INSTRUCTION MANUAL

MIO-R4
MIO MODERO R-4 REMOTE KIT

MIO-R4
MIO-RCC-KIT

AV FOR AN IT WORLD

IMPORTANT SAFETY INSTRUCTIONS

1. READ these instructions.
2. KEEP these instructions.
3. HEED all warnings.
4. FOLLOW all instructions.
5. DO NOT use this apparatus near water.
6. CLEAN ONLY with dry cloth.
7. DO NOT block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. DO NOT install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. DO NOT defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. PROTECT the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. ONLY USE attachments/accessories specified by the manufacturer.

12. USE ONLY with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. UNPLUG this apparatus during lightning storms or when unused for long periods of time.
14. REFER all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. DO NOT expose this apparatus to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
16. To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle.
17. Where the mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.
18. DO NOT overload wall outlets or extension cords beyond their rated capacity as this can cause electric shock or fire.

The exclamation point, within an equilateral triangle, is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to persons.

ESD Warning: The icon to the left indicates text regarding potential danger associated with the discharge of static electricity from an outside source (such as human hands) into an integrated circuit, often resulting in damage to the circuit.

WARNING: To reduce the risk of fire or electrical shock, do not expose this apparatus to rain or moisture.

WARNING: No naked flame sources - such as candles - should be placed on the product.

WARNING: Equipment shall be connected to a MAINS socket outlet with a protective earthing connection.

WARNING: To reduce the risk of electric shock, grounding of the center pin of this plug must be maintained.

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AMX WARRANTY AND RETURN POLICY

The AMX Warranty and Return Policy and related documents can be viewed/downloaded at www.amx.com.

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Mio Modero® R-4 Remote

Overview

The Mio Modero® R-4 remote provides custom control features, contained in an elegant hand-held rechargeable device(FIG. 1). The Mio R-4 communicates with a NetLinx master via a wireless ZigBee network: the device comes with installed firmware for connecting to a ZigBee Pro 2007 network, but it can be updated with firmware to allow it to connect to older ZigBee 2004 networks.

FIG. 1 The Mio R-4 (front panel)

Selecting a source device sends a command to the master and runs predetermined events associated with that source. Selecting a macro will run predefined events, which might not be associated with sources listed, then return the device to its previous mode.

You will need TPDesign4 to properly program this device. Both the application and its documentation are available from **www.amx.com**.

Touch And Tilt Sensor

The Mio R-4 wakes up upon touching the chrome side rails, touching the touch screen, or pressing a button. If the remote should go to sleep when holding it, you can reawaken the device by tilting it. Errant jostling, such as bumping a table on which the device rests, will not wake the device unless you are holding it.

Specifications

The Mio Modero R-4 remote specifications are as follows:

Mio Modero R-4 (FG148-04) Specifications	
Dimensions (HWD)	9.50" x 2.00" x .74" (241.3 mm x 50.8 mm x 18.80 mm)
Weight	• .45 lbs (20 g) without batteries • .55 lbs (25 g) with batteries
Battery	Rechargeable Lithium-Ion
Transmission Frequencies	ZigBee RF wireless network
Transmission Range	• 100 feet (30.48m). • Refer to the *The ZigBee Network Calculator* section on page 63 for more information
Memory	• 32 Mbytes of FLASH • 64 Mbytes of SDRAM
Top Components	• LED - blue backlit buttons indicate device is awake • LCD - high resolution (240x320) 76800 pixels with backlight and touch overlay • Pushbuttons - the power button is red backlit; the rest are blue backlit buttons. • 29 buttons total
Rear Components	• Programming Port • Battery Door • Rechargeable Battery Connection
Supported Languages:	• English • Spanish • French • Italian • German • Portuguese • Arabic • Russian • Greek • Simplified Chinese • Japanese • Thai • Hindi • Korean
Certifications:	• FCC ID: CWU-NXR-MO • IC: 5078A-NXRMO • CE • IEC-60950 • Japan Approval • Designed for ZigBee
Operating Environment	• Operating Temperature: 0° to 40° C (32° to 104° F) • Storage Temperature: -20° to 70° C (-4° to 158° F)
Included Items	• Mio-RBP Rechargeable Lithium-ion Battery (**FG147-10**)
Optional Keypads:	• Mio-R4-KP-ITALIAN (**FG148-141**) • Mio-R4-KP-FRENCH (**FG148-142**) • Mio-R4-KP-ARABIC (**FG148-143**) • Mio-R4-KP-CHINESE (**FG148-144**)
Other AMX Equipment	• CC-USB Programming cable USB to mini USB (**FG10-5965**) • Mio-RCC Charging Base (**FG147-02**) with power supply • NXR-ZGW NetLinx ZigBee Gateway (**FG5791-01**) • NXR-ZRP NetLinx ZigBee Repeater (**FG5791-02**)

Display Features

The Mio R-4 remote device supports the following display features:

- General Buttons
- Bargraphs
- Multistate General Buttons
- Multistate Bargraph Buttons
- Joystick Buttons
- Animated Icons
- List Buttons
- Marquee Text

These features can be implemented using TPDesign4 or higher. For details, please refer to the TPDesign4 online help or Instruction Manual, both available from **www.amx.com**.

Device Navigation

The Mio R-4 allows you to scroll through pages using the up and down buttons beneath the touch screen. Pressing the Back buttons moves the selection back by one page while holding the button down returns the device to the power up page.

FCC Compliance

This radio module was tested and certified as a stand-alone device according to FCC Rules CFR 47, Part 15, Subpart C. If this device is installed in a manner such that the radio module FCC ID label is not visible on the outside of the end product, a label must be placed on the end product with the following statement:

This device complies with Part 15 of the FCC rules. Subject to the following two conditions:

1. This device must not cause harmful interference and
2. This device must accept all interference, including interference that interferes with the operation of this device. "

Modifications not expressly approved by the manufacturer will void the user's authority to operate the equipment.

NOTE: *This device has been evaluated and found to be compliant with the FCC Rules for RF Exposure when the device is operated at a minimum separation distance of 2 cm. from the user and nearby persons. Operation of this device at closer distances should be avoided."*

Patents

This product is covered by the following patents:

AMX

- U.S. Patent No. D 602,858
- U.S. Patent No. D 520,495
- U.S. Patent No. 7,786,623

This product employs or practices certain features and/or methods of one or more of the following patents:

SIPCO, LLC

- U.S. Patent No. 7,103,511
- U.S. Patent No. 6,914,893
- U.S. Patent No. 7,697,492

Mio R-4 Setup

Installing or Replacing the Mio R-4 Lithium-Ion Battery

To install your lithium-ion battery into the Mio R-4:

1. Flip and turn the Mio R-4 so that the buttons are facing away from you and the device is upside down.
2. Holding the device in both hands, place your thumbs on the battery door and slide the battery door free. The battery door should slide toward the bottom end of the device.
3. Connect the terminal end of the Lithium Ion battery to the port shown in FIG. 2. It may be necessary to use a thin, blunt non-conductive object to seat the battery connector fully within its port.

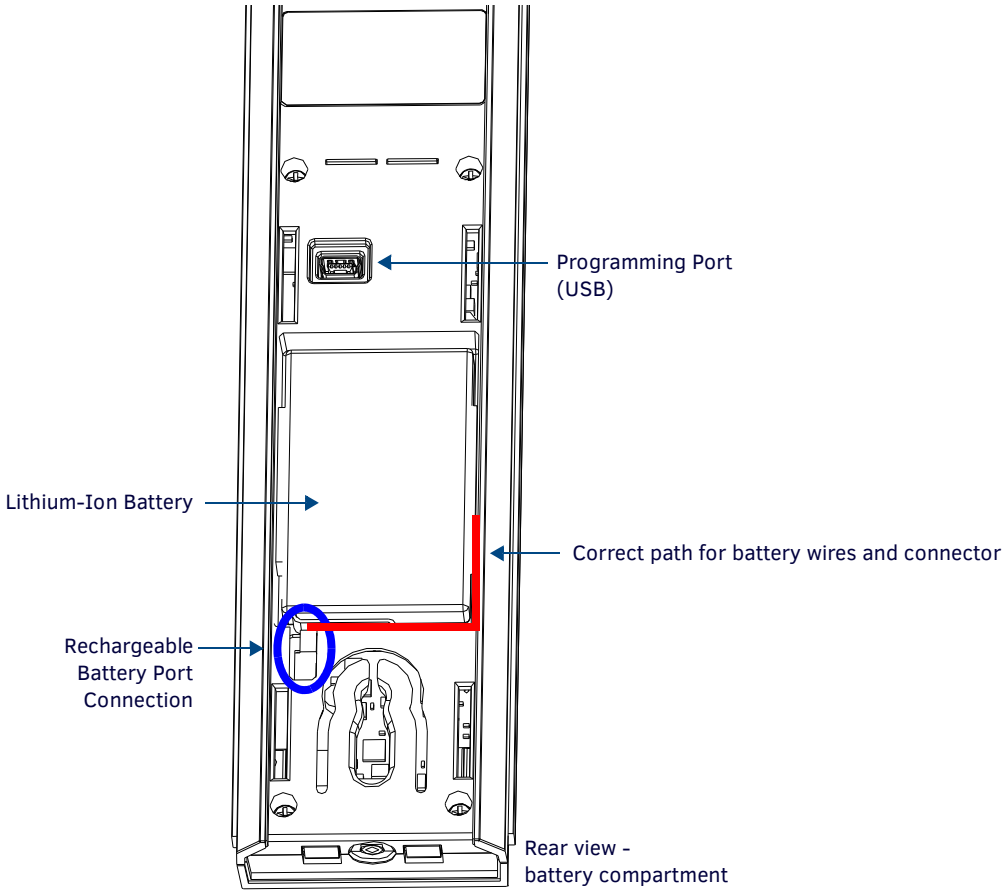


FIG. 2 Rechargeable Battery Port on The Mio Remote

NOTE: *Make sure that the battery wires run alongside the battery in the compartment as shown in FIG. 2. Otherwise, the wires may be damaged or the battery door may not close properly.*

4. Place the battery door back on the device, and slide the door upwards to lock it in place.

Battery Low Indicator

When the battery charge level is too low to sustain continuous operation, the Mio R-4's touchscreen will display a popup window reading "Battery Low" as an initial warning, and then a popup window reading "Battery Very Low" to encourage the user to shut it down. The device will then shut down to prevent a total discharge of the battery. To recharge the battery, insert the Mio R-4 into the Mio Remote Charging Base (see *Charging The Mio Remote with Charging Base* on page 65).

Customized Keypads

The Mio R-4 has the capacity to replace its default English keypad with an optional keypad in one of four languages for Arabic, French, Italian, or Mandarin Chinese readers. The keypad may also be replaced with other keypads to support other functions or arrangements of keys. The additional functions or arrangements are supported with firmware upgrades, available for download at **www.amx.com**.

NOTE: *Each of the alternate keypads requires the appropriate firmware download for proper function; please refer to the Updating Firmware* section on page 26 *for more information.*

Installing Keypads

To install a new keypad:

1. Flip and turn the Mio R-4 so that the buttons are facing away from you and the device is upside down.
2. Holding the Mio R-4 in both hands, place your thumbs on the battery door and push up to slide the battery door free.
3. Remove the battery.
4. Unscrew the 6 screw points indicated in FIG. 3.

