

ZigBee Mirror Module Generation 2

contact closure input transceiver module for use with Series 1 ZigBee Relay Controllers



ZSCAN16 MIRROR 16-Channel Contact Closure Input ZigBee Mirror Module



ZSCAN32 MIRROR 32-Channel Contact Closure Input ZigBee Mirror Module



ZSCAN48 MIRROR 48-Channel Contact Closure Input ZigBee Mirror Module

ZigBee Mirror Modules allow you to remotely control wireless relays without the use of a computer and without the need for any programming skills. 2-Way communication allows you to review the status of multiple remote relays. Targeting allows a single ZigBee Mirror Module to talk to 24 Different Remote Relay Controllers. The next page will provide you with a complete and detailed introduction to our ZigBee Mirror Modules.

National Control Devices, LLC

PO Box 455
Osceola, MO 64776
Phone: (417) 646-5644 FAX: (866) 562-0406

www.IORelay.com

Introduction

Our 2nd generation Wireless ZigBee Mirror Modules were built upon customer feedback of our original Mirror Module devices. ZigBee Mirror Modules offer all the features our customer have requested, including support for 2-way communication with feedback display and full support for targeting multiple wireless relay controllers.

ZigBee Mirror Modules transmit wireless contact closures to remote relay controllers. This allows you to activate wireless relays in a remote location by simply connecting a switch to the ZigBee Mirror Module. For example, let's say you have a light in another building that you want to control from your house. You don't want a computer to activate the lights, you just want to control the light remotely from a switch. Rather than running wires, you can simply wire a switch to a ZigBee Mirror Module. Every time you turn the switch on or off, the Mirror Module will send a signal to the remote ZigBee relay controller to turn the light on or off.

ZigBee is simply a form of wireless communications. We support ONLY Digi Series 1 communications, meaning the current line of ZigBee Mirror Modules will ONLY communicate to NCD devices that utilize the ZigBee Series 1 communications module. A complete list of compatible controllers is available by [clicking here](#). At this time, we do not plan to support Series 2 Mesh Networking communications.

You may also see references throughout this manual to contact closure inputs. For instance, a ZSCAN16_MIRROR controller has 16 contact closure inputs. This means you can connect 16 switches directly to the ZSCAN16_MIRROR. These switches can control up to 16 remote relays.

There are 3 versions of the ZigBee Wireless Mirror Module. All three versions are based on the ZSCAN series circuit board, but the firmware has been completely redesigned for the purposes of stand-alone operation for direct communications to any ZigBee Series 1 relay controller. Mirror Module firmware is indicated by the use of _MIRROR in the device part number.

The ZSCAN16_MIRROR is based on the ZSCAN16 Circuit board running MIRROR firmware, offering 16 contact closure inputs.

The ZSCAN32_MIRROR is based on the ZSCAN32 Circuit board running MIRROR firmware, offering 32 contact closure inputs.

The ZSCAN48_MIRROR is based on the ZSCAN48 Circuit board running MIRROR firmware, offering 48 contact closure inputs.

ZigBee Mirror Modules like to have direct control over a remote relay controller. Behavior may be unpredictable if you attempt to control a remote relay controller with a computer and a ZigBee Mirror Module at the same time. For best results, you should choose whether you need computer controlled relays or Mirror Module controlled relays.

Targeting

ZigBee Mirror Modules support targeting. Targeting allows a single ZigBee Mirror Module to talk to 24 remote ZigBee Relay Controllers. You can target many different types of devices, such as 1-channel relay controllers, 2-channel relay controllers, or our complete line of 2/4/8/16/24/32 ProXR Series relay controllers. You can mix controller types in any combination. For instance, a ZSCAN16_MIRROR with 16 contact closure inputs can be used to target two 8-Channel ProXR series ZigBee relay controllers. Or it can be configured to control one 8-Channel ZigBee relay controller, four 2-channel ZigBee relay controllers, and four 1-channel relay controllers, all in separate locations.

Expandability

ZigBee Mirror Modules are expandable to 256 contact closure inputs. They are compatible with any of our [Contact Closure Input Expansion Devices](#). As your application grows, your ZigBee Mirror Module is ready to grow with your needs.

Feedback

In some applications, you may want to know if the remote relay controller received your signals. ZigBee Mirror Modules support FULL 2-way communications. Data regarding the status of the remote relay is sent to the XR expansion port on the ZigBee Mirror module. If you only want to display the status of the remote relay, [you can use the following device](#). However, you can also turn on a local relay that can be used for other applications by plugging in any [XR Expansion Relay controller](#).

Configuration and Requirements

ZigBee Mirror Modules must be configured to control remote relays. The ZigBee Mirror Module must know the serial numbers of all of your remote relay controllers. These serial numbers are permanently stored in the ZigBee Mirror Module device, but may be changed at any time as your configuration changes. Configuration is accomplished by using our [ZigBee Mirror software](#). This software is used to tell the Mirror Module the type of remote relay controllers you plan to communicate with, its serial number, and a few other configuration settings. A ZigBee Mirror Module is configured wirelessly. As such, a [ZigBee Modem](#) is required to configure the ZigBee Mirror Module.

At this time, an enclosure is not available specifically for our ZigBee Mirror Modules; however, many universal electronics enclosures are available directly from www.digikey.com and www.mouser.com.

Getting Started...QUICKLY!

The best way to get started using ZigBee Mirror Modules is to dive in and go through the entire process of setting up your controller for the first time...step by step. Before we get started, here is a shopping list of devices you need:

Required Hardware:

Any ZigBee Mirror Module ([click on this link to see all available](#))
Any ZigBee Modem ([click on this link to see all available](#))
Any ZigBee Relay Controller ([click on this link to see all available](#))
PWR12 Power Supplies ([One Needed for Each Device, click here](#))

Optional Hardware: (Display Status of Remote Relays) [XR16OCLP \(Lowest Cost Display Option\)](#)

Required Computer:

Any Windows XP/XP Pro running [Service Pack 3](#) with [.NET Framework 3.5 \(or later\) Installed](#). Windows Vista should also work well, though it has not been tested.

