES NOT VOID the 5-Year Warranty. Please see the NCD return policy if you would like more information on the policies that apply to Surface Mount devices.


www.IORelay.com
Time Activated Relay Controller
National Control Devices, LLC
TARALIST REV.B
©2010
XR PORT
CONNECT RELAY EXPANSION CONTROLLERS TO THIS PORT
+12V AC/DC INPUT
USB
RX
TX
ZUSB
PGM RUN BUSY READY

Taralist Shown Above as shipped from National Control Devices. The unusual shape accommodates a standard enclosure.



Bend the tabs to break them away from the board. Note that controllers with Broken Tabs are NOT Returnable for Refund or Credit, but are still covered under our 5-Year Limited Warranty.



Shown above, the final controller with tabs removed is physically smaller in size, but no-longer fits a standard enclosure.

Hardware Reference: Communications

Establishing communications with a Taralist controller is an essential step in using this device. Communications can be very simple or seemingly very complicated depending on your background and communication method you have chosen.

Taralist series controllers are available in many different varieties. While all Taralist controllers are capable of functioning WITHOUT a computer, a computer is REQUIRED to configure the Taralist controller. Once configured, the communications module may be removed (on select Taralist models) and used again to configure other controllers.

The way the Taralist controller communicates with your computer depends on the communication option you have chosen. By far, the easiest and most recommended communication interface is USB using the ZUSB communications module, followed by 802.15.4 Wireless and XSC Long-Range wireless.

Ethernet is slightly more difficult to implement. If you are not experienced with IP Addresses and basic network troubleshooting, users should choose a USB, 802.15.4, or XSC interface. Please keep in mind, NCD technical support is NOT able to assist in network communication problems.

For the most advanced users, a very special kind of Wireless communication is also available called ZigBee ZB Mesh. While this communication method requires the greatest skill level, its wireless network functionality is unbeatable. This is by far the most study-intensive protocol to implement. Only the most advanced users should consider using this technology. However, this technology offers the very best in network communications. A ZUSB adapter is highly recommended to speed the configuration of the Taralist during configuration. We also recommend purchasing a ZigBee ZB Mesh Development Kit from www.digi.com. Once you have worked with this development kit, you will need to read the following article. This will help get you oriented with ZigBee ZB Mesh. Only after completing both steps above will you be qualified to use a Taralist series controller on a ZigBee ZB Mesh network. For those unfamiliar with mesh networking, please read the above referenced article. It is by far the most awesome wireless networking technology in existence and it is significantly more powerful than all other wireless technologies currently available. Setting up a ZigBee ZB Mesh network can be very time consuming if you are unfamiliar with the process. Once you are familiar with the process, it only takes a few minutes (we have seen users struggle with this for weeks, but it only takes us about 10 minutes. We have posted lots of information on our web site to help speed this process.) Due to the learning curve and time required, questions regarding ZB Mesh networking will not be handled over the phone via NCD technical support. We will direct you to our online resources, as this is a in -depth topic.

Communications to Taralist series controllers is based off serial communication protocols. We will not be using a Serial Port for communications to a Taralist controller. Instead, we will be using a Virtual COM Port. All communication technologies we offer can be used with a Virtual COM Port for normal daily use. Configuration REQUIRES a Virtual COM Port. If you are unfamiliar with VCP, simply follow the directions below for your communication technology.

USB, 802.15.4, XSC and ZigBee ZB Mesh Communications

If you plan to work with USB, 802.15.4, ZigBee ZB Mesh or XSC Long Range Wireless then the first thing you will need to do is download and install FTDI Virtual COM Port (VCP) drivers from www.ftdichip.com. The latest drivers can be downloaded from this page. **UPDATE: These drivers are now included and installed along with the NCD Configuration Utility Software installer package.**

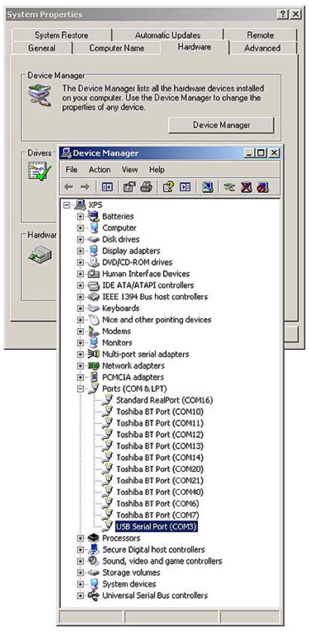
Just about every operating system is supported, but configuration can only be completed using our software written for Windows XP, Vista, or Windows 7. Therefore, you will need the drivers for your Windows operating system. A setup executable will greatly speed the driver installation process. Once drivers have been downloaded, you will need to install them onto your computer.

Once the above drivers are installed, plug in your ZUSB adapter or USB Wireless Modem (such as a 802.15.4 Modem or XSC Modem). ZB Mesh users should use the ZUSB adapter to configure the Taralist controller. Once configured, the ZB Mesh communications module can be used for all other operations.

Next, open your device manager to determine the COM assignment of your ZUSB or wireless Modem. Take note of the COM port number. COM3 is shown in the screen shot to the left. However, your COM port number may be different.

NOTE: If you unplug the USB interface and move it to a different USB connector on your computer, a new COM port may be assigned. So if you experience any communication issues, MAKE SURE you check your device manager to determine the correct COM port. This is a CRITICAL step in using a Taralist controller.

If you do not know how to open your device manager, please review page 3 of the following document.



The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.

Hardware Reference: Network Communications

Establishing communications with a Taralist controller via Ethernet is currently under development. At this time Network Communications is not supported. As we advance the Taralist line of controllers, we will develop communication methods for network devices.

Hardware Reference: ZigBee Mesh Communications

ZigBee ZB Mesh communications is very similar to USB communications. At this time, we currently recommend the use of a ZUSB adapter to configure your Taralist controller. Once configured, you can replace the ZUSB adapter with a ZB Mesh communications module. Programming a Taralist Controller using wireless ZigBee ZB Mesh directly may work, but is not officially supported. Only users experienced in ZigBee communications should attempt Taralist configuration using this wireless technology. If you are an experienced user, make sure:

1) ZigBee ZB Mesh devices are set to 115.2K Baud ONLY.
2) Do NOT enable API mode.
3) The PAN ID on the Coordinator Must Match the Router or End Point Device.
4) Device MUST be Married to the Coordinator.
5) Customer must be familiar with X-CTU software to implement this communications protocol.