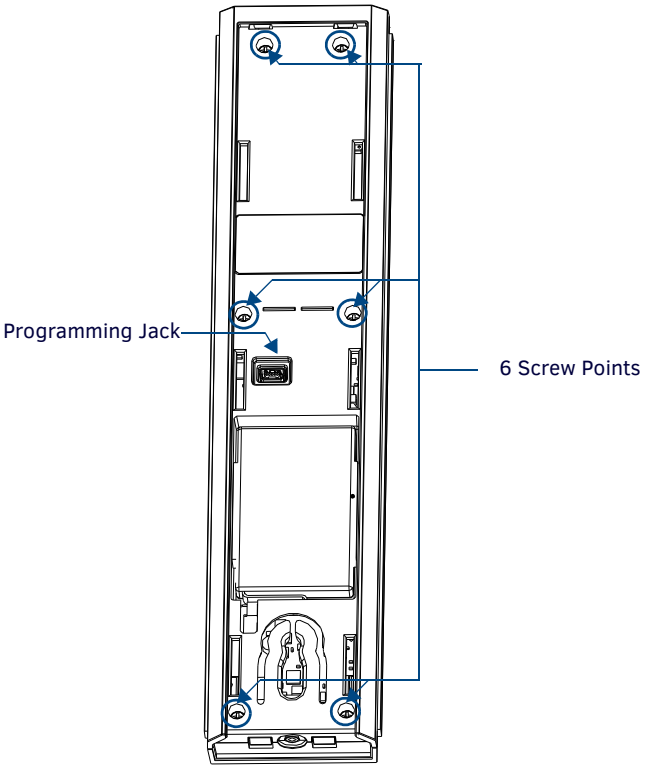


FIG. 3 Internal Mio R-4 Components

5. Turn the unit over so the buttons are facing you.
6. Lift the top assembly away from the PCB.
7. If necessary, push out the standard buttons from the front of the top assembly.
8. Place the new keypad in the top assembly and verify the alignment with the guide posts on the PCB.
9. Place the top assembly back down on the PCB and turn the unit over again, exposing the 6 screw points.
10. Tighten the 6 screw points.
11. Install the battery, replace the battery door, and slide the door to lock it in place.

Device Setup Pages

Overview

The Mio R-4 features onboard Setup pages that allow you to set and check the following features:

- Project Information functions (page 13)
- Remote & Display Settings (page 14)
- Date/Time Settings (page 16)
- Sound Settings (page 17)
- Protected Settings(page 19)
- Battery Settings (page 18)

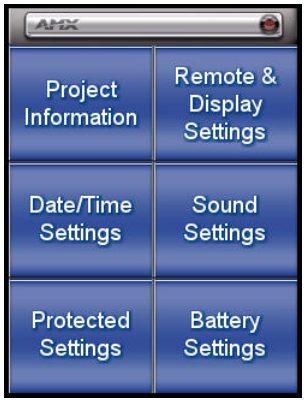


FIG. 4 Setup Page Menu

Accessing the Setup Pages

To enter Setup Menu:

- Hold the *Input* and *Back* buttons (see FIG. 1) for 6 seconds.
- Navigate the Setup pages using the onscreen menu selections and the up and down arrows.

Project Information

The *Project Information* page displays information specific to the TPDesign4 remote file currently located on the Mio R-4. Use the up and down arrows to scroll from viewable page to page.

FIG. 5 Mio R-4 Project Information Pages

Project Information	
File Name	The name of the file as it was created in the designing application.
Designer ID	The ID of the designer for the control pages.
File Revision	The revision number for the control pages.
Dealer ID	The ID of the dealer associated with the control pages.
Job Name	A friendly name for the job associated with the control pages.
Sales Order	The sales order number for the job.
Purchase Order	The purchase order number for the job.

Project Information (Cont.)	
Build Number	The current build version number for the device firmware.
Charger Sensor Port	The port number for the charger sensor.
Charger Sensor Channel	The channel number for the charger sensor.
Creation Date	The date the control pages were created.
Revision Date	The date of the last revision for the control pages.
Last Save Date	The date of the last save for the control pages.
Job Comments	Any additional comments added in the designing application.

Viewing Project Information

1. Select *Project Information* from the Setup Menu.
2. Use the **Up/Down** touchscreen arrows to view each page.
3. When finished, select the **Back** button until you are out of the Setup Menu.

Remote & Display Settings

The device provides you with information concerning current displays settings and allows you to edit the timeout and brightness. Use the up and down arrows to scroll from viewable page to page.

FIG. 6 Remote & Display Settings Pages

Remote & Display Settings	
Display Timeout	The valid display timeout times are 0, 10, 15, 20, 25, and 30 seconds.
Sleep Timeout	The valid sleep timeout times are 0, 3, 5, 10, 15, 30, 60, 120, 180, and 240 minutes.
LCD	The current brightness of the touchscreen display, between 0 and 100.
Charge LED	The current brightness of the LED displaying charging status, between 0 and 100.
Home Hold Time	The amount of time (in seconds, 0-6) in which the selected home page will be displayed.
Inactivity	The amount of time (in minutes, 0-240) spent inactive in its charging cradle before the unit switches to its inactivity page.
Inactivity Page	The selected page displayed when the inactivity timer expires.
Panel Type	The type of unit connected to the ZigBee network. This is always *R4*.
Firmware Version	The most current firmware version uploaded to the unit.
ZigBee Version	The most current version of the ZigBee module firmware uploaded to the device.

Remote & Display Settings (Cont.)	
S/N	The device serial number
Setup Pages Version	The current version of the Setup pages uploaded to the unit.
Power-up Page	The page displayed when the unit powers up.
File System	The total and available amounts of storage space in the unit.
RAM	The total amount of available RAM in the unit.
Setup Port	The port (usually 0) used to upload information to the unit.
High Port	The highest port number specified in the project pages.
High Address	The highest address specified in the project pages.
High Channel	The highest channel specified in the project pages.
High Level	The highest level specified in the project pages
Refresh Rate	The refresh rate, in screen lines, of the Setup page screen display.
Screen Width	The width (in pixels) of the Setup page screen display.
Screen Height	The height (in pixels) of the Setup page screen display.
Blink Rate	The rate (in seconds) at which features on the screen will blink.
Wake-up String	The code string chosen by the NetLinx administrator for the unit wake-up.
Sleep String	The code string chosen by the NetLinx administrator for the unit sleep mode.
Start-up String	The code string chosen by the NetLinx administrator for the unit startup.

Changing the Remote and Display Settings

The remote has two timeout levels to increase battery life; Display Timeout and Sleep Timeout. By default, these are set to occur together. For these to occur separately, disable *Sleep on Display Timeout*.

When the Mio R-4 is in *Display Timeout*, the device only turns off the display, while the device otherwise remains fully functional. Its display then comes on immediately upon registering a button or screen press. Upon Display Timeout, the device will send the sleep string, defined in the TPD4 panel page properties. to the NetLinx master. Besides turning on from a button or screen press, the device will also turn on upon receiving a wake command from the Master.

When the unit is in Sleep Timeout, the display is off and the radio is put in low-power mode. In this mode, the device takes slightly longer to wake up and respond to button presses or message updates from the master. When the device enters Sleep Timeout at the time specified, it sends a *standby* event, which is registered on the gateway and the master.

When the device is touched, it will bring the radio out of low-power mode and send an *awake* event to the master. If defined in the TPD4 project properties, a *wakeup* string is also sent to the master when the display comes on as the unit comes out of Display Timeout mode.

To change the Display Timeout and Sleep Timeout settings:

1. Select *Remote & Display Settings* from the Setup Page.
2. Under *Display Timeout*, use the Up/Down arrows to adjust the timeout period in five-second increments, to a maximum of 30 seconds.
3. Under *Sleep Timeout*, use the Up/Down arrows to adjust the timeout period in regular increments, to a maximum of 240 minutes.

   NOTE: *The Sleep Timeout period increments are 0 (sleep timeout disabled, remote will stay active until the battery charge runs low), 3, 5, 10, 15, 30, 60, 120, 180, and 240 minutes.*
4. To disable the default setting and allow separate display and sleep timeouts, press the **Sleep on Display Timeout** button. When *Sleep on Display Timeout* is engaged, the button is green (FIG. 7), and the *Sleep Timeout* settings will be disabled. Press the button again to re-enable the *Sleep on Display Timeout* function.

FIG. 7 Sleep on Display Timeout - enabled

NOTE: *Make sure to adjust the Sleep Timeout period after disengaging the Sleep on Display Timeout function. From the factory, the default sleep timeout will be set for 15 minutes, but engaging and then disengaging the Sleep on Display Timeout function will reset the period for 0 minutes (will not sleep until the battery charge runs low) because the previous setting will already have 0 for that setting, even though it was not actually used.*

5. Select the **Back** button until you are out of the Setup Menu.

NOTE: *While deactivating the Sleep on Display Timeout function will prevent the Mio R-4 from going offline when the selected Display Timeout time is reached, doing so will decrease the effective battery life. Setting the Sleep Timeout period to 0 will keep the device from disconnecting from the network, but even a fully charged battery will reach a very low point within 10 to 14 hours. If the device's battery is too depleted, it may need to be returned to the charging cradle and recharged before it can be used again.*

Raising and Lowering the LCD Brightness

1. Select *Remote & Display Settings* from the Setup Page.
2. Under *LCD*, use the Up/Down arrows to adjust the LCD brightness in one-point increments, from a minimum of 0 to a maximum of 100.

NOTE: *Take care not to set the LCD brightness too low, as the screen may become too dark to read. If you accidentally set the LCD brightness too low and the screen becomes too dark, touch the center right of the touchscreen until the screen brightens again.*

3. Select the **Back** button until you are out of the Setup Menu.

Raising and Lowering the Charge LED Brightness

1. Select *Remote & Display Settings* from the Setup Page.
2. Under *Charge LED*, use the Up/Down arrows to adjust the LED brightness in one-point increments, to a minimum of 0 and a maximum of 100.
3. Select the **Back** button until you are out of the Setup Menu.

Setting the Home Hold Time

1. Select *Remote & Display Settings* from the Setup Page.
2. Under *Home Hold Time*, use the Up/Down arrows to adjust the home hold time in one-second increments, to a maximum of 6.

NOTE: *A setting of 0 has special meaning: it disables the "home" function on button hold, allowing the back/home button to operate like other external buttons.*

3. Select the **Back** button until you are out of the Setup Menu.

Changing the Remote Inactivity Page Flip

1. Select *Remote & Display Settings* from the Setup Page.
2. Under *Inactivity*, use the Up/Down arrows to adjust the page flip time in increments, to a maximum of 240.
3. Select the **Back** button until you are out of the Setup Menu.

Checking Remote Display Settings

1. Select *Remote & Display Settings* from the Setup Page.
2. Use the device's arrow down to navigate to the fourth and fifth *Display Settings* pages.
3. Select the **Back** button until you are out of the Setup Menu.

Date/Time Settings

The date and time can be set on the device or you can use the NetLinx Master to establish the time and format used. Use the up and down arrows to scroll from viewable page to page.