Required Software:

ZigBee Mirror software ([click on this link to download](#))
USB Driver Software ([click here to get the latest version](#))
USB Driver Software ([Alternate Link if Above Link is Not Working](#))

Step 1:

Do NOT Plug the USB Modem into your Computer Until Instructed to do so. The first thing we need to do is get your ZigBee modem working. The ZigBee modem will be used to configure the ZigBee Mirror Module. [Start by downloading and installing the USB Driver Software](#). This USB driver software allows your modem to be used as a COM port on your computer.

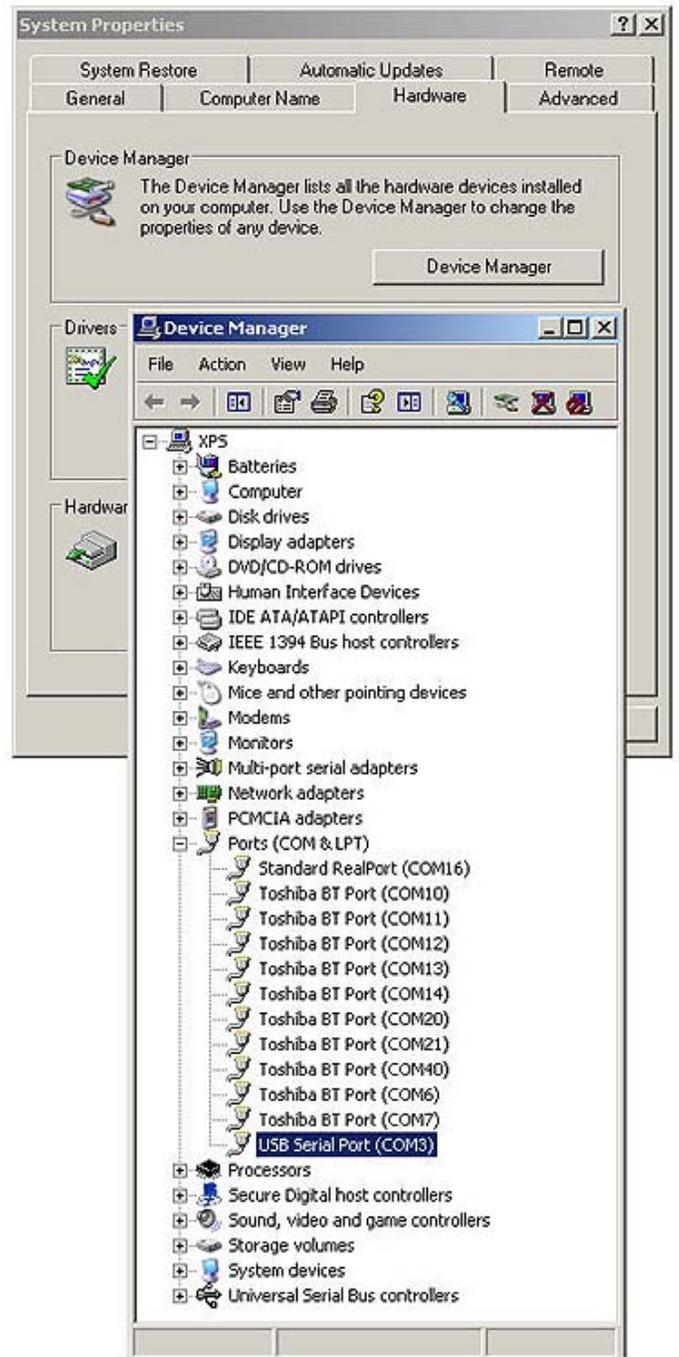
Step 2:

Now the driver software is installed, we need to open the device manager to see what COM port is assigned to the modem. If you are using Windows XP/Pro, Click on the "Start Menu" and select "Control Panels". Next, double-click on the "System" icon. Click on the "Hardware" tab. Click on the button that says "Device Manager". Next, click on the "+" next to "Ports (COM & LPT)". Here you will see a list similar to what is shown on the right. Review this list carefully.

Step 3:

Plug in the USB Modem. After a few moments, a new item will appear in the list that says USB Serial Port. In our example, COM3 was assigned. The list changes to "USB Serial Port (COM3)". Take note of what appears on your computer.

On your computer, it may be different. We need to know for sure what COM port is assigned to the modem. Please note that if you unplug the modem and plug it into a different USB port on your computer, a different COM port will likely be assigned. If you experience any problems during configuration, it will be necessary to review these settings to make sure you are using the correct COM port.



The Device Manager is useful for displaying many details about your system. For the purposes of setting up the Mirror Module, we need to know EXACTLY which COM port is assigned to the modem. You will need to install the drivers prior to plugging the modem into your computer. Once installed, the Device Manager should be able to detect the modem and assign it a COM port. Please make sure you install the drivers BEFORE you plug the modem into your computer.

Getting Started...QUICKLY!

By this point, you should know the COM port that was assigned to your modem. Your ZigBee Modem should be plugged in and the USB LED lit. Please do not proceed until you have determined the correct COM port.

Step 4:

The next thing we need to do is locate the PGM/RUN jumper and set this jumper to "PGM". This jumper sets the controller to PROGRAM mode. Use PROGRAM mode anytime you want to change the controllers settings. RUN mode is for normal daily use. RUN mode protects the memory from accidental changes. It is not possible to make changes to the settings of this controller if the jumper is set to RUN mode.

THIS DEVICE ONLY READS JUMPER SETTINGS WHEN POWER IS FIRST APPLIED TO THE CONTROLLER. JUMPER CHANGES HAVE NO EFFECT AFTER POWER UP. BE SURE TO POWER-CYCLE THE CONTROLLER EVERY TIME YOU CHANGE THE JUMPER SETTING.