All theories indicated ZigBee Mesh Wireless Configuration is possible, but will remain untested until after initial release of the Taralist series relay controllers. The following article can help get you started using this communication technology.

Hardware Reference: Taralist Configuration

By this point, you should know the COM port of your Taralist controller (ZUSB Adapter or 802.15.4/XSC Wireless USB Modem). If not, please review the previous pages to determine your COM port. Your Taralist Controller CANNOT be configured and it will not be possible to proceed through these instructions without knowing the current COM port assignment.

Before Proceeding, Make Sure your computer has .NET Framework 3.5 or later installed. This is a Microsoft update and a free download from www.microsoft.com. .NET Framework 3.5 is REQUIRED to run our software. Also make sure you have the latest operating system and service packs installed. Our software will use some of the important libraries that are only available by installing .NET Framework 3.5. Skipping this step may lead to unexplainable error messages that cannot be resolved.

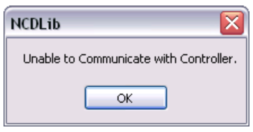
Next, download and install our NCD Configuration Utility:

Download NCD Configuration Utility

Run the NCD Configuration Utility and you should see the following window appear (the configuration window will look similar to the one shown, the NCD Configuration Utility is evolving and some menu options may not be present in the release version):

Having Problems?

If you see this error, then we need to take a few steps back.


NCDLib

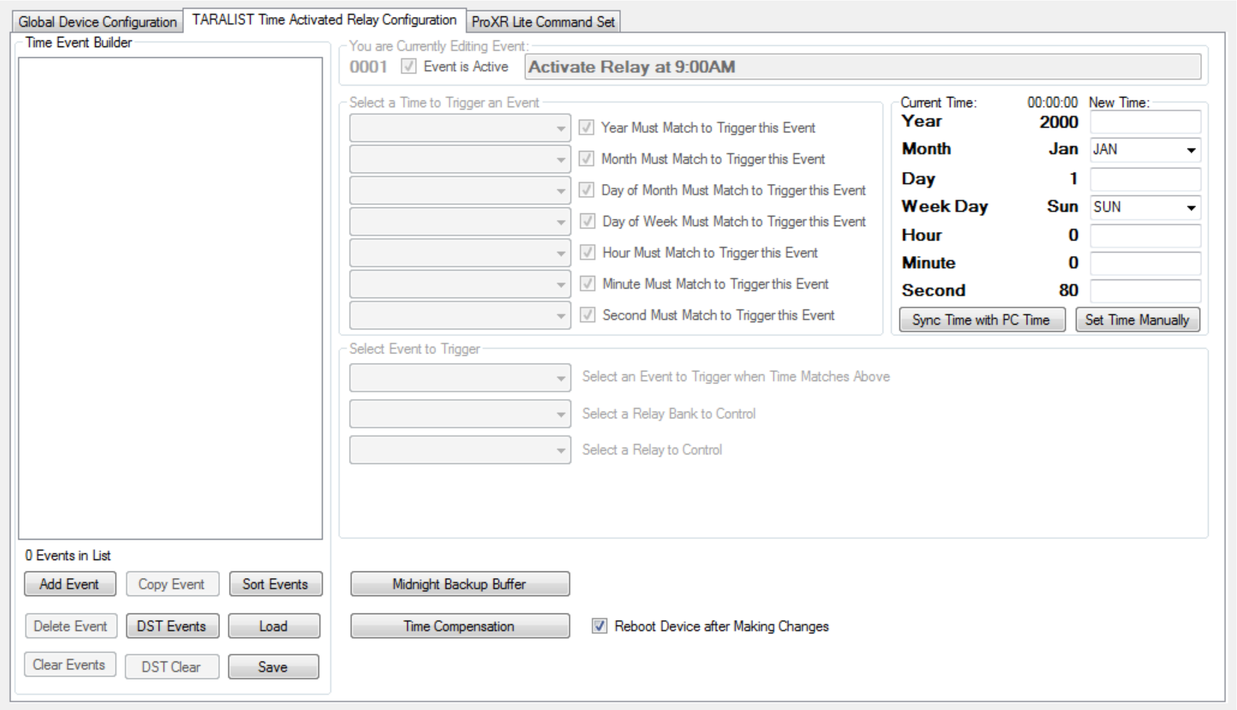
Unable to Communicate with Controller.

The most common cause for this error is the incorrect COM port assignment. Using the ZUSB adapter is the cheapest and easiest way to avoid this error, as wireless communications may be more complicated to troubleshoot.

If you know the COM port is correct and you are using a Wireless communications protocol such as ZigBee or XSC, there are many possible reasons for this error. The following page will help you troubleshoot wireless communication problems.

ZB Mesh users MUST USE the ZUSB adapter to configure a Taralist Controller. ZB Mesh Wireless Configuration is not currently supported. All other wireless features ARE supported.

NOTE: If you have received any other error other than the one shown, MAKE SURE .NET Framework 3.5 or later is installed on your computer. Windows XP Users MUST be using Service Pack 3 or Later to run our configuration software.


Global Device Configuration
TARALIST Time Activated Relay Configuration
ProXR Lite Command Set
Time Event Builder

You are Currently Editing Event: 0001 ☑ Event is Active — Activate Relay at 9:00AM

Select a Time to Trigger an Event

☑ Year Must Match to Trigger this Event
☑ Month Must Match to Trigger this Event
☑ Day of Month Must Match to Trigger this Event
☑ Day of Week Must Match to Trigger this Event
☑ Hour Must Match to Trigger this Event
☑ Minute Must Match to Trigger this Event
☑ Second Must Match to Trigger this Event

	Current Time: 00:00:00	New Time:
Year	2000	
Month	Jan	JAN
Day	1	
Week Day	Sun	SUN
Hour	0	
Minute	0	
Second	80	

Select Event to Trigger

Select an Event to Trigger when Time Matches Above
Select a Relay Bank to Control
Select a Relay to Control

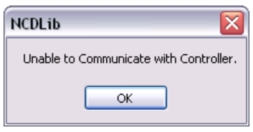
0 Events in List

☑ Reboot Device after Making Changes

If you see the above window, you can skip the next page of the manual.
You are ready to configure your Taralist controller.

Hardware Reference: Troubleshooting Communications

This page may be skipped if you have successfully established communications with your Taralist controller as shown on the previous page. If you see the following error then we can help you further, but additional study will be required on your part to troubleshoot the communications problem.