FIG. 8 Date/Time Settings Pages

Date/Time Settings	
Get Time & Date	Allows the user to get date and time information from the NetLinx master.
Time Format	Selects between displayed standard and military time formats.
Date Format	Selects displayed date format.
Year	Selects the chosen year for the date.
Month	Selects the chosen month for the date.
Day	Selects the chosen day for the date.
Hour	Selects the chosen hour for the time.
Minute	Selects the chosen minute for the time.
Second	Selects the chosen second for the time.

NOTE: *If the time and date are changed on the Mio R-4 and the device is online with a NetLinx Master, the time and date will also be changed on the NetLinx Master.*

Getting time and date from your NetLinx Master

1. Select *Date/Time Settings* from the Setup Page.
2. Select **Get** under *Set Date & Time*.
3. Select the **Back** button until you are out of the Setup Menu.

Sound Settings

The device can provide an audible indicator of both hit and miss of button selections.

FIG. 9 Sound Settings Page

Sound Settings	
Volume	Adjusts the volume of the sound.
Mute	Silences any button sound.
Play Test	Plays a test tune consisting of a single octave of the musical scale.
Button Hit	Enables or disables the sound of a correctly chosen button.
Button Miss	Enables or disables the sound of an incorrectly chosen button.

Setting the Volume

1. Select *Sound Settings* from the Setup Page.
2. Select the Up and Down arrow under *Volume* to increase or decrease the sound volume by one setting. The settings are Mute, Low, Medium, and High.
3. Select the **Back** button until you are out of the Setup Menu.

Testing the Sound Settings

1. Select *Sound Settings* from the Setup Page.
2. Select either the **Mute**, **Button Hit**, or **Button Miss** button. The button will turn green when properly selected.
3. Push **Play Test** to test the sound and the volume.

   NOTE: *The Mio R-4 will allow the Mute button to be selected along with the Button Hit or Button Miss buttons. In this case, the Mute button overrides any sound produced by any of the other buttons.*
4. Press the **Mute** button again until it is no longer green.
5. Select the **Back** button until you are out of the Setup Menu.

Battery Settings

Check the battery and charging status from this page.

FIG. 10 Battery Settings Pages

Battery Settings	
Battery Charge	The quality of the charge is indicated by the number of green lights versus red lights in the display. The more green lights, the higher the charge. While on the charger, the Battery Charge indicator will always show a full bar of green lights.
Dock Status	Indicates whether the device is in the charging cradle.
Disable Brightness Limit	Disables limits on the LCD brightness; this will reduce battery life.

Checking Dock Status

1. Select *Battery Settings* in the Setup Menu.
2. If the *Dock Status* button is green, the device is seated correctly in its Mio-RCC charging cradle. If the *Dock Status* button remains blue, the remote is not in the charging cradle or is not seated correctly in the charging cradle.
3. Select the **Back** button until you are out of the Setup Menu.

Toggling Brightness Limit

1. Select *Battery Settings* from the Setup Page.
2. Select *Disable Brightness Limit*. The button will turn from green to blue to note that the backlight brightness limit is no longer disabled (FIG. 11).

FIG. 11 Battery Settings - brightness limit disabled.

3. Select the **Back** button until you are out of the Setup Menu.

Protected Settings Menu

Overview

Some of the device settings are security sensitive or change the way the device behaves. These are considered *Protected Settings*. The Protected Settings Menu (FIG. 12) is accessed via the *Protected Settings* button in the Startup Menu (FIG. 4).

FIG. 12 Protected Settings Pages

Protected Settings Menu	
Options & Recovery	Opens the Options & Recovery Page (page 20)
Change Passwords	Opens the Edit Passwords page (page 21)
Calibrate	Opens the Calibrate page (page 22)
System Settings	Opens the System Settings page (page 22)
Reboot Panel	Opens the Reboot Panel page (page 25)
Test Pages	Used to test for dead pixels in the touchscreen (page 25)

Accessing *Protected Settings* menu items usually requires a password confirmation (FIG. 13).

NOTE: *When accessing the Protected Settings for the first time, the Mio R-4 will request a password. The default password is 1988. Changing the password after initial access is highly recommended, and choosing to reset the Mio R-4's system settings to factory defaults will return the password to its default as well.*

Password Entry

The *Password Confirmation* page protects the device's system settings, network information and calibration from casual changes. Use the Numeral Keypad pushbuttons (FIG. 1) to enter passwords.

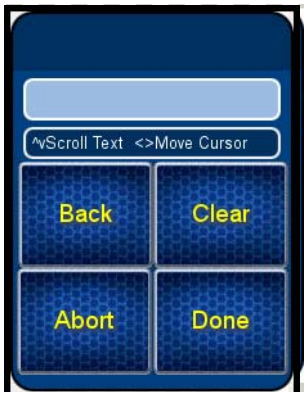


FIG. 13 Password Confirmation Page

NOTE: *The MIO-R4 allows only numeric passwords.*

The default password is **1988**, which has to be entered in the text entry field upon opening the *Password Confirmation* page for the first time.

Password Confirmation	
Back	Goes to the Password Entry page
Clear	Clears the entry field

Password Confirmation (Cont.)	
Abort	Shuts down the *Password* page without submitting a password
Done	Submits the password

Entering a Numeric Password

1. Select *Protected Settings* in the Setup Menu.
2. Press any button on the Protected Settings Menu to invoke the *Password Confirmation* page.
3. Enter your password from the keypad.

   NOTE: *Should you decide to leave the Password Confirmation page for any reason, press the Exit button (FIG. 1) to return to the last page displayed.*
4. After entering a password, select *Done* to submit it.

Options & Recovery Page

The *Options & Recovery* page (FIG. 14) enables you to enable page tracking and function identification features, as well as to reset system settings and remove all currently loaded user pages.

FIG. 14 Options & Recovery Page

Options & Recovery	
Device Number	The device's NetLinx Device Number.
Function Show	When enabled, displays the function codes for each button push.
Page Tracking	When enabled, reports all page flips to the NetLinx master.
Reset System Settings	Returns all systems settings to factory defaults.
Remove User Pages	Removes any custom designed control pages.
Protection	Enables or disables Front Button Setup Access

Checking the Device Number

1. Select **Protected Settings** in the *Setup* Menu.
2. Select **Options & Recovery**. The device number is displayed at the top of the first page.

Toggling the Function Show option

1. Select **Options & Recovery** in the *Protected Settings* Menu.
2. Select **Function Show**. Not only will the button turn green, but every button or display with a function code will display that function code.
3. To turn off the *Function Show* feature, select **Function Show** again. The function codes will disappear and the button will return to its normal color.
4. Select the **Back** button until you are out of the Setup Menu.

Toggling the Page Tracking Option

NOTE: *The NetLinx master will track all page flips if the String handler for the device Data event is set in the NetLinx code.*

1. Select **Options & Recovery** in the *Protected Settings* Menu.
2. Select *Page Tracking*; page tracking will start when the button turns green.
3. To disable page tracking, select *Page Tracking* again, and the button will return to blue.
4. Select the **Back** button until you are out of the Setup Menu.

Resetting System Settings

1. Select **Options & Recovery** in the *Protected Settings* Menu.
2. Select *Reset System Settings*.
3. At the page reading “Confirmation: Are sure you want to reset all system settings?”, select **Yes** to confirm your selection or **No** to return to the *Protected Settings Page* (FIG. 15).

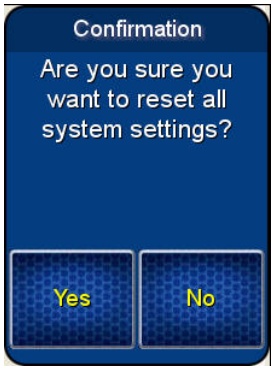


FIG. 15 Reset Systems Settings confirmation page

NOTE: *The Yes button will be disabled for five seconds after this page opens, with a countdown appearing at the top right of the screen. After the countdown, the Yes button will change from gray to blue.*

4. Select the **Back** button until you are out of the Setup Menu.
5. Press the **Yes** button to reboot the device.

Removing User Pages

1. Select **Options & Recovery** in the *Protected Settings* Menu.
2. Select *Remove User Pages*.
3. At the page reading “Confirmation: Are you sure you want to remove all user pages?”, select **Yes** to confirm your selection or **No** to return to the *Protected Settings Main Page*.

   NOTE: *The Yes button will be disabled for five seconds after this page opens, with a countdown appearing at the top right of the screen. After the countdown, the Yes button will change from gray to its normal color.*
4. Select the **Back** button until you are out of the Setup Menu.
5. Press the **Yes** button to reboot the device.

Enabling Front Button Setup Access

To enable Front Button Setup Access:

1. Select **Options & Recovery** in the *Protected Settings* Menu.
2. Press the **Down** arrow to access the *Protection* page.
3. To enable Front Button Setup Access, press the button, which will turn green. To disable Front Button Setup Access, press the button again to return it to blue.
4. Select the **Back** button until you are out of the Setup Menu.

Edit Passwords

The *Edit Passwords* page manages multiple passwords for the device. The first four passwords can be used to protect access to the specific pages in each project. Password 5 is for access to the *Protected Setup* pages.

FIG. 16 Edit Passwords Page

Changing the Device Password

1. Select *Protected Settings* in the Setup Menu.
2. Select *Change Passwords* on the Protected Settings Menu.
3. Select one of the five passwords to be changed.

   NOTE: *Should you decide to leave the Password Confirmation page for any reason, press the Exit button (FIG. 1) to return to the last page displayed.*
4. Enter, edit and confirm changes to the password.
5. Select the **Back** button until you are out of the Setup Menu.

NOTE: *Make sure to save a copy of Password 5 after it is changed. Without access to the password, you cannot access the* Protected Settings *page.*

Calibrate

To make sure that button selections behave as expected, calibrating the touch screen area may be necessary. The system will ask the user to touch crosshairs that appear in different portions of the screen.

FIG. 17 Calibrate page

Calibrating the Touch Screen Area

1. Select *Calibrate* from the Protected Settings Menu.
2. Touch each target that appears on the screen.
3. If successfully calibrated, the Mio R-4 will return you to the *Protected Settings* Menu.

Alternate methods for accessing the calibration page:

- Press and hold the *Input* and *Back* buttons (FIG. 1) for 9 seconds.
- Touch and hold the touchscreen during a reboot (see the *Reboot Page* section on page 25 for details) and release when the *Calibrate* page appears.
- Hold the **Calibrate** button until the page flips to the *Calibrate* page. When on that page, a set of crosshairs will go wherever the touch is registered.

System Settings

The *System Settings* pages (FIG. 18) provide you with the connection status, gateway selection, and RF link information. Use the device's up and down arrows to move from page to page.