Step 5:

The ZigBee Mirror Module requires a regulated 12V DC Power Supply. The ZigBee Mirror Module is equipped with a 2.1mm Center Positive Barrel Connector, used to supply power to the device. If you do not have a compatible power supply available, a [PWR12 power supply is available from our web site](#). It is safe to use the ZigBee Mirror Module in automotive power systems. Connect the power supply at this time.

Step 6:

Every ZigBee relay controller has a serial number printed on the back of each ZigBee module. Carefully remove each ZigBee Module, Record the type of Controller and the Last 8 Digits of the Serial Number. DO NOT MIX UP THE ZIGBEE MODULES. Reinstall the ZigBee module on the controller it came from, making sure all pins are properly inserted into the socket. Your log may look something like this:

Part:	Serial Number:	
ZR25	40018E66	(shown at right)
ZR25	40328E7F	
ZR15	40321BFF	
ZR85ProXR	40329F3E	
ZR45ProXR	40328EF1	

Every ZigBee Module will have a unique serial number. No two controllers are ever alike. Please do NOT proceed until you have logged the serial numbers of ALL controllers you plan to associate with the ZigBee Mirror Module. **You do NOT need to log the Serial Number of the ZigBee Mirror Module. DO NOT POWER THE RELAY CONTROLLERS AT THIS TIME.**

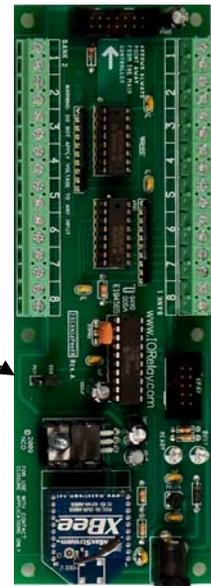
Step 7:

[Install and Run the ZigBee Mirror software.](#)

Step 8:

Choose the correct COM port for your system and Click the "OK" button. (see previous page for complete instructions to determine the correct COM port for your system).

Step 4: Set the PGM/RUN Jumper to PGM. Use this setting ONLY when setting up your ZigBee Mirror Module.

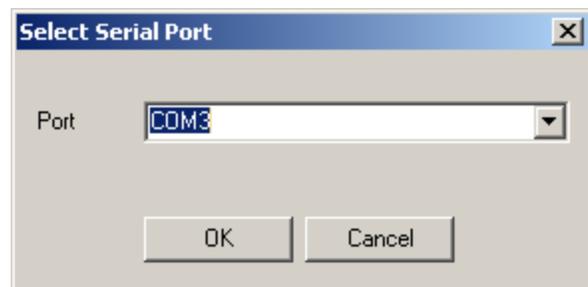


Step 5: Connect PWR12 Power Supply at this location.

ZigBee Module Shown Removed from the Relay Controller



Step 6: Remove the ZigBee Module from each relay controller. The complete serial number is shown at left with a red Box around it. You only need the LAST 8 DIGITS of the serial number. In the case of the module shown, you will need 40018E66. Logging your serial numbers will be critical to proper configuration.



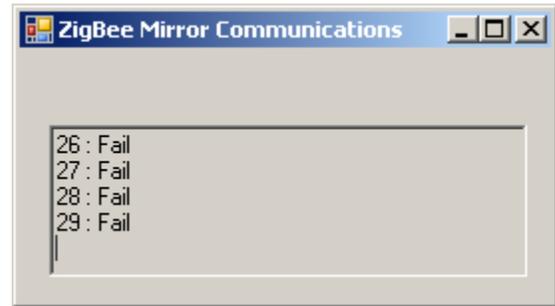
Step 8: Choose the COM Port for your system. Every system may be different, so please follow the directions on the previous page.

Getting Started...QUICKLY!

It is now time to configure the Mirror Module for use in your application. The process is pretty easy. You will need to configure the Mirror Module so that it knows how many controllers you want to talk to, the model of the relay controller, and a few other simple parameters. Follow these simple steps...

Step 9:

After a few moments, the following screen (shown below) will appear. The settings shown represent part of our initial testing. Every user will have to create custom settings based on the devices they are using. In this section we will identify all of the elements of the configuration screen and provide you with a brief overview of their function. Many of the default settings do not need to be changed. The number of devices you are controlling and the serial numbers will be different for every user.



Step 9: You may see a few failed attempts during initial communications. This is normal. However, you should verify the PGM/RUN Jumper is set to PGM on the ZigBee Mirror Module. Once the jumper is set, make sure power is applied and the READY light is lit. Make sure the controller is powered down when changing the jumper, the Microprocessor on the ZigBee Mirror Module reads the jumper setting on Power-Up ONLY.

Serial numbers are a very important part of using ZigBee Mirror Modules. You may notice we do not require you to enter the entire serial number. The "base" serial number is the first part of the serial number, and is shared by all devices. You should never change the "base" serial number unless you want to broadcast Mirror data to ALL devices. For most applications, leave this setting as it is.

The Debounce Setting controls the Reaction Time between an input change and a "Trigger" to activate a remote relay. Lower settings make the ZigBee Mirror Module more Sensitive while larger settings offer better noise immunity. Most users will want to use a value of 0.

Configure the Refresh Setting to 1 for most applications. Other settings will be discussed later in the manual.

You can suspend communications to any remote device by making it inactive. By default, all should be active ("Yes" in every row).

Enter the Lat 8 Digits of the Serial Number of EACH remote Relay Controller in this field. To use this field, click on the serial number. A Box will appear that allows you to make changes. Make necessary changes for your relay controllers. Move your mouse to exit and save your edited changes. If the box turns RED after editing, there is an error in the data you have entered. Please verify the serial number and try again. Only 8 digits are allowed, each Digit is character from 0-9 and A-F.

This setting tells the ZigBee Mirror Module how many devices you want to communicate with. Most users will probably only use the ZigBee Mirror Module with ONE remote device. However, as your application grows, ZigBee Mirror Modules are capable of talking to 24 different remote relay controllers. Make sure this setting matches the number of remote relay controllers EXACTLY.