NCDLib

Unable to Communicate with Controller.

NOTE: If you have received any other error other than the one shown above, MAKE SURE .NET Framework 3.5 or later is installed on your computer. Please visit www.microsoft.com to obtain this free download. Also, make sure your computer is up to date with Service Pack 3 or later is you are using Windows XP. Our software has also been tested with Windows Vista and Windows 7.

If you are attempting to configure your Taralist controller using a wireless ZB Mesh then follow the instructions below:

1) ZB Mesh cannot be used to configure a Taralist controller at this time. We hope to support this option in the future.
2) ZB Mesh users must power down the Taralist controller and replace the ZB Mesh wireless communications module with a ZUSB communications module.
3) Once replaced and connected to your PC via the USB port, power the controller up and review the COM port settings in your device manager. If you are not familiar with how to open your device manager, directions can be found on Page 3 of the following document.

If you are using XSC or 802.15.4 to configure your Taralist controller via wireless communications then solving the communication problems may be simple or complex.

The simple solution being to check your COM port and make sure the Taralist Configuration Utility is using the same COM port as your ZigBee/XSC modem. If this does not resolve the problem, then some experience with X-CTU will be helpful.

It is not practical for us go through all of the documentation as it relates to X-CTU. The documentation for this software is extensive. If you have NEVER used X-CTU to change any settings in the ZigBee or XSC communications module, then you should NEVER be required to use X-CTU. However, in case there is a compatibility problem, please follow these steps (the following steps assume you understand X-CTU. If you are not familiar with X-CTU, it would be better to use a ZUSB adapter to configure your Taralist controller. However, a ZUSB adapter will NOT solve your wireless communication problems. So at some point, you MUST consider learning about X-CTU).

1) Install and Run X-CTU
2) Choose the COM port of your wireless modem.
3) If you are using a ZigBee Modem, set the Baud Rate to 115.2K Baud.
4) If you are using a XSC Modem, set the Baud Rate to 57.6K Baud.
5) Click the “Test/Query” button. You should see a window that says “Communication with modem..OK” and the last line should show “Modem Firmware Version = xxxx“ where xxxx is the actual firmware version. If you do NOT get this message, then test the 9600 Baud Rate. If communications are successful, go to the Modem Configuration Tab and click the “Read” button. Change the Baud Rate to 115.2K Baud if you are using ZigBee and 57.6K if you are using XSC communications. After changing the Baud Rate to the proper setting, click the “Write” button to store your changes in the ZigBee/XSC module. A Baud Rate problem has been identified and should now be corrected. Check BOTH wireless communication modules to make sure they are BOTH set to the same Baud Rate of 115.2K Baud for ZigBee or 57.6K for XSC versions.
6) If communications was successful (in step 5), we need to check the Pan ID. The Pan ID on the both wireless communication modules MUST match. Also, the destination address should be set to 0 on both wireless communication modules.

By this point, your problems should be resolved. If you have purchased your wireless communications modules from National Control Devices, we have prepared these modules for you, and none of these steps should be required. If you are still unable to establish communications, you may need to arrange a warranty examination of your product. A warranty examination is ONLY valid if you have purchased your wireless communication modules from National Control Devices, therefore, you must reference your order number when arranging a warranty examination. Please Contact Us to arrange a warranty examination.

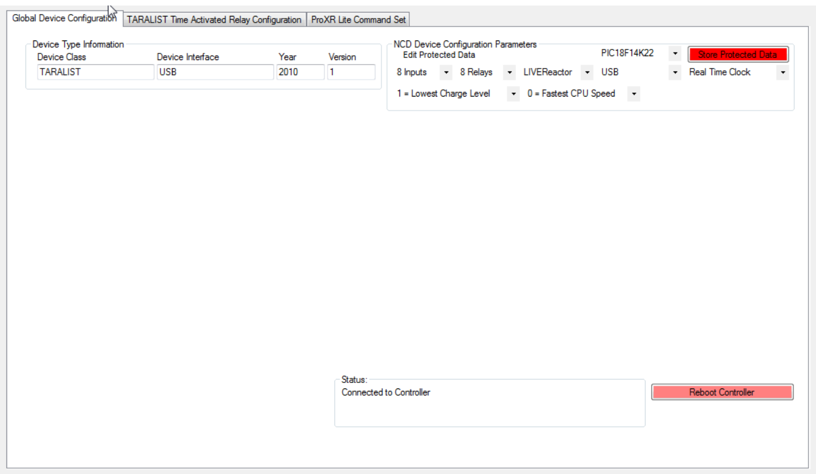
If you are supplying your own wireless communication modules, additional steps may be required and we will be unable to instruct you further. NCD technical support staff is not trained to answer all questions regarding ZigBee and XSC communications. These are considered advanced topics, and users are strongly urged to obtain a ZigBee or XSC development kit from www.digi.com.

From this point forward, we will assume you have established communications with your Taralist controller.

Taralist Configuration

The NCD Configuration Utility is a powerful utility used to load and save profiles into a Taralist controller.

When communications is established, you will see the following screen appear. This screen has three tabs across the top that allow you to configure and control your Taralist Device.


Global Device Configuration
TARALIST Time Activated Relay Configuration
ProXR Lite Command Set
Store Protected Data
Reboot Controller

Device Type Information

Device Class	Device Interface	Year	Version
TARALIST	USB	2010	1

NCD Device Configuration Parameters
Edit Protected Data
PIC18F14K22
8 Inputs
8 Relays
LIVEReactor
USB
Real Time Clock
1 = Lowest Charge Level
0 = Fastest CPU Speed

Status:
Connected to Controller

Note: It is NOT Possible to Store Taralist Configuration data into the Taralist Controller when the Program/Run jumper (PGM/RUN) is set to the Run position. This jumper may be changed at any time. Power cycling is NOT REQUIRED.

The "Global Device Configuration" tab is used to Reboot the controller or edit protected data (see page 15).