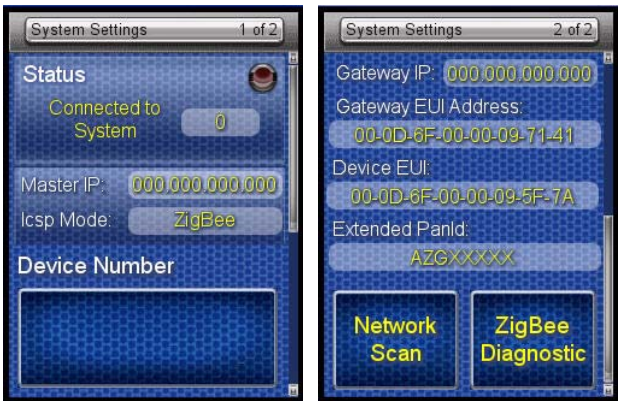


FIG. 18 System Settings Pages

System Settings	
Status	Green light indicates the overall connection is good.
Connected to System	Shows the number of the connected system.
Master IP	The IP of the connected master.
Icsp Mode	The mode used for wireless communication. This is always defaulted to “ZigBee”.
Device Number	The number of the device in the NetLinx system.
Gateway IP	The IP for the Gateway providing the connection.
Gateway EUI Address	The EUI Address for the Gateway providing the connection.
Device EUI	A ZigBee network ID unique to the device.
Extended PANID	The ID for the ZigBee personal area network.
Network Scan	This button opens the *Site Survey* page (FIG. 19).
ZigBee Diagnostic	This button opens the *ZigBee Diagnostics* page (FIG. 20).

Checking Connection Status

1. Select *Protected Settings* in the Setup Menu.
2. Select *System Settings* in the *Protected Settings* Menu. If the round button at the top right of the first page is green, the system is connected.
3. Select the **Back** button until you are out of the Setup Menu.

Checking the Master IP Address

1. Select *Protected Settings* in the Setup Menu.
2. Select *System Settings* in the Protected Settings Menu. The master IP is indicated on the first page.
3. Select the **Back** button until you are out of the Setup Menu.

Checking the Gateway IP Address

1. Select *Protected Settings* in the Setup Menu.
2. Select *System Settings* in the *Protected Settings* Menu. The gateway IP is indicated on the second page.
3. Select the **Back** button until you are out of the Setup Menu.

Checking the Gateway EUI Address

1. Select *Protected Settings* in the Setup menu.
2. Select *System Settings* in the *Protected Settings* Menu.
3. Select the device’s down arrow to navigate to the second page. The Gateway EUI address is indicated on the second page.
4. Select the **Back** button until you are out of the Setup Menu.

Checking the Extended PAN ID

1. Select *Protected Settings* in the Setup Menu.
2. Select *System Settings* in the *Protected Settings* Menu.
3. Select the device’s down arrow to navigate to the second page. The Extended PAN ID is indicated at the bottom of the page, above the **Network Scan** and **ZigBee Statistics** buttons.
4. Select the **Back** button until you are out of the Setup Menu.

Changing the Device Number

1. Select *Protected Settings* in the Setup Menu.
2. Select *System Settings* in the Protected Settings Menu.
3. The **Device Number** button at the bottom of the first page lists the current NetLinx Device Number for the unit.
4. To change the device number, press the **Device Number** button to open the *Device Number* page.
5. Enter the new device number with the device keypad.
   - To move the cursor back one number at a time, press the **Back** button.
   - To clear the entire device number field, press the **Clear** button.
   - To return to the *System Settings* page without saving any changes, press the **Abort** button.
   - To save any changes and return to the *System Settings* page, press the **Done** button.
6. Reboot the Mio R-4 from the Reboot Page (see the *Reboot Page* section on page 25).

   NOTE: *In addition to the Abort button, should you decide not to change the Device Number for any reason, press the Back button (FIG. 1) to return to the last page displayed.*
7. Select the **Back** button until you are out of the Setup Menu.

Site Survey

The *Site Survey* page (FIG. 19) is a report of the wireless networks found and the status of their availability to the device. The *Site Survey* page is accessed by pressing the **Network Scan** button on the second *System Settings* page (page 22).

FIG. 19 Site Survey page

Site Survey	
Extended PAN ID	The Personal Area Network ID.
Join	The availability of the network. *Yes* indicates that it is open to join.
Stack Profile	The Stack Profile indicates the capabilities of that wireless network.

Joining a Wireless Network

1. Select *Protected Settings* in the Setup Menu.
2. Select *System Settings* in the *Protected Settings* Menu.
3. Press the **Network Scan** button on the second page to open the *Wireless Networks* page. Pushing the *Extended PAN ID* header sorts the available networks by Extended PAN ID in alphabetical order; pressing the header again will reverse the sorting.
4. Select the network by pushing it on the touch screen. A pop-up page reading “Do you wish to connect to PAN [PAN number]” will appear.
   - To connect to the PAN, press the **Yes** button.
   - To return to the *Site Survey* page without connecting to the PAN, press the **No** button.
   - If you do not make a selection within three seconds, the pop-up page will automatically close in three seconds.
5. Select the **Back** button until you return to the Setup Menu.

ZigBee Diagnostics

The *ZigBee Diagnostics* page (FIG. 20) is a report of the wireless networks found and the status of their availability to the device. This allows assessment of a network connection to the device while moving through a particular area, for instance. The *ZigBee Diagnostics* page is accessed by pressing the **ZigBee Diagnostics** button on the second *System Settings* page (page 22)

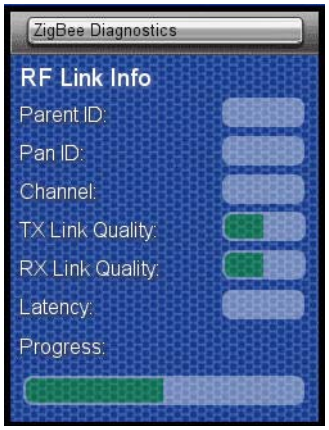


FIG. 20 ZigBee Diagnostics page

RF Link Info	
Parent ID:	The ID number of the ZigBee gateway currently being contacted by the device. Any number other than “0” (zero) indicates that the network signal is going through a repeater.

RF Link Info (Cont.)	
Pan ID:	The PAN ID number of the device.
Channel:	The ZigBee channel currently being used by the device.
TX Link Quality	The connection quality for transmission.
RX Link Quality	The connection quality for reception.
Latency:	The delay detected in the network connection.
Progress:	This scroll bar shows the progress of finding a ZigBee PAN within range of the device. Continuous scrolling means that the device is connected.

To return to the previous page when finished, press the **Back** button on the remote.

Reboot Page

Some changes to the device settings require a reboot before the changes are accepted. This may be accessed through the *Reboot* page (FIG. 21).

FIG. 21 Reboot Page

Rebooting the Device

1. Select *Protected Settings* from the Setup Page.
2. Select **Reboot Panel.**
3. Select **Reboot**. The device will reboot and restart.
4. To calibrate the touchscreen, touch and hold the touchscreen during the reboot and release when the *Calibrate Test* page (page 22) appears.

Test Pages

The Test Pages are for testing the Mio R-4's touchscreen. To check the touchscreen:

1. Select *Protected Settings* from the Setup Page.
2. Select **Test Pages**.
3. The subsequent displayed pages are all one color, intended to differentiate touchscreen pixels that may no longer be functioning. After checking each colored page, touch the screen to move to the next colored page. The pages run through blue, green, red, white, black, and then blue again.
4. When finished inspecting the colored pages, select the **Back** button until you are out of the Setup Menu.

Programming the Mio R-4

Overview

Most functionality of the Mio R-4 is handled using the application *TPDesign4*. Go to **www.amx.com** for the supporting documentation.

The Mio R-4 recognizes a select number of NetLinx Commands. For a full list and descriptions, consult the *SEND_COMMANDs* section on page 29.

NOTE: *Before doing any programming for the Mio R-4, you must download and install the latest AMX USB LAN driver from www.amx.com. The user will be required to install the driver, put the device in USB mode, and connect the device to the computer prior to any upload or download.*

Using the Programming Jack on the Mio R-4

The programming jack located on the back of the Mio R-4 (FIG. 22) is used for communication between the device and AMX software. The programming jack uses a CC-USB Programming cable, USB to mini USB (**FG10-5965**), which can be ordered from AMX. Make sure the device is situated in the charging cradle before starting download of configuration files.

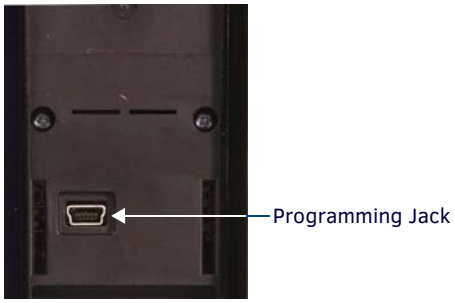


FIG. 22 The Mio R-4 Programming Jack

NOTE: *USB file transfers should only be performed while the unit is on the charging cradle and with the sleep timeout set to 0 (off). Set the sleep timeout (in the Setup Menu,* Remote and Display Settings->Timeout*) to 0 BEFORE attaching the USB cable.*

To download Configuration Files

1. Flip and turn the Mio R-4 device so that the buttons are facing away from you and the device is upside down.
2. Holding the device in both hands, place your thumbs on the battery door and slide the battery door free.
3. Place the device in the charging cradle and connect the mini USB programming cable (**FG10-5965**) into the programming jack on the back side of the remote device.
4. Connect the other end of the USB cable to the USB port on your computer.
5. Configure the communication parameters in NetLinx Studio or File Transfer 2 and download the resultant file.
6. Disconnect the USB cable after the download. The Mio R-4 will self-reboot after the file download.

Downloading Configuration Files through TPDesign4

TPDesign4 may also be used to download configuration files to the Mio R-4. To download files directly from TPDesign4:

1. Place the device in the charging cradle and connect the mini USB programming cable (**FG10-5965**) into the programming jack on the back side of the remote device.
2. Connect the other end of the USB cable to the USB port on your computer.
3. In TPDesign4, select **Transfer->Connect...**
4. Wait until the connection icon in the Mio R-4 setup pages turns green.
5. Select **Transfer to device** in TPDesign4.

NOTE: *If the Mio R-4's connection icon does not turn green within 10-15 seconds of enabling the virtual NetLinx master ("Refresh System" in NetLinx Studio, "Connect..." in TPDesign4), unplug the device for at least 5 seconds and then reconnect it.*

Updating Firmware

Main Mio R-4 firmware updates are only available at this time via USB connection to the Virtual NetLinx Master.

Updating Mio R-4 Firmware Through USB

To update the main firmware for the Mio R-4:

1. Connect the Mio R-4 to your computer via the USB programming jack (FIG. 22).
2. Open NetLinx Studio.
3. Connect to the Virtual NetLinx Master.
4. Select **Tools > Firmware Transfer**.

5. Choose the firmware file to be transferred.
6. Enter the Mio R-4's Device ID.
7. Select **Send**.
8. The unit reboots after the upgrade and enters un-archiving mode, during which the AMX logo is displayed and the POWER LED continuously flashes. The unit reboots again after un-archiving with the new firmware running.

NOTE: *If you are using the Mio R-4 in conjunction with other ZigBee-enabled devices, such as the Mio R-3 and the NXR-ZGW wireless gateway, you should update the ZigBee firmware to all of the ZigBee devices at the same time.*

USB

NetLinx Studio can be set up to run a Virtual Master where the PC acts as the Master by supplying its own IP Address for communication to the Mio R-4. For a PC to establish a USB connection with a Mio R-4, it must have the AMX USBLAN driver installed.

The AMX USBLAN driver for Windows XP can be downloaded as a stand-alone application from www.amx.com.