2-Way Communication vs. 2-Way XR Port Confirmation is a very important topic that will be discussed in depth in Step 10 on the next page.

Advanced Features will be discussed in a later portion of the manual. These features are not required for most applications.

These Settings Cannot be Changed.

Input Assignment will be discussed in Step 11 on the next page.

Use this button if you would like for us to manufacture many ZigBee Mirror Modules with the exact same settings.

Read the Current Settings stored in the ZigBee Mirror Module.

Store the Current Settings in the ZigBee Mirror Module.

Device:	Active:	Serial:	Controller Type:	Function:	Input Assignment:
1	Yes	4032981F	ProXR 8-Ch. Relay Device	Mirror Relay On/Off	Bank: 1 Input: 1-8
2	Yes	40329805	ProXR 8-Ch. Relay Device	Mirror Relay On/Off	Bank: 2 Input: 1-8
3	Yes	4032983F	ZR1x 1-Ch. Relay Device	Mirror Relay On/Off	Bank: 3 Input: 1
4	Yes	40329811	ZR2x 2-Ch. Relay Device	Mirror Relay On/Off	Bank: 3 Input: 2-3
5	Yes	4032984F	ZR1x 1-Ch. Relay Device	Mirror Relay On/Off	Bank: 3 Input: 4
6	Yes	40329818	ZR2x 2-Ch. Relay Device	Mirror Relay On/Off	Bank: 3 Input: 5-6
7	No	40329842	ZR2x 2-Ch. Relay Device	Mirror Relay On/Off	Bank: 3 Input: 7-8

Buttons: Generate Production Profile for Quantity Purchases, Read Settings from Controller, Store These Settings into Controller.

This help box will provide you with useful hints as you move your mouse to different elements of the user interface.

Getting Started...QUICKLY!

2-Way Communications is an important topic with regard to ZigBee Mirror Modules. This topic will be discussed at length on this page. It is a vital part of understanding how the controller functions.

2-Way Communication

Step 10: Understanding 2-Way Communications

ZigBee Mirror Modules work by sending a relay control command to a remote relay controller. In this mode, the ZigBee Mirror Module then waits for a confirmation byte from the relay controller. If a confirmation byte is not received, the ZigBee Mirror Module will change the READY LED to BUSY. Every time an error in communication occurs, the READY/BUSY LED will flash. **THIS DOES NOT MEAN THE RELAY DID NOT ACTIVATE. THIS SIMPLY MEANS DATA DID NOT PROPERLY COMMUNICATE BOTH DIRECTIONS. IT IS NORMAL FOR THIS LED TO FLASH OCCASIONALLY UNDER NORMAL OPERATION. IN SOME CASES, IT MAY FLASH COSTANTLY AND STILL BE FUNCTIONING PROPERLY.**

2-Way XR Port Confirmation

Understanding 2-Way XR Port Confirmation

When the 2-Way XR Port Confirmation mode is selected, the ZigBee Mirror module sends a command to activate a remote relay, and then waits for a confirmation byte from the remote relay controller. Next, the ZigBee Mirror Module will ask the remote relay controller the status of the remote relay. Status data is then sent directly to the XR Relay Expansion port. By connecting the [XR16OCLP](#) controller (shown at right) to the XR Expansion Port of the ZigBee Mirror Module, the LEDs will indicate the status of the remote relay.

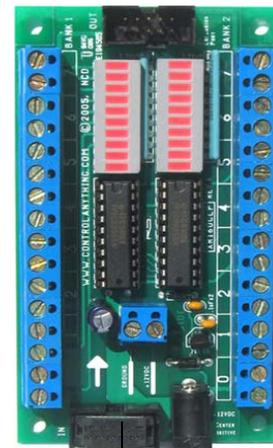
In the event power is lost at a remote relay controller, the XR16OCLP may still indicate the relay is On. Triggering any Contact Closure input will Refresh the display to the current status of the remote device. Some users may want to connect a push button to any available input to manually trigger a "Refresh" condition.

When power returns to the remote relay controller, the relay will automatically update to the current state of the corresponding ZigBee Mirror Module inputs. Some user settings may prevent automatic relay refresh from occurring.

Operational Modes:

- 2-Way Communication
- 2-Way XR Port Confirmation

Plug the [XR16OCLP](#) into the ZigBee Mirror Module XR Expansion Port and Enable 2-Way XR Port Confirmation to see the status of remote relays. LEDs may flash if a communication error is detected. A connection cable is included with [XR16OCLP](#). This device will require a separate power supply such as the [PWR12](#).



XR Cable Included with [XR16OCLP](#).

Flashing LEDs indicate communication errors.



Helpful Hint:

The XR Expansion Port is compatible with ANY XR Relay Expansion controller we offer. The [XR16OCLP](#) is a great way to display the status of remote relays. User may want to activate a local relay using other expansion devices.

Understanding LED Status Lights

A ZigBee Mirror Module is equipped with 2 LEDs that help you identify communication errors. Under the best of conditions, the READY LED will always be ON and you will never see the BUSY LED flash. This indicates perfect communications. In reality, this is rarely the case. ZigBee Mirror Modules expect to hear back from remote devices within a very short time frame. If they do not respond quick enough, the ZigBee Mirror Module will flash the BUSY LED. **THIS DOES NOT MEAN MIRRORING WAS NOT SUCCESSFUL.** It simply means the remote relay controller did not respond within the allotted time frame. The controller will constantly try to Mirror data from the Inputs of ZigBee Mirror Module to the Remote Relay. The Busy LED may flash for long periods of time and still work properly.

Use 2-Way XR Port Confirmation if you need to know the status of remote relays at the location of the ZigBee Mirror Module.