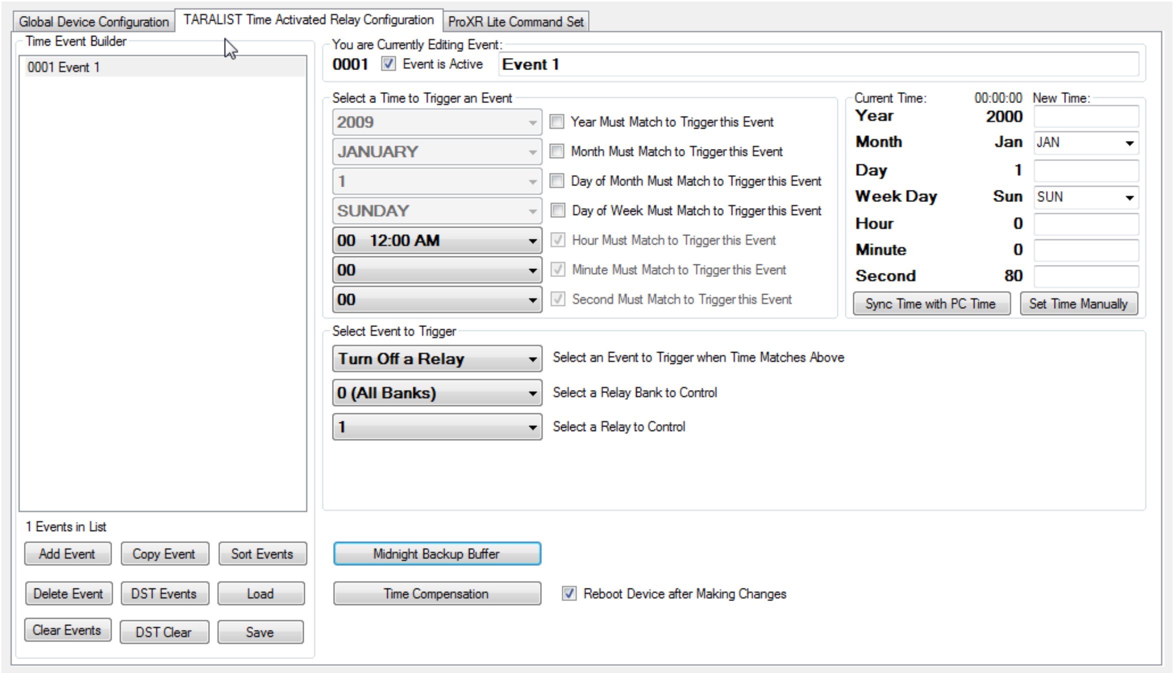
Some users may find the Taralist controller particularly suitable for a specific application. Once you have created a Configuration file that matches your needs, you may email your Taralist configuration file to us and we can build and ship any number of Taralist controllers with your configuration built in! This will save you time and allow you to order a controller that is customized for your exact application at no additional cost.

Program Mode allows you to permanently write to on-board non-volatile storage. Use this mode to load, test, and modify Taralist configuration data.

Run Mode write-protects memory, making it impossible to store new configuration settings.

Jumper settings are read by the Taralist firmware only during an operation that requests a write to on-board memory.

TaraList Event Configuration



Time Event Builder: 0001 Event 1

1 Events in List

You are Currently Editing Event: 0001 ☑ Event is Active Event 1

Select a Time to Trigger an Event

2009	□ Year Must Match to Trigger this Event
JANUARY	□ Month Must Match to Trigger this Event
1	□ Day of Month Must Match to Trigger this Event
SUNDAY	□ Day of Week Must Match to Trigger this Event
00 12:00 AM	☑ Hour Must Match to Trigger this Event
00	☑ Minute Must Match to Trigger this Event
00	☑ Second Must Match to Trigger this Event

Current Time:	00:00:00	New Time:
Year	2000	
Month	Jan	JAN
Day	1	
Week Day	Sun	SUN
Hour	0	
Minute	0	
Second	80	

Select Event to Trigger

Turn Off a Relay	Select an Event to Trigger when Time Matches Above
0 (All Banks)	Select a Relay Bank to Control
1	Select a Relay to Control

☑ Reboot Device after Making Changes

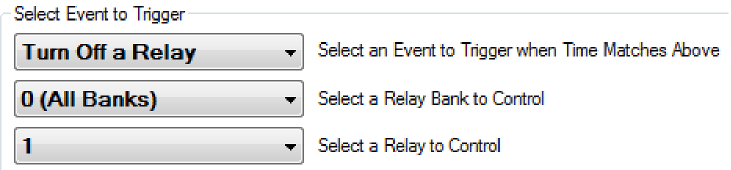
Now that communications are established between your computer and the Taralist controller we are ready to move on to configuring the device. To start there are a few things to understand when it comes to Taralist Logic. We will start with Events.

Understanding Events

Events are scheduled times when a relay or group of relays are turned on or off. They are defined by the user first by time: Year, Month, Day of Month, Day of week, Hour, Minute, and Second. By having these options you have the ability of switching relays on or off at very specific times. They are also defined by how they control the relays, whether they turn a relay or group of relays on or off. You can add up to 999 Events to the list.

First we will talk about defining the time of an Event. When determining time, the hour, minute, and second are required information. These parameters must be entered. If only these parameters are filled then the event will occur every single day at this time. However you can fill in the Day of Week box so the event only occurs on a certain day of the week such as Monday. You must check the box next to Day of Week Must Match to Trigger Event for this parameter to take effect. By filling in the rest of the parameters you can have an event only occur on December 25 2012 at 1:53.45 PM on that exact second.

Secondly we will talk about what the Event does, it controls relays. You can select exactly which relays in which banks (group of 8 relays) you want to come on or turn off when the event is triggered.



Select Event to Trigger

Turn Off a Relay	Select an Event to Trigger when Time Matches Above
0 (All Banks)	Select a Relay Bank to Control
1	Select a Relay to Control

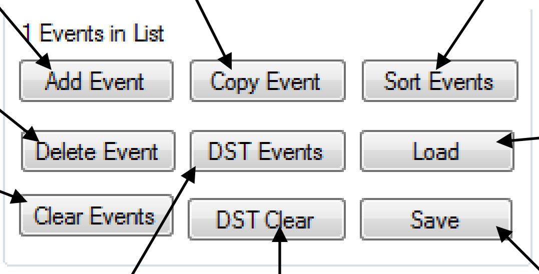
ADDING/REMOVING EVENTS

Copy Event will make a copy of the currently highlighted Event in the list, this is useful if you are creating several similar events that only need one or two parameters changed.

1. Add Event will add a new event to the list which you can then de-

5. Sort Events will put events in order by time and Date. This will be covered more on a later page in the manual.

Delete Event will Remove the event from the list.



4. Load will allow you to load a previously saved Configuration from a

Clear Events will remove all events from the list.