NOTE: *It may be necessary to temporarily disable any software firewalls on the computer before attempting to transfer via USB. A common source of firmware transfer failures over USB to an Mio R-4 is that Windows Firewall is blocking the Mio R-4 from connecting to the virtual netlinx master.*

Prepare Your PC for USB Communication With the Mio R-4

If you haven't already done so, download and install the latest versions of NetLinx Studio and TPDesign4 (from www.amx.com), and restart your PC.

Configure a Virtual NetLinx Master Using NetLinx Studio

A Virtual NetLinx Master (VNM) is used when the target Mio R-4 is not connected to a physical NetLinx Master. In this situation, the PC takes on the functions of a Master via a Virtual NetLinx Master. This connection is made by either using the PC's Ethernet Address (via TCP/IP using a known PC's IP Address as the Master) or using a direct mini-USB connection to communicate directly to the Mio R-4.

Before beginning:

1. Download the latest AMX USB LAN driver from **www.amx.com**.
2. In NetLinx Studio, select **Settings** > **Master Communication Settings**, from the Main menu to open the *Master Communication Settings* dialog (FIG. 23).

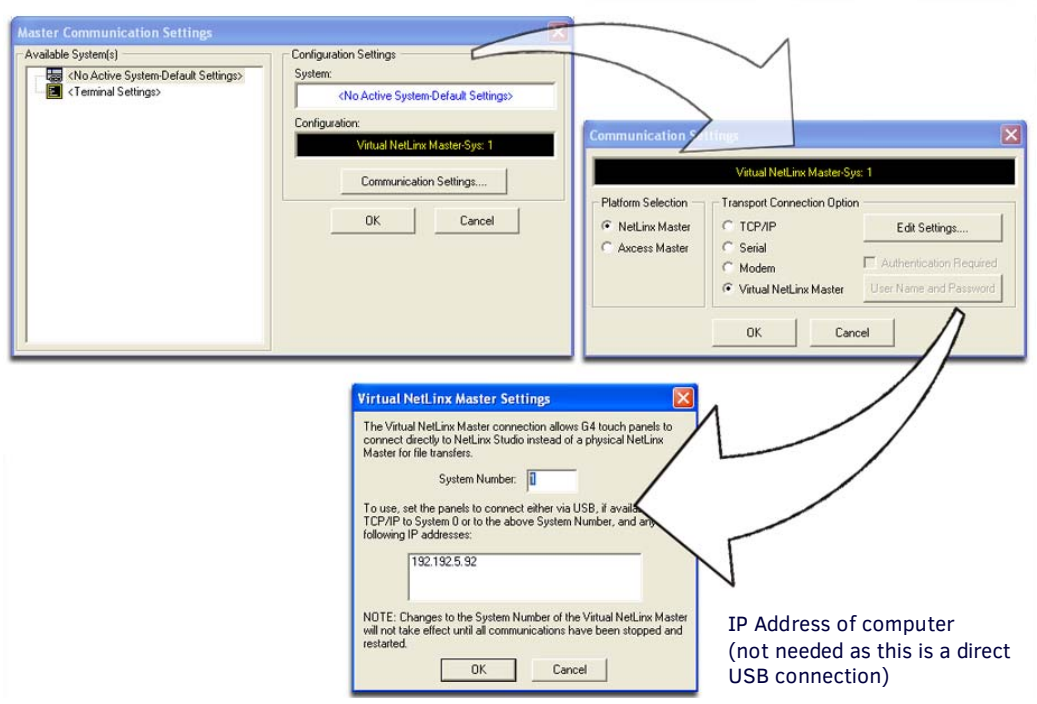


FIG. 23 Assigning Communication Settings for a Virtual Master

3. Click the **Communications Settings** button to open the *Communications Settings* dialog box.
4. Click the **NetLinx Master** radio button (*from the Platform Selection section*).
5. Click the **Virtual Master** radio button (*from the Transport Connection Option section*).
6. Click the **Edit Settings** button to open the *Virtual NetLinx Master Settings* dialog (FIG. 23).
7. Enter the System number (default is **1**).
8. Click **OK** to close all open dialogs and save your settings.

9. Click the **OnLine Tree** tab in the Workspace window to view the devices on the Virtual System.
10. Right-click on *Empty Device Tree/System* and select **Refresh System** to re-populate the list.

    The Mio R-4 will not appear as a device below the virtual system number (in the Online Tree tab) until both the system number (default = 1) is entered into the Master Connection section of the System Settings page and the Mio R-4 is restarted.

    - The Connection status turns green after a few seconds to indicate an active USB connection to the PC (Virtual Master).
    - If the System Connection icon does not turn green, check the USB connection and communication settings and refresh the system.

SEND_COMMANDs

Overview

Below is a list of SEND_COMMANDs accepted by the Mio R-4 from NetLinx masters. To use these commands, establish a Telnet session from the PC to the NetLinx master. Additionally, you could use NetLinx Studio 2.4 or the master's web page to send the commands.

NOTE: *All text is based on a Unicode index.*

Page Commands

Page Commands are used in the NetLinx Programming Language and are case insensitive.

Page Commands	

PAGE	Flips to a page with a specified page name. If the page is currently active, it will not redraw the page.
	Syntax:
	`"'PAGE-<page name>'"`
	Variables:
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'PAGE-Page1'"`
	Flips to page1.

@APG	Add a specific popup page to a specified popup group. Add the popup page to a group if it does not already exist. If the new popup is added to a group which has a popup displayed on the current page along with the new pop-up, the displayed popup will be hidden and the new popup will be displayed.
	Syntax:
	`SEND_COMMAND <DEV>,"'@APG-<popup page name>;<popup group name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• popup group name = 1 - 50 ASCII characters. Name of the popup group.
	Example:
	`SEND_COMMAND Device,"'@APG-Popup1;Group1'"`
	Adds the popup page 'Popup1' to the popup group 'Group1'.

@CPG	Clear all popup pages from a specified popup group.
	Syntax:
	`SEND_COMMAND <DEV>,"'@CPG-<popup group name>'"`
	Variable:
	• popup group name = 1 - 50 ASCII characters. Name of the popup group.
	Example:
	`SEND_COMMAND Device,"'@CPG-Group1'"`
	Clears all popup pages from the popup group 'Group1'.

@DPG	Delete a specific popup page from a specified popup group if it exists.
	Syntax:
	`SEND_COMMAND <DEV>,"'@DPG-<popup page name>;<popup group name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• popup group name = 1 - 50 ASCII characters. Name of the popup group.
	Example:
	`SEND_COMMAND Device,"'@DPG-Popup1;Group1'"`
	Deletes the popup page 'Popup1' from the popup group 'Group1'.

@PDR	Set the popup location reset flag. If the flag is set, the popup will return to its default location on show instead of its last drag location.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PDR-<popup page name>;<reset flag>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	• reset flag = 1 = Enable reset flag
	0 = Disable reset flag
	Example:
	`SEND_COMMAND Device,"'@PDR-Popup1'"`
	Popup1 will return to its default location when turned On.

Page Commands (Cont.)	

@PHE	Set the hide effect for the specified popup page to the named hide effect.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PHE-<popup page name>;<hide effect name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	• hide effect name = Refers to the popup effect names being used.
	Example:
	`SEND_COMMAND Panel,"'@PHE-Popup1;Slide Left'"`
	Sets the Popup1 hide effect name to 'Slide Left'.

@PHP	Set the hide effect position. Only 1 coordinate is ever needed for an effect, however the command will specify both. This command sets the location at which the effect will end at.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PHP-<popup page name>;<x coordinate>,<y coordinate>'"`
	Variable:
	• popup page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'@PHP-Popup1;75,0'"`
	Sets the Popup1 hide effect x-coordinate value to 75 and the y-coordinate value to 0.

@PHT	Set the hide effect time for the specified popup page.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PHT-<popup page name>;<hide effect time>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	• hide effect time = Given in 1/10ths of a second.
	Example:
	`SEND_COMMAND Device,"'@PHT-Popup1;50'"`
	Sets the Popup1 hide effect time to 5 seconds.

@PPA	Close all popups on a specified page. If the page name is empty, the current page is used. This command works in the same way as the 'Clear Page' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPA-<page name>'"`
	Variable:
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'@PPA-Page1'"`
	Close all popups on Page1.

@PPF	Deactivate a specific popup page on either a specified page or the current page. If the page name is empty, the current page is used (see example 2). If the popup page is part of a group, the whole group is deactivated. This command works in the same way as the 'Hide popup' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPF-<popup page name>;<page name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example 1:
	`SEND_COMMAND Device,"'@PPF-Popup1;Main'"`
	Deactivates the popup page 'Popup1' on the Main page.
	Example 2:
	`SEND_COMMAND Device,"'@PPF-Popup1'"`
	Deactivates the popup page 'Popup1' on the current page.

@PPG	Toggle a specific popup page on either a specified page or the current page. If the page name is empty, the current page is used (see example 2). Toggling refers to the activating/deactivating (On/Off) of a popup page. This command works in the same way as the 'Toggle Popup' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPG-<popup page name>;<page name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'@PPG-Popup1;Main'"`
	Toggles the popup page 'Popup1' on the 'Main' page from one state to another (On/Off).
	Example 2:
	`SEND_COMMAND Device,"'@PPG-Popup1'"`
	Toggles the popup page 'Popup1' on the current page from one state to another (On/Off).

Page Commands (Cont.)	

@PPK	Kill a specific popup page from all pages. Kills refers to the deactivating (Off) of a popup window from all pages. If the pop-up page is part of a group, the whole group is deactivated. This command works in the same way as the 'Clear Group' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPK-<popup page name>'"`
	Variable:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	Example:
	`SEND_COMMAND Device,"'@PPK-Popup1'"`
	Kills the popup page 'Popup1' on all pages.

@PPM	Set the modality for a specific popup page to either Modal or Non-Modal. A Modal popup page, when active, only allows you to use the buttons and features on that popup page. All other buttons on the panel page are inactivated.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPM-<popup page name>;<mode>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• mode = NONMODAL converts a previously Modal popup page to a NonModal.
	MODAL converts a previously NonModal popup page to Modal.
	modal = 1 and non-modal = 0
	Examples:
	`SEND_COMMAND Device,"'@PPM-Popup1;Modal'"`
	Sets the popup page 'Popup1' to Modal.
	`SEND_COMMAND Device,"'@PPM-Popup1;1'"`
	Sets the popup page 'Popup1' to Modal.

@PPN	Activate a specific popup page to launch on either a specified page or the current page. If the page name is empty, the current page is used (see example 2). If the popup page is already on, do not re-draw it. This command works in the same way as the 'Show Popup' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPN-<popup page name>;<page name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On
	Example:
	`SEND_COMMAND Device,"'@PPN-Popup1;Main'"`
	Activates 'Popup1' on the 'Main' page.
	Example 2:
	`SEND_COMMAND Device,"'@PPN-Popup1'"`
	Activates the popup page 'Popup1' on the current page.

@PPT	Set a specific popup page to timeout within a specified time. Timeout is in 1/10 seconds. If timeout is empty, popup page will clear the timeout.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPT-<popup page name>;<timeout>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• timeout = timeout duration in 1/10ths of a second.
	Example:
	`SEND_COMMAND Device,"'@PPT-Popup1;30'"`
	Sets the popup page 'Popup1' to timeout within 3 seconds.