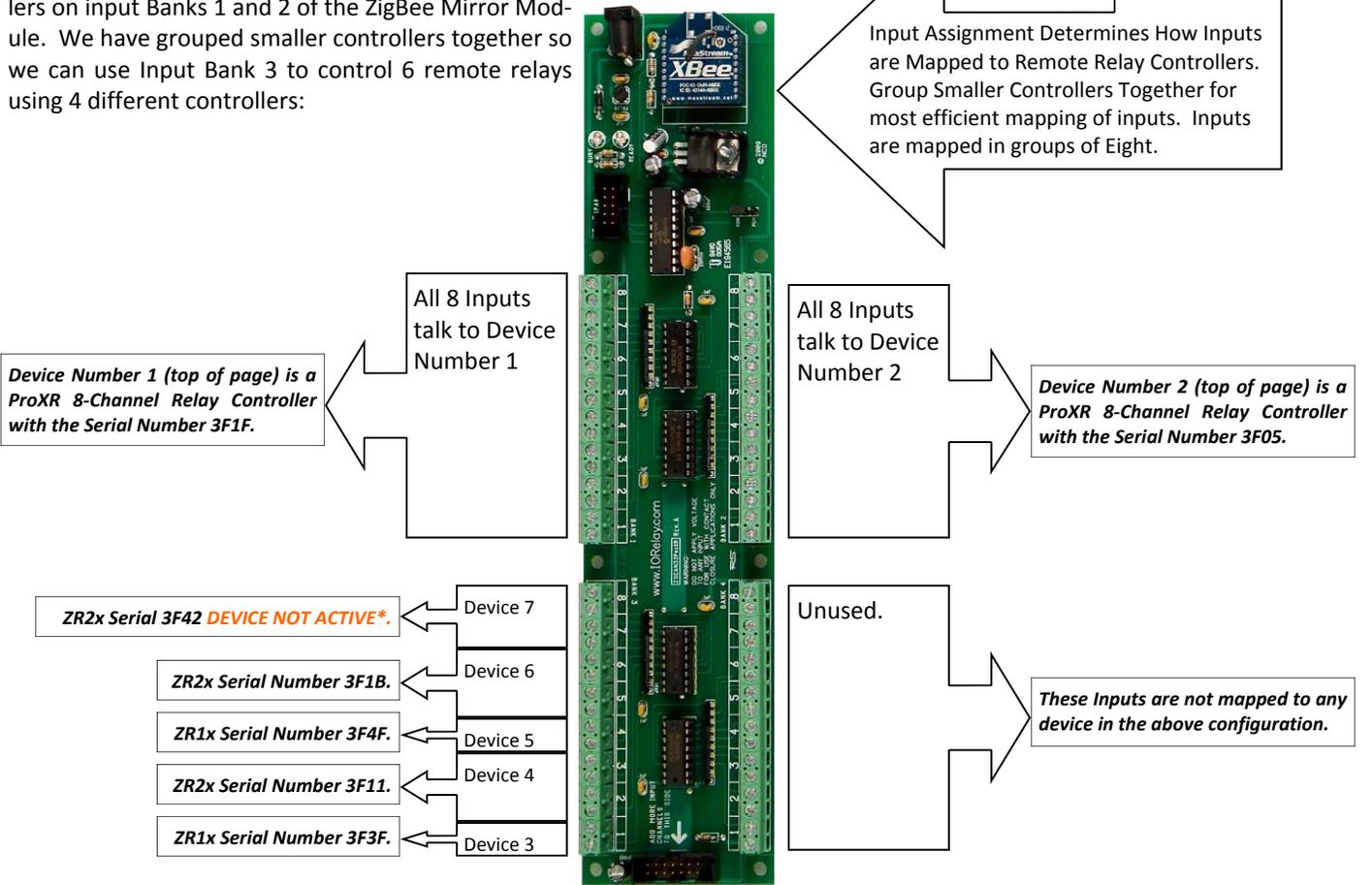
Getting Started...QUICKLY!

Input Assignment is another important topic when using ZigBee Mirror Modules. This Page will explain how inputs are mapped to Remote Relay controllers.

Device:	Active:	Serial:	Controller Type:	Function:	Input Assignment:
1	Yes	40329B1F	< ProXR 8-Ch. Relay Device >	Mirror Relay On/Off	Bank: 1 Input: 1-8
2	Yes	40329B05	< ProXR 8-Ch. Relay Device >	Mirror Relay On/Off	Bank: 2 Input: 1-8
3	Yes	40329B3F	< ZR1x 1-Ch. Relay Device >	Mirror Relay On/Off	Bank: 3 Input: 1
4	Yes	40329B11	< ZR2x 2-Ch. Relay Device >	Mirror Relay On/Off	Bank: 3 Input: 2-3
5	Yes	4032904F	< ZR1x 1-Ch. Relay Device >	Mirror Relay On/Off	Bank: 3 Input: 4
6	Yes	40329B1B	< ZR2x 2-Ch. Relay Device >	Mirror Relay On/Off	Bank: 3 Input: 5-6
7	No	40329B42	< ZR2x 2-Ch. Relay Device >	Mirror Relay On/Off	Bank: 3 Input: 7-8

Step 11: Managing Automatic Input Assignments

The ZigBee Mirror software in combination with your settings will determine how inputs on the ZigBee Mirror Module will be mapped to remote relay controllers. As a general rule, it is better to group smaller controllers together so the Input Assignments will make more efficient use of your inputs. In the example above, we have assigned two 8-channel relay controllers on input Banks 1 and 2 of the ZigBee Mirror Module. We have grouped smaller controllers together so we can use Input Bank 3 to control 6 remote relays using 4 different controllers:



DEVICE NOT ACTIVE:
The Mirror Module Stores Data About Inactive Devices, but Does NOT Attempt to Communicate with Inactive Devices. To Make a Device Active/Inactive, Use the Second Column ("Active" Column) of the Interface shown at the Top of this Page.

Helpful Hint:
Devices are Mapped in Groups of Eight. Group Smaller Controllers Together when Assigning Devices and Serial Numbers to the Configuration Software. This will Make the Most Efficient Use of your Inputs.