2. DST Events will add Day Light Savings Time Events where the controller will reset its clock to compensate for Daylight Savings.

DST Clear will remove all Daylight Saving time events.

3. Save will save your current list of events to a file on your computer.

1. Add Event
- The first thing you will do is add an event. Once an Event is added to the list it may then be edited with time and relay control information.

2. DST Events
- Users have the option to automatically add all daylight savings time events to the event list. When this button is pushed Daylight Savings time events are added to cover the next 30 years. This will compensate the Taralist's Clock each time Daylight Savings Time Comes Around. However this may be removed by simply clicking the DST Clear Button.

3. Save
- Once you have spent the time to build a list of events we highly recommend you save that list of events as it cannot be loaded from the controller, there simply is not enough room in its memory chip. By clicking this button you will be prompted to save a file on your computer. At any time you can open this file and load it into the controller quickly and simply.

4. Load
- You may load an Event List, saved as a file on your computer, into your controller easily by clicking this Load button. If you need to load a previously saved List of Events this is the way to do it.

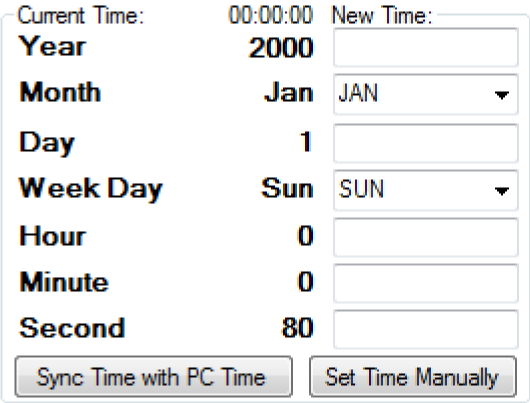
5. Sort Events

- Sort Events will put all of the events entered into the list in order by time and date. This is very important to know. All 999 events are checked every second by the controller to look for a match with the current time. If two events conflict with each other the controller will not be able to process either event properly. So if a relay does not come on when it is suppose to click this sort events button and look for events that conflict with each other. It is important to know that items at the top of the list have lowest priority while items at the bottom of the list have the highest priority. We recommend sorting you list periodically when entering events to the list. The Taralist controller scans through all events in the list from top down to the bottom so events at the end of the list may override events at the top of the list.

Taralist Configuration Continued

Defining Time

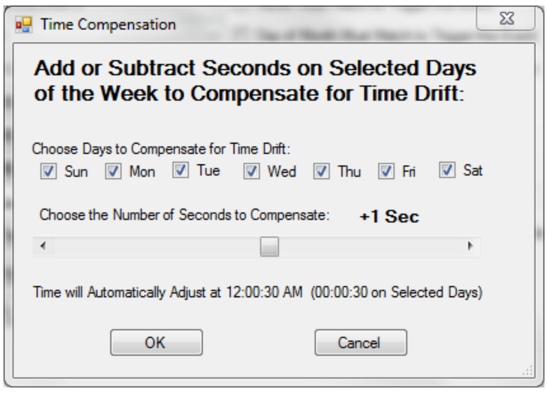
Now that we have determined what an event is and how to define an event we can move on to how the Taralist controller keeps track of time. By default the Taralist controller does not know what time it is so this must be defined. The only way of doing this is from the NCD Configuration Utility. Once your controller is connected to the computer and the Configuration Utility is launched the first thing to do is tell the Taralist Controller what time it is. You may do this manually or you can Sync the time with your PC. This is done using the window below in the Configuration utility. The user can do this by simply clicking the Sync Time with PC Time button or by filling in the Year, Month, Day, Week Day, Hour, Minute, Second parameters and then clicking the Set Time Manually button.



Current Time:	00:00:00	New Time:
Year	2000	
Month	Jan	JAN
Day	1	
Week Day	Sun	SUN
Hour	0	
Minute	0	
Second	80	

Time Compensation

Another feature that must be noted is the Taralist controllers time may drift by as much as a second each day. How much the controller drifts is determined by Temperature, Power Supply and specific application differences. This has been accounted for in the design of the Taralist Controller and NCD Configuration Utility, using the Time Compensation Feature on the NCD Configuration Utility. This button is found on the Taralist Time Activated Relay Configuration Tab in the NCD Configuration Utility. Once this Button is clicked a new window will open.



Time Compensation

Add or Subtract Seconds on Selected Days of the Week to Compensate for Time Drift:

Choose Days to Compensate for Time Drift:

☑ Sun ☑ Mon ☑ Tue ☑ Wed ☑ Thu ☑ Fri ☑ Sat

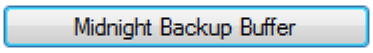
Choose the Number of Seconds to Compensate: +1 Sec

Time will Automatically Adjust at 12:00:30 AM (00:00:30 on Selected Days)

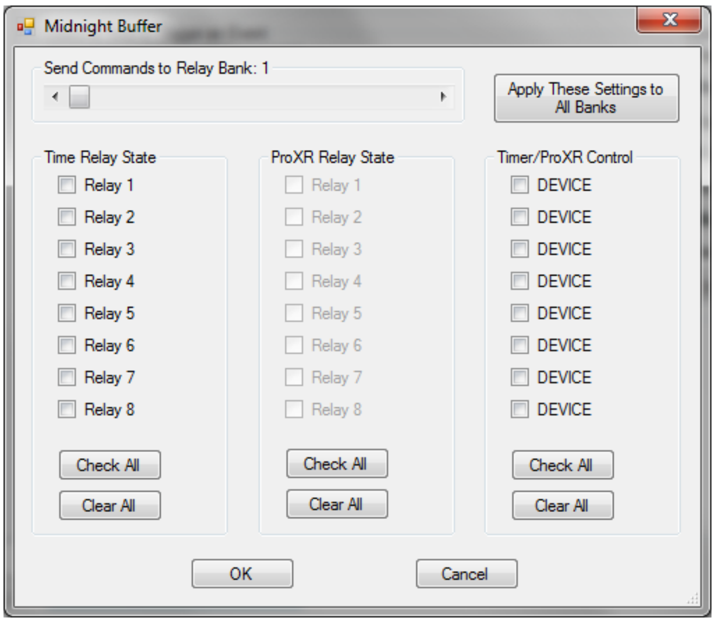
Using this Feature the user can add or subtract a specified amount of seconds in the Taralist Clock each day or only on a certain day to compensate for time drift in the Taralist Controller.