@PPX	Close all popups on all pages. This command works in the same way as the 'Clear All' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PPX'"`
	Example:
	`SEND_COMMAND Panel,"'@PPX'"`
	Close all popups on all pages.

@PSE	Set the show effect for the specified popup page to the named show effect.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PSE-<popup page name>;<show effect name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	• show effect name = Refers to the popup effect name being used.
	Example:
	`SEND_COMMAND Device,"'@PSE-Popup1;Slide from Left'"`
	Sets the Popup1 show effect name to 'Slide from Left'.

Page Commands (Cont.)	

@PSP	Set the show effect position. Only 1 coordinate is ever needed for an effect, however the command will specify both. This command sets the location at which the effect will begin at.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PSP-<popup page name>;<x coordinate>,<y coordinate>'"`
	Variable:
	• popup page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'@PSP-Popup1;100,0'"`
	Sets the Popup1 show effect x-coordinate value to 100 and the y-coordinate value to 0.

@PST	Set the show effect time for the specified popup page.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PST-<popup page name>;<show effect time>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	• show effect time = Given in 1/10ths of a second.
	Example:
	`SEND_COMMAND Device,"'@PST-Popup1;50'"`
	Sets the Popup1 show effect time to 5 seconds.

PPOF	Deactivate a specific popup page on either a specified page or the current page. If the page name is empty, the current page is used (see example 2). If the popup page is part of a group, the whole group is deactivated. This command works in the same way as the 'Hide Popup' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'PPOF-<popup page name>;<page name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'PPOF-Popup1;Main'"`
	Deactivates the popup page 'Popup1' on the Main page.
	Example 2:
	`SEND_COMMAND Device,"'PPOF-Popup1'"`
	Deactivates the popup page 'Popup1' on the current page.

PPOG	Toggle a specific popup page on either a specified page or the current page. If the page name is empty, the current page is used (see example 2). Toggling refers to the activating/deactivating (On/Off) of a popup page. This command works in the same way as the 'Toggle Popup' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'PPOG-<popup page name>;<page name>'"`
	Variables:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'PPOG-Popup1;Main'"`
	Toggles the popup page 'Popup1' on the Main page from one state to another (On/Off).
	Example 2:
	`SEND_COMMAND Device,"'PPOG-Popup1'"`
	Toggles the popup page 'Popup1' on the current page from one state to another (On/Off).

PPON	Activate a specific popup page to launch on either a specified page or the current page. If the page name is empty, the current page is used (see example 2). If the popup page is already On, do not re-draw it. This command works in the same way as the 'Show Popup' command in TPDesign4.
	Syntax:
	`SEND_COMMAND <DEV>,"'PPON-<popup page name>;<page name>'"`
	Variable:
	• popup page name = 1 - 50 ASCII characters. Name of the popup page.
	• page name = 1 - 50 ASCII characters. Name of the page the popup is displayed On.
	Example:
	`SEND_COMMAND Device,"'PPON-Popup1;Main'"`
	Activates the popup page 'Popup1' on the Main page.
	Example 2:
	`SEND_COMMAND Device,"'PPON-Popup1'"`
	Activates the popup page 'Popup1' on the current page.

Button Commands

These Button Commands are used in the NetLinx protocol and are case insensitive.

All commands that begin with "^" have the capability of assigning a variable text address range and button state range.

A device must first be defined in the NetLinx programming language with values for the Device: Port: System (in all programming examples - *Remote* is used in place of these values).

- **Variable text ranges** allow you to target one or more variable text channels in a single command.
- **Button State ranges** allow you to target one or more states of a variable text button with a single command.
- The **"."** Character is used for the 'through' notation, also the "&" character is used for the 'And' notation.

Button Query Commands

Button Query commands reply back with a custom event. Each button/state combination has one custom event. Each query is assigned a unique custom event type. The following example is for debug purposes only:

```
NetLinx Example: CUSTOM_EVENT[device, Address, type]
DEFINE_EVENT
CUSTOM_EVENT[TP,529,1001]      // Text
CUSTOM_EVENT[TP,529,1002]      // Bitmap
CUSTOM_EVENT[TP,529,1003]      // Icon
CUSTOM_EVENT[TP,529,1004]      // Text Justification
CUSTOM_EVENT[TP,529,1005]      // Bitmap Justification
CUSTOM_EVENT[TP,529,1006]      // Icon Justification
CUSTOM_EVENT[TP,529,1007]      // Font
CUSTOM_EVENT[TP,529,1008]      // Text Effect Name
CUSTOM_EVENT[TP,529,1009]      // Text Effect Color
CUSTOM_EVENT[TP,529,1010]      // Word Wrap
CUSTOM_EVENT[TP,529,1011]      // ON state Border Color
CUSTOM_EVENT[TP,529,1012]      // ON state Fill Color
CUSTOM_EVENT[TP,529,1013]      // ON state Text Color
CUSTOM_EVENT[TP,529,1014]      // Border Name
CUSTOM_EVENT[TP,529,1015]      // Opacity
 {
    SEND_STRING 0,"'ButtonGet Id=',ITOA(CUSTOM.ID),' Type=',ITOA(CUSTOM.TYPE)"
    SEND_STRING 0,"'Flag   =',ITOA(CUSTOM.FLAG)"
    SEND_STRING 0,"'VALUE1 =',ITOA(CUSTOM.VALUE1)"
    SEND_STRING 0,"'VALUE2 =',ITOA(CUSTOM.VALUE2)"
    SEND_STRING 0,"'VALUE3 =',ITOA(CUSTOM.VALUE3)"
    SEND_STRING 0,"'TEXT   =',CUSTOM.TEXT"
    SEND_STRING 0,"'TEXT LENGTH =',ITOA(LENGTH_STRING(CUSTOM.TEXT))"
 }
```

All custom events have the following 6 fields:

Field	Description
Uint Flag	0 means text is a standard string, 1 means Unicode encoded string
slong value1	button state number
slong value2	actual length of string (this is not encoded size)
slong value3	index of first character (usually 1 or same as optional index)
string text	the text from the button
text length	button text length

These fields are populated differently for each query command. The Encode field is not used in any command.

Button Commands	

^ANI	Run a button animation (in 1/10 second).
	Syntax:
	`"'^ANI-<vt addr range>,<start state>,<end state>,<time>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• start state = Beginning of button state (0= current state).
	• end state = End of button state.
	• time = In 1/10 second intervals.
	Example:
	`SEND_COMMAND Panel,"'^ANI-500,1,25,100'"`
	Runs a button animation at text range 500 from state 1 to state 25 for 10 second.

Button Commands (Cont.)	

^APF	Add page flip action to a button if it does not already exist.
	Syntax:
	`"'^APF-<vt addr range>,<page flip action>,<page name>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• page flip action =
	Stan[dardPage] - Flip to standard page
	Prev[iousPage] - Flip to previous page
	Show[Popup] - Show Popup page
	Hide[Popup] - Hide Popup page
	Togg[lePopup] - Toggle popup state
	ClearG[roup] - Clear popup page group from all pages
	ClearP[age] - Clear all popup pages from a page with the specified page name
	ClearA[ll] - Clear all popup pages from all pages
	• page name = 1 - 50 ASCII characters.
	Example:
	`SEND COMMAND Device,"'^APF-400,Stan,Main Page'"`
	Assigns a button to a standard page flip with page name 'Main Page'.

^BAT	Append non-unicode text.
	Syntax:
	`"'^BAT-<vt addr range>,<button states range>,<new text>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• new text = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'^BAT-520,1,Enter City'"`
	Appends the text 'Enter City' to the button's OFF state.

^BAU	Append unicode text. Same format as ^UNI.
	Syntax:
	`"'^BAU-<vt addr range>,<button states range>,<unicode text>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• unicode text = 1 - 50 ASCII characters. Unicode characters must be entered in Hex format.
	Example:
	`SEND_COMMAND Device,"'^BAU-520,1,00770062'"`
	Appends Unicode text '00770062' to the button's OFF state.

^BCB	Set the border color to the specified color **only if** the specified border color is not the same as the current color.
	Note: Color can be assigned by color name (without spaces), number or R,G,B value (RRGGBB or RRGGBBAA).
	Syntax:
	`"'^BCB-<vt addr range>,<button states range>,<color value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• color value = Refer to *RGB Values for all 88 Basic Colors* on page 58 for more information.
	Example:
	`SEND_COMMAND Device,"'^BCB-500.504&510,1,12'"`
	Sets the Off state border color to 12 (Yellow). Colors can be set by Color Numbers, Color name, R,G,B,alpha colors (RRGGBBAA) and R, G & B colors values (RRGGBB). Refer to *RGB Values for all 88 Basic Colors* on page 58.

Button Commands (Cont.)	

?BCB	Get the current border color.
	Syntax:
	`SEND_COMMAND <DEV>,"'?BCB-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1011:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string (should be 9)
	Value3 - Zero
	Text - Hex encoded color value (ex: #000000FF)
	Text length - Color name length (should be 9)
	Example:
	`SEND COMMAND Device,"'?BCB-529,1'"`
	Gets the button 'OFF state' border color information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1011
	Flag = 0
	VALUE1 = 1
	VALUE2 = 9
	VALUE3 =0
	TEXT = #222222FF
	TEXT LENGTH = 9

^BCF	Set the fill color to the specified color **only if** the specified fill color is not the same as the current color.
	Note: Color can be assigned by color name (without spaces), number or R,G,B value (RRGGBB or RRGGBBAA).
	Syntax:
	`"'^BCF-<vt addr range>,<button states range>,<color value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• color value = Refer to *RGB Values for all 88 Basic Colors* on page 58 for more information.
	Example:
	`SEND_COMMAND Device,"'^BCF-500.504&510.515,1,12'"`
	`SEND_COMMAND Device,"'^BCF-500.504&510.515,1,Yellow'"`
	`SEND_COMMAND Device,"'^BCF-500.504&510.515,1,#F4EC0A63''"`
	`SEND_COMMAND Device,"'^BCF-500.504&510.515,1,#F4EC0A'"`
	Sets the Off state fill color by color number. Colors can be set by Color Numbers, Color name, R,G,B,alpha colors (RRGGBBAA) and R, G & B colors values (RRGGBB).

?BCF	Get the current fill color.
	Syntax:
	`SEND_COMMAND <DEV>,"'?BCB-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1012:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string (should be 9)
	Value3 - Zero
	Text - Hex encoded color value (ex: #000000FF)
	Text length - Color name length (should be 9)
	Example:
	`SEND COMMAND Device,"'?BCF-529,1'"`
	Gets the button 'OFF state' fill color information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1012
	Flag = 0
	VALUE1 = 1
	VALUE2 =9
	VALUE3 = 0
	TEXT = #FF8000FF
	TEXT LENGTH = 9

Button Commands (Cont.)	

^BCT	Set the text color to the specified color **only if** the specified text color is not the same as the current color.
	Note: Color can be assigned by color name (without spaces), number or R,G,B value (RRGGBB or RRGGBBAA).
	Syntax:
	`"'^BCT-<vt addr range>,<button states range>,<color value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• color value = Refer to *RGB Values for all 88 Basic Colors* on page 58 for more information.
	Example:
	`SEND_COMMAND Device,"'^BCT-500.504&510,1,12'"`
	Sets the Off state border color to 12 (Yellow). Colors can be set by Color Numbers, Color name, R,G,B,alpha colors (RRGGBBAA) and R, G & B colors values (RRGGBB).