Getting Started...**QUICKLY!**

Now that you have had an overview of configuration, it is time to apply your settings to the controller. Follow these steps to complete your configuration and begin testing your ZigBee Mirror Module for the first time.

Step 12: Configure Number of Devices

Use the information shown in the previous pages to configure your ZigBee Mirror Module for the number of Relay Controllers you will be using.

Step 13: Configure Serial Numbers

Use the information shown in the previous pages to configure your ZigBee Mirror Module to store the serial numbers of each remote device.

Step 15: Configure Device types

Use the information shown in the previous pages to configure your ZigBee Mirror Module for the different types of devices you may be using, making sure each device type matches the serial number you have chosen.

Step 16: Store Your Settings

It is now time to store your settings into the ZigBee Mirror Module. Use the button in the lower right corner that says "Store These Settings Into Controller".

Step 17: Power Down the ZigBee Mirror Module

Step 18: Set the PGM/RUN Jumper on the ZigBee Mirror Module to the RUN Position

Step 19: Power Up All Remote Relay Controllers

Step 20: Power Up the ZigBee Mirror Module

Step 21: Test the ZigBee Mirror Module

The best way to test the ZigBee Mirror Module is to connect input pairs together using a wire. You can connect the wire to any ground on the ZigBee Mirror Module. More details regarding electrical connections can be found on the next page.

Troubleshooting:

We have extensively tested our ZigBee Mirror Module devices. These devices have been tested with many types of controllers. We do not know of any bugs in the firmware of this device at this time. Testing of this device was a very important part of the development of this ZigBee Mirror Module. Most tests included a ZigBee 32-Channel Relay Controller, 24-Channel Relay Controller, 4-Channel Relay controller, and Several 1 and 2-Channel Relay controllers. We created a list of serial numbers and device types. We mixed input settings to test mapping and we have extensively tested the API communications layer as well as all relay control protocol layers and relay feedback status layers. The internal architecture of the CPU that powers the ZigBee Mirror Module is highly modular. Should you discover any problems, we highly recommend reviewing your settings and this manual very carefully. Most problems can be corrected by reviewing your settings.

Like all wireless devices, communication distance will be determined by your installation. Unfortunately, it is not possible for us to ever predict the range you will experience in your application. The best distance is always achieved when antennas can see each other. We realize this is not always possible. ZigBee Mirror Modules will try relentlessly to communicate your relay control data to a remote device. You do not need to make any special configuration changes to help improve distance.

ZigBee Mirror Modules have also been tested extensively for false triggers. While we have never seen a relay activate or deactivate on its own, there is always this possibility. Therefore, we NEVER recommend the use of ZigBee Mirror Modules in any applications that may endanger human life. ZigBee Mirror Modules should only be used in applications where the failure of a relay will not harm or threaten any person or property.

If you experience problems, please review the [Induction Suppression](#) portion of our web site. If problems persist, please [contact us](#) for potential solutions.

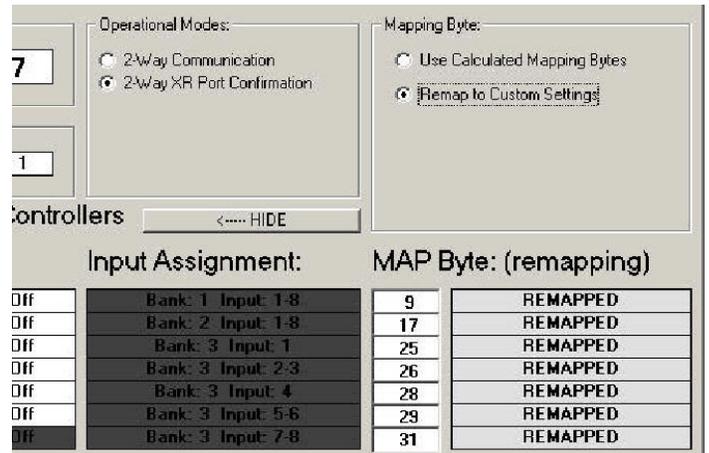
Advanced Features

Advanced Features. There are a few settings that most users will never need, but it is worthy of mention in this section.



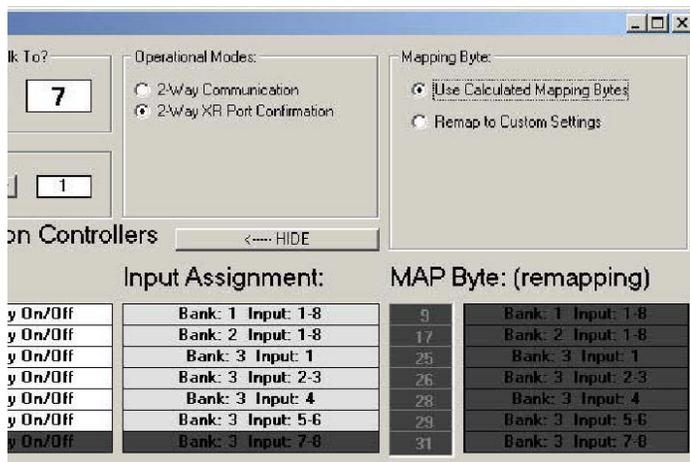
Configure Refresh Setting

ZigBee Mirror Modules should normally be configured to have a Refresh setting of 1 to 5. However, other refresh settings may be desirable for some applications. The Refresh setting determines the speed of communications between the ZigBee Mirror Module and the Remote Relay Controller (or controllers). A Refresh setting of 0 instructs the ZigBee Mirror Module to communicate to the remote relay controller as quickly as possible. You should be very cautious about choosing this value. This data rate generates an enormous amount of radio traffic. If you attempt to use other devices with computers or other ZigBee Mirror Modules, you might find there is few communications gaps available for reliable communication. A value of 255 instructs the ZigBee Mirror Module to ONLY communicate data to remote devices when a change is detected. Again, good refresh values of 1 to 5 are strongly recommended.