Midnight Backup Buffer

The Midnight Backup Buffer is absolutely essential to the functionality of the Taralist controller. Without it power loss would result in a useless device. Constant power supply is recommended for all Taralist controllers and a UPS style battery backup system is also recommended, but no matter how many precautions are taken at some point a Taralist controller will loose power. For example if a relay is turned on by an event on Monday and is told to turn back off on Friday but power is lost on Wednesday, with out the Midnight Backup Buffer the relay will not turn back on until the following Monday. So now you can see how essential this feature is.



Every night at Midnight; 0 hours, 0 minutes, 0 seconds, the controller reads what the status of all relays are at that exact second and stores that information into the Midnight Backup Buffer. If a controller looses power momentarily and is powered back up it will scan through all events from Midnight to the exact moment it is powered up. and it will also take into account the status of all relays at Midnight to determine what the status of all relays should be at that current time.



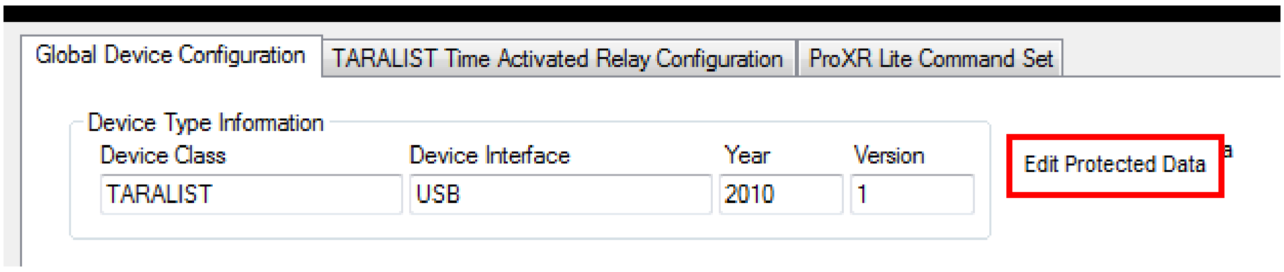
Midnight Buffer

Send Commands to Relay Bank: 1

Time Relay State	ProXR Relay State	Timer/ProXR Control
□ Relay 1	□ Relay 1	□ DEVICE
□ Relay 2	□ Relay 2	□ DEVICE
□ Relay 3	□ Relay 3	□ DEVICE
□ Relay 4	□ Relay 4	□ DEVICE
□ Relay 5	□ Relay 5	□ DEVICE
□ Relay 6	□ Relay 6	□ DEVICE
□ Relay 7	□ Relay 7	□ DEVICE
□ Relay 8	□ Relay 8	□ DEVICE
Check All	Check All	Check All
Clear All	Clear All	Clear All

You can read the status of the Midnight Backup Buffer at any time by clicking the Midnight Backup Buffer button on the NCD Configuration Utility. You may also modify the status of the Midnight Backup Buffer Stored inside the Taralist controller. This is helpful if you are working with a brand new controller and it has nothing stored in the Midnight Backup Buffer. If the relay was suppose to be turned on Monday and turned off Friday but you got your controller on Wednesday you can modify the Midnight Backup Buffer to think the Relay was on at Midnight and if no events during the day tell it to turn off until Friday the relay will come on until Friday. Otherwise the Relay would not come on until Monday next week.

PROTECTED DATA



Global Device Configuration | TARALIST Time Activated Relay Configuration | ProXR Lite Command Set

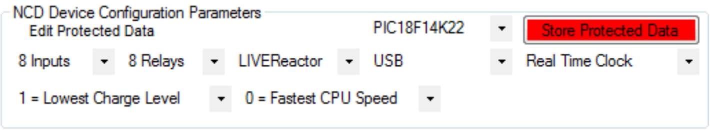
Device Type Information

Device Class	Device Interface	Year	Version
TARALIST	USB	2010	1

Editing Protected Data

Protected Data is best described as a form of BIOS for a Taralist controller. Under most circumstances, it is not necessary to Edit Protected Data, but there are circumstances that may require this operation. Protected Data holds important parameters regarding the Taralist Relay controller you are using. In some cases, you may want to change your hardware, so Editing Protected Data may be essential. :

A Taralist Controller that is allowed to interface to a computer while in Runtime Mode.



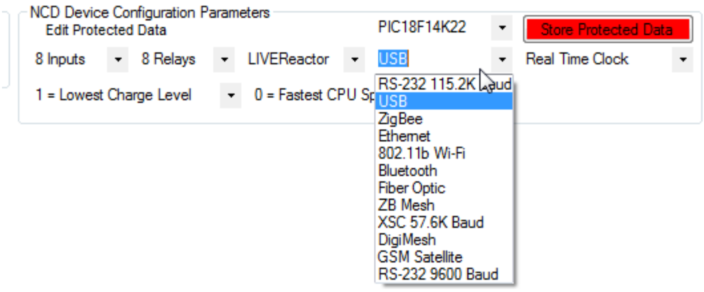
NCD Device Configuration Parameters

Edit Protected Data

PIC18F14K22

8 Inputs | 8 Relays | LIVEReactor | USB | Real Time Clock

1 = Lowest Charge Level | 0 = Fastest CPU Speed



NCD Device Configuration Parameters

Edit Protected Data

PIC18F14K22

8 Inputs | 8 Relays | LIVEReactor | USB | Real Time Clock

1 = Lowest Charge Level | 0 = Fastest CPU Sp

The Edit Protected Data feature is a universal resource for several different types of controllers National Control Devices offers. For this reason there are options under Edit Protected Data that do not apply to Taralist controllers.

DEVICE INTERFACE

One option that could be changed under Edit Protected Data should be the computer to device interface drop down menu shown above. You will be able to choose from USB, 802.15.4, ZB Mesh, etc.