?BCT	Get the current text color.
	Syntax:
	`SEND_COMMAND <DEV>,"'?BCT-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1013:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string (should be 9)
	Value3 - Zero
	Text - Hex encoded color value (ex: #000000FF)
	Text length - Color name length (should be 9)
	Example:
	`SEND COMMAND Device,"'?BCT-529,1'"`
	Gets the button 'OFF state' text color information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1013
	Flag = 0
	VALUE1 = 1
	VALUE2 = 9
	VALUE3 = 0
	TEXT = #FFFFFEFF
	TEXT LENGTH = 9

^BDO	Set the button draw order
	Syntax:
	`"'^BDO-<vt addr range>,<button states range>,<1-5><1-5><1-5><1-5><1-5>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• layer assignments = Fill Layer = 1
	Image Layer = 2
	Icon Layer = 3
	Text Layer = 4
	Border Layer = 5
	Note: The layer assignments are from bottom to top. The default draw order is **12345**.
	Example:
	`SEND_COMMAND Device,"'^BDO-530,1&2,51432'"`
	Sets the button's variable text 530 ON/OFF state draw order (from bottom to top) to Border, Fill, Text, Icon, and Image.
	Example 2:
	`SEND_COMMAND Device,"'^BDO-1,0,12345'"`
	Sets all states of a button back to its default drawing order.

^BFB	Set the feedback type of the button. **ONLY works** on General-type buttons.
	Syntax:
	`"'^BFB-<vt addr range>,<feedback type>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• feedback type = (None, Channel, Invert, On (Always on), Momentary, and Blink).
	Example:
	`SEND_COMMAND Remote,"'^BFB-500,Momentary'"`
	Sets the Feedback type of the button to 'Momentary'.

Button Commands (Cont.)	

^BIM	Set the input mask for the specified address.
	Syntax:
	`"'^BIM-<vt addr range>,<input mask>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• input mask = Refer to the *Input Commands* section on page 52 for character types.
	Example:
	`SEND_COMMAND Device,"'^BIM-500,AAAAAAAAAA'"`
	Sets the input mask to ten 'A' characters, that are required, to either a letter or digit **(entry is required).**

^BMC	Copy attributes of the source button to all the destination buttons. Note that the source is a single button state. Each state must be copied as a separate command. The <codes> section represents what attributes will be copied. All codes are 2 char pairs that can be separated by comma, space, percent or just ran together.
	Syntax:
	`"'^BMC-<vt addr range>,<button states range>,<source port>,<source address>,<source state>,<codes>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• source port = 1 - 100.
	• source address = 1 - 4000.
	• source state = 1 - 256.
	codes:
	BM - Picture/Bitmap
	BR - Border
	CB - Border Color
	CF - Fill Color
	CT - Text Color
	EC - Text effect color
	EF - Text effect
	FT - Font
	IC - Icon
	JB - Bitmap alignment
	JI - Icon alignment
	JT - Text alignment
	LN - Lines of video removed
	OP - Opacity
	TX - Text
	WW - Word wrap on/off
	Example:
	`SEND_COMMAND Device,"'^BMC-425,1,1,500,1,BR'"`
	or
	`SEND_COMMAND Device,"'^BMC-425,1,1,500,1,%BR'"`
	Copies the OFF state border of button with a variable text address of 500 onto the OFF state border of button with a variable text address of 425.
	Example 2:
	`SEND_COMMAND Device,"'^BMC-150,1,1,315,1,%BR%FT%TX%BM%IC%CF%CT'"`
	Copies the OFF state border, font, Text, bitmap, icon, fill color and text color of the button with a variable text address of 315 onto the OFF state border, font, Text, bitmap, icon, fill color and text color of the button with a variable text address of 150.

^BMF	See page 49.

^BMI	Mask image is used to crop a borderless button to a non-square shape. This is typically used with a bitmap.
	Syntax:
	`"'^BMI-<vt addr range>,<button states range>,<mask image>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• mask image = Graphic file used.
	Example:
	`SEND_COMMAND Device,"'^BMI-530,1&2,newMac.png'"`
	Sets the button with variable text 530 ON/OFF state mask image to 'newmac.png'.

Button Commands (Cont.)	

^BMP	Assign a picture to those buttons with a defined address range.
	Syntax:
	`"'^BMP-<vt addr range>,<button states range>,<name of bitmap/picture>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• name of bitmap/picture = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'^BMP-500.504&510.515,1,bitmap.png'"`
	Sets the OFF state picture for the buttons with variable text ranges of 500-504 & 510-515.

?BMP	Get the current bitmap name.
	Syntax:
	`SEND_COMMAND <DEV>,"'?BMP-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1002:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string
	Value3 - Zero
	Text - String that represents the bitmap name
	Text length - Bitmap name text length (should be 9)
	Example:
	`SEND COMMAND Device,"'?BMP-529,1'"`
	Gets the button 'OFF state' bitmap information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1002
	Flag = 0
	VALUE1 = 1
	VALUE2 = 9
	VALUE3 = 0
	TEXT = Buggs.png
	TEXT LENGTH = 9

?BOP	Get the overall button opacity.
	Syntax:
	`SEND_COMMAND <DEV>,"'?BOP-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1015:
	Flag - Zero
	Value1 - Button state number
	Value2 - Opacity
	Value3 - Zero
	Text - Blank
	Text length - Zero
	Example:
	`SEND COMMAND Device,"'?BOP-529,1'"`
	Gets the button 'OFF state' opacity information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1015
	Flag = 0
	VALUE1 = 1
	VALUE2 = 200
	VALUE3 = 0
	TEXT =
	TEXT LENGTH = 0

Button Commands (Cont.)	

^BOR	Set a border to a specific border style associated with a border value for those buttons with a defined address range.
	Syntax:
	`"'^BOR-<vt addr range>,<border style name or border value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• border style name = Refer to theBorder Styles by Numbers table on page 60.
	• border value = 0 - 41.
	Examples:
	`SEND_COMMAND Device,"'^BOR-500.504&510.515,10'"`
	Sets the border by number (#10) to those buttons with the variable text range of 500-504 & 510-515.
	`SEND_COMMAND Device,"'^BOR-500.504&510,AMX Elite -M'"`
	Sets the border by name (AMX Elite) to those buttons with the variable text range of 500-504 & 510-515. The border style is available through the TPDesign4 border-style drop-down list. Refer to *Border Styles by Numbers* on page 60 for more information.

^BPP	Set or clear the protected page flip flag of a button. Zero clears the flag.
	Syntax:
	`"'^BPP-<vt addr range>,<protected page flip flag value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• protected page flip flag value range = 0 - 4 (**0 clears the flag**).
	Example:
	`SEND_COMMAND Device,"'^BPP-500,1'"`
	Sets the button to protected page flip flag 1 (sets it to password 1).

^BRD	Set the border of a button state/states **only if** the specified border is not the same as the current border. The border names are available through the TPDesign4 border-name drop-down list.
	Syntax:
	`"'^BRD-<vt addr range>,<button states range>,<border name>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• border name = Refer toBorder Styles by Numbers table on page 60.
	Example:
	`SEND_COMMAND Device,"'^BRD-500.504&510.515,1&2,Quad Line'"`
	Sets the border by name (Quad Line) to those buttons with the variable text range of 500-504 & 510-515. Refer to *Border Styles by Name and Numbers* on page 60.

?BRD	Get the current border name.
	Syntax:
	`SEND_COMMAND <DEV>,"'?BRD-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1014:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string
	Value3 - Zero
	Text - String that represents border name
	Text length - Border name length
	Example:
	`SEND COMMAND Device,"'?BRD-529,1'"`
	Gets the button 'OFF state' border information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1014
	Flag = 0
	VALUE1 = 1
	VALUE2 = 22
	VALUE3 = 0
	TEXT = Double Bevel Raised -L
	TEXT LENGTH = 22

Button Commands (Cont.)	

^BSF	Set the focus to the text area.
	Note: Select one button at a time (single variable text address). Do not assign a variable text address range to set focus to multiple buttons. Only one variable text address can be in focus at a time.
	Syntax:
	`"'^BSF-<vt addr range>,<selection value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• selection value = Unselect = 0 and select = 1.
	Example:
	`SEND_COMMAND Device,"'^BSF-500,1'"`
	Sets the focus to the text area of the button.

^BSM	This command causes the text areas to send their text as strings to the NetLinx Master.
	Syntax:
	`"'^BSM-<vt addr range>'"`
	Variable:
	• variable text address range = 1 - 4000.
	Example:
	`SEND_COMMAND Device,"'^BSM-500'"`
	Submits the text of the text area button.

^BSP	Set the button size and its position on the page.
	Syntax:
	`"'^BSP-<vt addr range>,<left>,<top>,<right>,<bottom>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• left = left side of page.
	• top = top of page.
	• right = right side of page.
	• bottom = bottom of page.
	Example:
	`SEND_COMMAND Device,"'^BSP-530,left,top'"`
	Sets the button with variable text 530 in the left side top of page.

^BWW	Set the button word wrap feature to those buttons with a defined address range. By default, word-wrap is Off.
	Syntax:
	`"'^BWW-<vt addr range>,<button states range>,<word wrap>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• word wrap = (0=Off and 1=On). Default is Off.
	Example:
	`SEND_COMMAND Device,"'^BWW-500,1,1'"`
	Sets the word wrap on for the button's Off state.

?BWW	Get the current word wrap flag status.
	Syntax:
	`SEND_COMMAND <DEV>,"'?BWW-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1010:
	Flag - Zero
	Value1 - Button state number
	Value2 - 0 = no word wrap, 1 = word wrap
	Value3 - Zero
	Text - Blank
	Text length - Zero
	Example:
	`SEND COMMAND Device,"'?BWW-529,1'"`
	Gets the button 'OFF state' word wrap flag status information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1010
	Flag = 0
	VALUE1 = 1
	VALUE2 = 1
	VALUE3 = 0
	TEXT =
	TEXT LENGTH = 0

Button Commands (Cont.)	

^CPF	Clear all page flips from a button.
	Syntax:
	`"'^CPF-<vt addr range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	Example:
	`SEND_COMMAND Remote,"'^CPF-500'"`
	Clears all page flips from the button.

^DPF	Delete page flips from button if it already exists.
	Syntax:
	`"'^DFP-<vt addr range>,<actions>,<page name>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• actions =
	Stan[dardPage] - Flip to standard page
	Prev[iousPage] - Flip to previous page
	Show[Popup] - Show Popup page
	Hide[Popup] - Hide Popup page
	Togg[lePopup] - Toggle popup state
	ClearG[roup] - Clear popup page group from all pages
	ClearP[age] - Clear all popup pages from a page with the specified page name
	ClearA[ll] - Clear all popup pages from all pages
	• page name = 1 - 50 ASCII characters.
	Example:
	`SEND COMMAND Device,"'^DPF-409,Prev'"`
	Deletes the assignment of a button from flipping to a previous page.

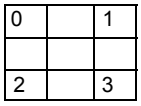
^ENA	Enable or disable buttons with a set variable text range.
	Syntax:
	`"'^ENA-<vt addr range>,<command value>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• command value = (0= disable, 1= enable)
	Example:
	`SEND_COMMAND Device,"'^ENA-500.504&510.515,0'"`
	Disables button pushes on buttons with variable text range 500-504 & 510-515.