Remap to Custom Settings

Choosing the Remap to Custom Settings option allows you to modify the MAP Bytes. The best use for MAP bytes is to copy a value from one location to the other. For instance, if you copy the 9 (shown above) to the position of the 17 (shown above), the controller will remap inputs 1-8 to talk to the first 2 ProXR controllers. Some experimentation is in order if you want to change the way inputs are mapped to controllers. Again, you cannot damage the controller in any way.



Restore to Factory Default Settings

Clicking this button will return the controller to the same settings that it had when you first received the controller. These settings are ideal for helping you understand how to use the controller, as these settings will match the information contained in this manual.

Calculated Mapping Bytes

By Default, the ZigBee Mirror software will calculate the "MAP" Byte, which determines the starting input location for every controller. Most users will want to keep the default mapping byte values. However, you may choose to Remap the inputs manually. You may experiment with this as much as you want, you cannot damage the controller. However, it should be stated that modifying the mapping byte can cause undesirable operation.

Mirror Module Hardware

Power Connector: 2.1mm Center Positive Power Connection for use with Optional [PWR12](#) 12VDC Regulated Power Supply.

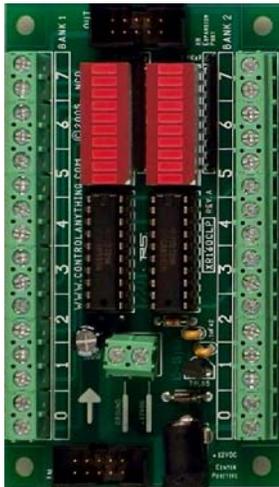
ZigBee Series 1 Module in API Mode set to 115.2K Baud. There are many versions of this module available as product options. We do NOT plan to make a ZB Mesh Version of this device anytime soon.

XR Expansion Port Allows you to See the Status of Remote Relays by Plugging ANY [XR Expansion Controller](#) Into this Port (cable included with Expansion Controller).

PGM/RUN Jumper. Set to PGM when Configuring this Device. Set to RUN when using it in daily service. Jumper settings are read only when the device is first powered up. Changing the jumper with power applied will have no effect.

Flashing LEDs indicate communication errors.

Connect Expansions to See Status of Remote Relays



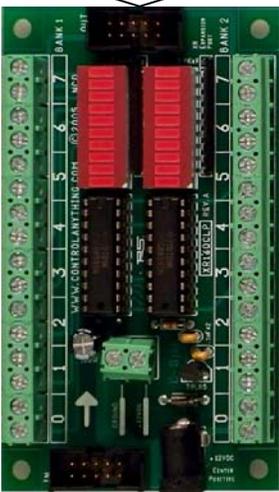
- Bank 1 Input 8 Ground
- Bank 1 Input 8 Contact Closure Input
- Bank 1 Input 7 Ground
- Bank 1 Input 7 Contact Closure Input
- Bank 1 Input 6 Ground
- Bank 1 Input 6 Contact Closure Input
- Bank 1 Input 5 Ground
- Bank 1 Input 5 Contact Closure Input
- Bank 1 Input 4 Ground
- Bank 1 Input 4 Contact Closure Input
- Bank 1 Input 3 Ground
- Bank 1 Input 3 Contact Closure Input
- Bank 1 Input 2 Ground
- Bank 1 Input 2 Contact Closure Input
- Bank 1 Input 1 Ground
- Bank 1 Input 1 Contact Closure Input

- Bank 2 Input 8 Ground
- Bank 2 Input 8 Contact Closure Input
- Bank 2 Input 7 Ground
- Bank 2 Input 7 Contact Closure Input
- Bank 2 Input 6 Ground
- Bank 2 Input 6 Contact Closure Input
- Bank 2 Input 5 Ground
- Bank 2 Input 5 Contact Closure Input
- Bank 2 Input 4 Ground
- Bank 2 Input 4 Contact Closure Input
- Bank 2 Input 3 Ground
- Bank 2 Input 3 Contact Closure Input
- Bank 2 Input 2 Ground
- Bank 2 Input 2 Contact Closure Input
- Bank 2 Input 1 Ground
- Bank 2 Input 1 Contact Closure Input

- Bank 3 Input 8 Ground
- Bank 3 Input 8 Contact Closure Input
- Bank 3 Input 7 Ground
- Bank 3 Input 7 Contact Closure Input
- Bank 3 Input 6 Ground
- Bank 3 Input 6 Contact Closure Input
- Bank 3 Input 5 Ground
- Bank 3 Input 5 Contact Closure Input
- Bank 3 Input 4 Ground
- Bank 3 Input 4 Contact Closure Input
- Bank 3 Input 3 Ground
- Bank 3 Input 3 Contact Closure Input
- Bank 3 Input 2 Ground
- Bank 3 Input 2 Contact Closure Input
- Bank 3 Input 1 Ground
- Bank 3 Input 1 Contact Closure Input

- Bank 4 Input 8 Ground
- Bank 4 Input 8 Contact Closure Input
- Bank 4 Input 7 Ground
- Bank 4 Input 7 Contact Closure Input
- Bank 4 Input 6 Ground
- Bank 4 Input 6 Contact Closure Input
- Bank 4 Input 5 Ground
- Bank 4 Input 5 Contact Closure Input
- Bank 4 Input 4 Ground
- Bank 4 Input 4 Contact Closure Input
- Bank 4 Input 3 Ground
- Bank 4 Input 3 Contact Closure Input
- Bank 4 Input 2 Ground
- Bank 4 Input 2 Contact Closure Input
- Bank 4 Input 1 Ground
- Bank 4 Input 1 Contact Closure Input

XR Expansions Chain Together So You Can Monitor the Status of up to 256 Remote Relays.