CHARGE LEVEL

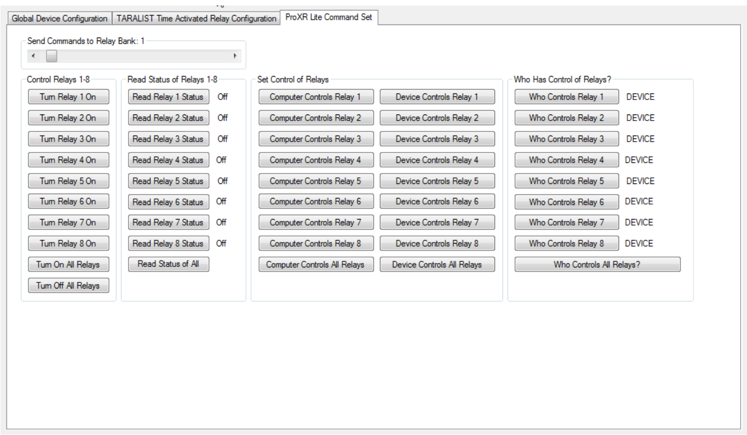
Another option that may be changed with your Taralist controller is the Charge Level. This will control how fast the Taralist charges its on board battery backup. We recommend leaving the charge level as low as possible, 1 preferably, in order to extend the life of the battery.

Other options such as number of inputs, number of relays, CPU Speed, Type of Device, and IC number do not apply to your Taralist controller.

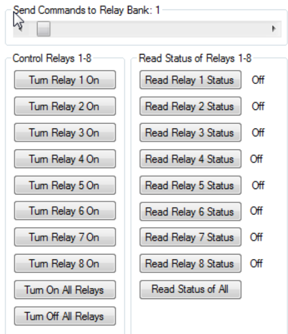
Take Computer Control of the Taralist

Computer Override

The Taralist series controllers have some amazing abilities when it comes to making decisions on their own based on the events you configure into them, but you can take control of the relays at any time from a computer as long as communications are established between your computer and the Taralist device.

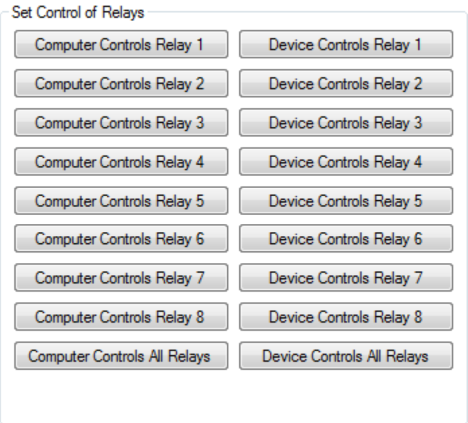


The Taralist Series Relay controllers support a "Lite" ProXR command set. If you are familiar with our ProXR series relay controllers, then the command set should be easy to understand. We will provide a summary of all Taralist commands in this manual, but for now, let's explore some of the computer control features.



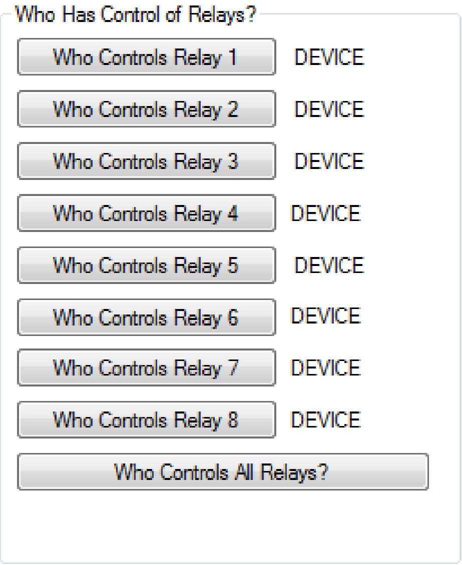
The interface elements shown at left allow a computer to take over control of any relay and force the relays to a On or Off state. You may also turn all relays on or off using the all relays on and all relays off buttons.
You can also read the status of relays by clicking the Read Relay 1-8 Status. The Status of the relay will be shown to the right of the button. The slider at the top of the screen allows you to select with bank of relays these commands are directed to. You may attach up to 32 banks or 256 Relays.

Set Control of Relays


Set Control of Relays
Computer Controls Relay 1
Device Controls Relay 1
Computer Controls Relay 2
Device Controls Relay 2
Computer Controls Relay 3
Device Controls Relay 3
Computer Controls Relay 4
Device Controls Relay 4
Computer Controls Relay 5
Device Controls Relay 5
Computer Controls Relay 6
Device Controls Relay 6
Computer Controls Relay 7
Device Controls Relay 7
Computer Controls Relay 8
Device Controls Relay 8
Computer Controls All Relays
Device Controls All Relays

When you change the state of a relay manually from this screen you have taken control of that particular relay and the Taralist controller will not be able to control it. Using the window shown left you can set the relay to be controlled by the Computer or the Taralist Device. It is important to always return control of the relay back to the Taralist device after you are done manually controlling it.

Who Has Control of the Relays?


Who Has Control of Relays?
Who Controls Relay 1 DEVICE
Who Controls Relay 2 DEVICE
Who Controls Relay 3 DEVICE
Who Controls Relay 4 DEVICE
Who Controls Relay 5 DEVICE
Who Controls Relay 6 DEVICE
Who Controls Relay 7 DEVICE
Who Controls Relay 8 DEVICE
Who Controls All Relays?

It is important to know if the Taralist device or your computer has control of the relays. Using the window shown left you can read who has control of each individual relay. Simply click the Who Controls Relay 1 button and the information will be updated to the right of the button telling you who has control of Relay 1. You may also read who has control of all 8 relays in a bank by clicking the Who Controls All Relays Button.

Custom Software Control

Custom software may be written to take computer control of the relays by using the ProXR Lite Command Set on page 18. Custom Software by be written on any software platform capable of sending RS 232 bytes of data through a Com Port or through direct TCP/IP communications for Ethernet Devices.

Relay Logic

Sample 1

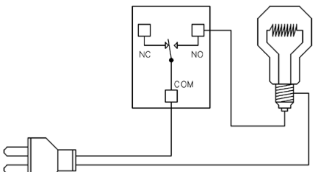
This sample demonstrates how a relay can be used to activate a light bulb. When the relay turns on, the light comes on. Only one power wire is switched with this sample using the COM (common) and NO (normally open) connections of a relay.

Sample 2

This sample demonstrates how a relay can be used to turn a light bulb OFF. When the relay turns off, the light will be ON. Only one power wire is switched in this sample using the COM (common) and NC (normally closed) connections of a relay.

Sample 3

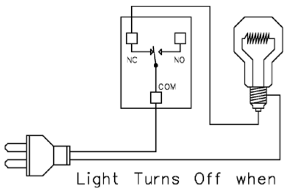
This sample demonstrates how two activated relays are required to activate a light bulb. This is the same as a Logic AND function because Relay 1 AND Relay 2 MUST be on to activate the light.



Light Turns On when Relay Turns On

Sample 4

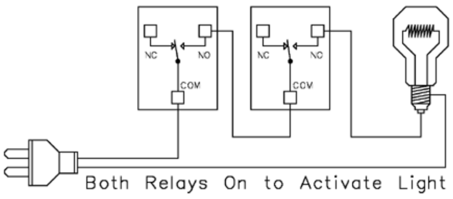
This sample demonstrates how three activated lights are required to activate a light bulb. This is the same as a Logic AND function because Relay 1 AND Relay 2 AND Relay 3 MUST be on to activate the light.



Light Turns Off when Relay Turns On

Sample 5

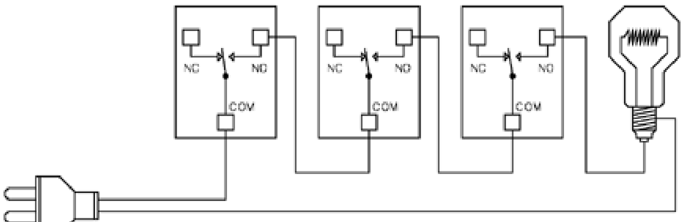
This sample demonstrates the AND/OR function. The Light Bulb will be activated if Relay 1 AND Relay 2 are ON OR if Relay 3 is ON. This sample is perfect for applications that may require a Logical condition of 2 relays PLUS an Override feature. For instance: Relay 1 is a Night/Day Sensor, Relay 2 is a Moisture Sensor. If its Dark AND the soil is Dry, Relays 1 and 2 can activate a Pump. If you want to override these conditions with a Key Fob, Relay 3 may be used.



Both Relays On to Activate Light

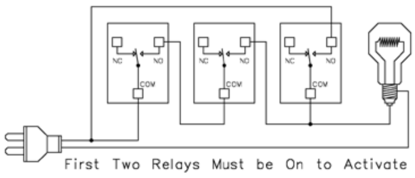
Sample 6

This sample demonstrates how either relay can be used to activate a light. In this sample, only one activated relay is required to activate the light. If both relays are activated, the light will be on.



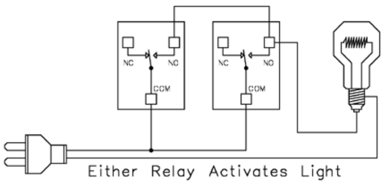
Three Relays On to Activate Light

Sample 7

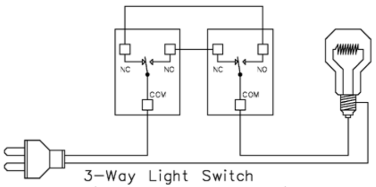


First Two Relays Must be On to Activate Light
Third Relay Overrides First Two Relays and Activates Light

This sample demonstrates how a 3-way light switch can be used to activate a light. A 3-way light switch is often found in your house where two light switches can be used to activate a single light. This sample is exactly the same as a 3-way light switch, the only difference being each physical switch is replaced by a relay. Operationally, it works the same way. Each relay activation will cause the light to toggle. Switching two relays at one time is like flipping 2 switches at once....with the same result. This sample is particularly useful since you can replace one relay (as shown in the diagram) with a physical light switch. This will allow a computer/Taralist to control a light as well as manual operation of a light. Properly used, this can be one of the most valuable diagrams we offer on this page.



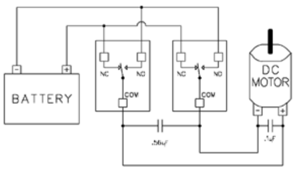
Either Relay Activates Light



3-Way Light Switch
Either Relay Toggles Light

Sample 8

This sample demonstrates how to control the direction of a DC motor using 2 relays. Braking is accomplished by connecting both motor terminals to a common power connection (Faraday's Law). The capacitors shown may not be required for small motors, but if you experience problems with relays shutting themselves off, the induction suppression capacitor will be required. The .1uF capacitor helps suppress electronic noise if the battery were to be used by sensitive devices (such as radios/amplifiers).



Relay 1 Off Relay 2 Off = Motor Brake to +
Relay 1 On Relay 2 Off = Motor Forward
Relay 1 Off Relay 2 On = Motor Backward
Relay 1 On Relay 2 On = Motor Brake to −
.56µF Induction Capacitor Should be Located Near Relays
.1µF Filter Capacitor Should be Located Near Motor
Additional Capacitors May be Desireable for Some Motors

Troubleshooting

Problem:Relay does not come on at appropriate time.
Solution: Check that there are no conflicting events in the configuration. Click the sort Events button as documented on page 14. It is important to know that events at the top of the list have lowest priority. The reason for this is the Taralist controller scans through all events in the list from top to bottom before it refreshes the relays, so events at the bottom of the list can override events at the top of the list.
An Inductive device can also cause communication malfunctions in the CPU, review our Documentation on Inductive Devices to correct this problem.

Problem: Clock Speed running slow or fast.
Solution: The Taralist controller may be effected by temperature. In excessively cold environments the clock may run slow, in excessively hot conditions the clock may run fast. This can be corrected using the Time Compensation feature documented on page 15. The Taralist controllers clock may naturally drift even at room temperature by as much as 1 second per day. This can also be corrected using the Time Compensation feature documented on page 15.

Problem: Controller is Running HOT
Solution: It is normal for some components run very hot on the Taralist series relay controllers. This is not a concern as we have tested the design carefully and are operating our components well within the specified limits of the components we are using. It is NOT normal for the CPU to run hot at any time. The CPU should remain cool. If the CPU is running hot and/or both Busy/Ready LEDS are on at the same time, the CPU has been damaged.

Problem: Unable to Communicate with Controller
Solution: Use the ZUSB Communications Module to validate communications, do NOT use any other communications module if this error occurs. The ZUSB is the safest communication method of all communication technologies, and must be used if you experience configuration problems. Make sure you are using the correct COM port. Our software has been tested under Windows XP, Vista, and Windows 7. Windows XP Users MUST use .NET Framework 3.5 or Later with all the latest service packs installed. If the problem persists, makes sure the serial port is NOT in use by another application. Lastly, we can only recommend trying a different computer if problems persist.

Known Bugs:
At this time, the Taralist Series Relay Controllers are not known to have any bugs in the firmware. This Firmware has been tested extensively tested by National Control Devices Engineers. If you experience a bug, please email us with your Taralist Configuration File so we can examine the problem in more detail. Any known bugs will be posted in this section of the manual.