- Bank 5 Input 8 Ground
- Bank 5 Input 8 Contact Closure Input
- Bank 5 Input 7 Ground
- Bank 5 Input 7 Contact Closure Input
- Bank 5 Input 6 Ground
- Bank 5 Input 6 Contact Closure Input
- Bank 5 Input 5 Ground
- Bank 5 Input 5 Contact Closure Input
- Bank 5 Input 4 Ground
- Bank 5 Input 4 Contact Closure Input
- Bank 5 Input 3 Ground
- Bank 5 Input 3 Contact Closure Input
- Bank 5 Input 2 Ground
- Bank 5 Input 2 Contact Closure Input
- Bank 5 Input 1 Ground
- Bank 5 Input 1 Contact Closure Input

- Bank 6 Input 8 Ground
- Bank 6 Input 8 Contact Closure Input
- Bank 6 Input 7 Ground
- Bank 6 Input 7 Contact Closure Input
- Bank 6 Input 6 Ground
- Bank 6 Input 6 Contact Closure Input
- Bank 6 Input 5 Ground
- Bank 6 Input 5 Contact Closure Input
- Bank 6 Input 4 Ground
- Bank 6 Input 4 Contact Closure Input
- Bank 6 Input 3 Ground
- Bank 6 Input 3 Contact Closure Input
- Bank 6 Input 2 Ground
- Bank 6 Input 2 Contact Closure Input
- Bank 6 Input 1 Ground
- Bank 6 Input 1 Contact Closure Input

Connect More Expansions Here, Any [XR Expansion](#) May be Used.

Connect More [Contact Closure Input Expansions](#), Up to 256 Total Inputs Supported.

Cable Included with [USCS16](#). Expansion Input Boards do NOT Require a Power Supply.

[Other Contact Closure Input Expansions are Available Here.](#) ZigBee Mirror Modules are Expandable up to 256 Inputs.

Device Characteristics

Voltage Requirements:

10-15VDC Regulated or Automotive Supply Recommended
UNREGULATED WALL ADAPTERS SHOULD NOT BE USED WITH
THIS DEVICE.

Amperage Requirements: 300MA Absolute MAX

Power Connector type: 2.1mm Center Positive

Power Supply: [PWR12](#) (www.iorelay.com)

Power Cable: CP-2185-ND (www.digikey.com)

CP-2189-ND (www.digikey.com)

Power Connector: SC1052-ND (www.digikey.com)

Input Ratings:

The inputs of the ZigBee Mirror Module were designed to accept contact closures ONLY. Voltages should not be applied to the inputs. All inputs are pulled up to 5VDC using a 1K Resistor. All inputs share a single common ground.

Input Compatibility:

Switches
Push Buttons
Magnetic Reed Switches
Mechanical Relays
Motion Detectors (if equipped with contact closure outputs)
Any other device that can connect 2 wires together

Transmission Range:

Up to 300 Feet using XBee Module.
Up to 1 Mile using XBee Pro module and Rooftop Antenna.
Communication range will vary greatly and is very difficult to predict. For best results, choose a controller with an external antenna. This allows for positioning the antenna for better communication. The most popular ZigBee choice is the XBee Pro Module with the External Antenna (this is the most expensive option when ordering). This device offers the best possible range and flexibility if you determine an outdoor antenna may be required.

Enclosures:

ZigBee Mirror Modules were not profiled for use with a specific enclosure. Many enclosures are available from [www.digikey.com](#) and [www.mouser.com](#) that could work with some minor drilling. We do not recommend any particular part number. Users should review enclosure types carefully. Metal enclosures should not be used unless you have chosen the External Antenna Option and you plan to mount the antenna outside the enclosure.

Operating/Storage Temperature:

-40 to +125° C

Note: Temperature ratings are based on Ratings provided to us by the manufacturer of the components used in our products. This rating represents the most temperature sensitive component used. We do not do any form of environmental testing to verify manufacturer ratings.

Country of Origin:

This device was designed and manufactured in the United States of America using components from many countries.

FCC/UL Approvals:

NCD Implements communication technologies from [www.digi.com](#). ZigBee communication devices are UL/FCC approved for use in the United States and Europe. Agency approvals may not be available in all countries. Details on agency approvals are available from [www.digi.com](#). It is the policy of National Control Devices to assist customers in UL/FCC compliance in any way necessary, including design modifications, if required, to meet UL/FCC compliance. NCD does not directly obtain approval from these agencies as product volumes are too low to be practical for all NCD devices. To date, many NCD devices have met these approvals without design modifications, when installed in a proper enclosure that meets certification requirements. Electrically, no design changes have ever been required to meet these certifications.

Technical Support:

Please [contact National Control Devices](#) if you are seeking technical support for this or other devices.

Warranty

Warranty

NCD Warrants its products against defects in materials and workmanship for a period of 5 years. If you discover a defect, NCD will, at its option, repair, replace, or refund the purchase price. Simply return the product with a description of the problem and a copy of your invoice (if you do not have your invoice, please include your name and telephone number). We will return your product, or its replacement via UPS Ground service anywhere within the continental United States. Customers outside the continental US 48 States will be responsible for all shipping charges.

This warranty does not apply if the product has been modified or damaged by accident, abuse, or misuse.

30-Day Money-Back Guarantee

If, within 30 days of having received your product, you find that it does not suit your needs, you may return it for a refund. NCD will refund the purchase price of the product, excluding shipping/handling costs. This guarantee does not apply if the product has been altered or damaged.

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NCD is not responsible for special, incidental, or consequential damages resulting from any breach of warranty, or under any legal theory, including lost profits, downtime, goodwill, damage to or replacement of equipment or property, and any costs or recovering, reprogramming, or reproducing any data stored in or used with NCD products.

Technical Assistance

Technical questions should be directed to National Control Devices Technical Support Staff. For current contact information, please visit www.iorelay.com and click "Contact Information" on the left side. Technical questions submitted via e-mail are answered frequently throughout the business day. Technical support is also available by calling (417) 646-5644.

NCD Contact Information

Mailing Address:

National Control Devices
P.O. Box 455
Osceola, MO 64776

Telephone:

(417) 646-5644

FAX:

(866) 562-0406

Internet:

www.controlanything.com
www.contraleverything.com
www.iorelay.com