^FON	Set a font to a specific Font ID value for those buttons with a defined address range. Font ID numbers are generated by the TPDesign4 programmers report.
	Syntax:
	`"'^FON-<vt addr range>,<button states range>,<font value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• font value = range = 1 - XXX. Refer to theFixed Fonts and ID Numbers table on page 59.
	Example:
	`SEND_COMMAND Device,"'^FON-500.504&510.515,1&2,4'"`
	Sets the font size to font ID #4 for the On and Off states of buttons with the variable text range of 500-504 & 510-515.
	Note: The Font ID is generated by TPD4 and is located in TPD4 through the Main menu.
	Panel > Generate Programmer's Report >Text Only Format >Readme.txt.

Button Commands (Cont.)	

?FON	Get the current font index.
	Syntax:
	`SEND_COMMAND <DEV>,"'?FON-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1007:
	Flag - Zero
	Value1 - Button state number
	Value2 - Font index
	Value3 - Zero
	Text - Blank
	Text length - Zero
	Example:
	`SEND COMMAND Device,"'?FON-529,1'"`
	Gets the button 'OFF state' font type index information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1007
	Flag = 0
	VALUE1 = 1
	VALUE2 =72
	VALUE3 = 0
	TEXT =
	TEXT LENGTH = 0

^GDI	Change the bargraph drag increment.
	Syntax:
	`"'^GDI-<vt addr range>,<bargraph drag increment>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• bargraph drag increment = The default drag increment is 256.
	Example:
	`SEND_COMMAND Device,"'^GDI-7,128'"`
	Sets the bargraph with variable text 7 to a drag increment of 128.

^GIV	Invert the joystick axis to move the origin to another corner. Parameters 1,2, and 3 will cause a bargraph or slider to be inverted regardless of orientation. Their effect will be as described for joysticks.
	Syntax:
	`"'^GIV-<vt addr range>,<joystick axis to invert>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• joystick axis to invert = 0 - 3.
	 
	0 = Normal
	1 = Invert horizontal axis
	2 = Invert vertical axis
	3 = Invert both axis locations
	For a bargraph 1 = Invert , 0 = Non Invert
	Example:
	`SEND_COMMAND Device,"'^GIV-500,3'"`
	Inverts the joystick axis origin to the bottom right corner.

^GLH	Change the bargraph upper limit.
	Syntax:
	`"'^GLH-<vt addr range>,<bargraph hi>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• bargraph limit range = 1 - 65535 (*bargraph upper limit range*).
	Example:
	`SEND_COMMAND Device,"'^GLH-500,1000'"`
	Changes the bargraph upper limit to 1000.

Button Commands (Cont.)	

^GLL	Change the bargraph lower limit.
	Syntax:
	`"'^GLL-<vt addr range>,<bargraph low>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• bargraph limit range = 1 - 65535 (*bargraph lower limit range*).
	Example:
	`SEND_COMMAND Device,"'^GLL-500,150'"`
	Changes the bargraph lower limit to 150.

^GRD	Change the bargraph ramp-down time in 1/10th of a second.
	Syntax:
	`"'^GRD-<vt addr range>,<bargraph ramp down time>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• bargraph ramp down time = In 1/10th of a second intervals.
	Example:
	`SEND_COMMAND Device,"'^GRD-500,200'"`
	Changes the bargraph ramp down time to 20 seconds.

^GRU	Change the bargraph ramp-up time in 1/10th of a second.
	Syntax:
	`"'^GRU-<vt addr range>,<bargraph ramp up time>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• bargraph ramp up time = In 1/10th of a second intervals.
	Example:
	`SEND_COMMAND Device,"'^GRU-500,100'"`
	Changes the bargraph ramp up time to 10 seconds.

^GSC	Change the bargraph slider color or joystick cursor color. A user can also assign the color by Name and R,G,B value (RRGGBB or RRGGBBAA).
	Syntax:
	`"'^GSC-<vt addr range>,<color value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• color value = Refer to *RGB Values for all 88 Basic Colors* on page 58.
	Example:
	`SEND_COMMAND Device,"'^GSC-500,12'"`
	Changes the bargraph or joystick slider color to Yellow.

^GSN	Change the bargraph slider name or joystick cursor name. Slider names and cursor names can be found in the TPDesign4 slider name and cursor drop-down list. Syntax: `"'^GSN-<vt addr range>,<bargraph slider name>'"` Variable: • variable text address range = 1 - 4000. • bargraph slider name = See table below.

Bargraph Slider Names:		
None	Ball	Circle -L
Circle -M	Circle -S	Precision
Rectangle -L	Rectangle -M	Rectangle -S
Windows	Windows Active	
Joystick Cursor Names:		
None	Arrow	Ball
Circle	Crosshairs	Gunsight
Hand	Metal	Spiral
Target	View Finder	

Example:
`SEND_COMMAND Device,"'^GSN-500,Ball'"`
Changes the bargraph slider name or the Joystick cursor name to 'Ball'.

Button Commands (Cont.)	

^ICO	Set the icon to a button.
	Syntax:
	`"'^ICO-<vt addr range>,<button states range>,<icon index>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• icon index range = 0 - 9900 (**a value of 0 is clear**).
	Example:
	`SEND_COMMAND Device,"'^ICO-500.504&510.515,1&2,1'"`
	Sets the icon for On and Off states for buttons with variable text ranges of 500-504 & 510-515.

?ICO	Get the current icon index.
	Syntax:
	`SEND_COMMAND <DEV>,"'?ICO-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1003:
	Flag - Zero
	Value1 - Button state number
	Value2 - Icon index
	Value3 - Zero
	Text - Blank
	Text length - Zero
	Example:
	`SEND COMMAND Device,"'?ICO-529,1'"`
	Gets the button 'OFF state' icon index information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1003
	Flag = 0
	VALUE1 = 2
	VALUE2 = 12
	VALUE3 = 0
	TEXT =
	TEXT LENGTH = 0

^JSB	Set bitmap/picture alignment using a numeric keypad layout for those buttons with a defined address range.The alignment of 0 is followed by ',<left>,<top>'. The left and top coordinates are relative to the upper left corner of the button.
	Syntax:
	`"'^JSB-<vt addr range>,<button states range>,<new text alignment>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• new text alignment = Value of 1- 9 corresponds to the following locations:
	0
	1 2 3
	4 5 6
	7 8 9
	Zero can be used for an absolute position
	Example:
	`SEND_COMMAND Device,"'^JSB-500.504&510.515,1&2,1'"`
	Sets the off/on state picture alignment to upper left corner for those buttons with variable text ranges of 500-504 & 510-515.

Button Commands (Cont.)	

?JSB	Get the current bitmap justification.
	Syntax:
	`SEND_COMMAND <DEV>,"'?JSB-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1005:
	Flag - Zero
	Value1 - Button state number
	Value2 - 1 - 9 justify
	Value3 - Zero
	Text - Blank
	Text length - Zero
	Example:
	`SEND COMMAND Device,"'?JSB-529,1'"`
	Gets the button 'OFF state' bitmap justification information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1005
	Flag = 0
	VALUE1 = 1
	VALUE2 = 5
	VALUE3 = 0
	TEXT =
	TEXT LENGTH = 0

^JSI	Set icon alignment using a numeric keypad layout for those buttons with a defined address range. The alignment of 0 is followed by ',<left>,<top>'. The left and top coordinates are relative to the upper left corner of the button.
	Syntax:
	`"'^JSI-<vt addr range>,<button states range>,<new icon alignment>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• new icon alignment = Value of 1 - 9 corresponds to the following locations:
	0
	1 2 3
	4 5 6
	7 8 9
	Zero can be used for an absolute position
	Example:
	`SEND_COMMAND Device,"'^JSI-500.504&510.515,1&2,1'"`
	Sets the Off/On state icon alignment to upper left corner for those buttons with variable text range of 500-504 & 510-515.

?JSI	Get the current icon justification.
	Syntax:
	`SEND_COMMAND <DEV>,"'?JSI-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1006:
	Flag - Zero
	Value1 - Button state number
	Value2 - 1 - 9 justify
	Value3 - Zero
	Text - Blank
	Text length - Zero
	Example:
	`SEND COMMAND Device,"'?JSI-529,1'"`
	Gets the button 'OFF state' icon justification information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1006
	Flag = 0
	VALUE1 = 1
	VALUE2 = 6
	VALUE3 = 0
	TEXT =
	TEXT LENGTH = 0

Button Commands (Cont.)	

^JST	Set text alignment using a numeric keypad layout for those buttons with a defined address range. The alignment of 0 is followed by ',<left>,<top>'. The left and top coordinates are relative to the upper left corner of the button.
	Syntax:
	`"'^JST-<vt addr range>,<button states range>,<new text alignment>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• new text alignment = Value of 1 - 9 corresponds to the following locations:
	0
	1 2 3
	4 5 6
	7 8 9
	Zero can be used for an absolute position
	Example:
	`SEND_COMMAND Device,"'^JST-500.504&510.515,1&2,1'"`
	Sets the text alignment to the upper left corner for those buttons with variable text ranges of 500-504 & 510-515.

?JST	Get the current text justification.
	Syntax:
	`SEND_COMMAND <DEV>,"'?JST-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1004:
	Flag - Zero
	Value1 - Button state number
	Value2 - 1 - 9 justify
	Value3 - Zero
	Text - Blank
	Text length - Zero
	Example:
	`SEND COMMAND Device,"'?JST-529,1'"`
	Gets the button 'OFF state' text justification information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1004
	Flag = 0
	VALUE1 = 1
	VALUE2 = 1
	VALUE3 = 0
	TEXT =
	TEXT LENGTH = 0

^SHO	Show or hide a button with a set variable text range.
	Syntax:
	`"'^SHO-<vt addr range>,<command value>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• command value = (0= hide, 1= show).
	Example:
	`SEND_COMMAND Device,"'^SHO-500.504&510.515,0'"`
	Hides buttons with variable text address range 500-504 & 510-515.

^TEC	Set the text effect color for the specified addresses/states to the specified color. The Text Effect is specified by name and can be found in TPD4. You can also assign the color by name or RGB value (RRGGBB or RRGGBBAA).
	Syntax:
	`"'^TEC-<vt addr range>,<button states range>,<color value>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• color value = Refer to *RGB Values for all 88 Basic Colors* on page 58.
	Example:
	`SEND_COMMAND Device,"'^TEC-500.504&510.515,1&2,12'"`
	Sets the text effect color to Very Light Yellow on buttons with variable text 500-504 and 510-515.

Button Commands (Cont.)	

?TEC	Get the current text effect color.
	Syntax:
	`SEND_COMMAND <DEV>,"'?TEC-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1009:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string (should be 9)
	Value3 - Zero
	Text - Hex encoded color value (ex: #000000FF)
	Text length - Color name length (should be 9)
	Example:
	`SEND COMMAND Device,"'?TEC-529,1'"`
	Gets the button 'OFF state' text effect color information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1009
	Flag = 0
	VALUE1 = 1
	VALUE2 = 9
	VALUE3 = 0
	TEXT = #5088F2AE
	TEXT LENGTH = 9

^TEF	Set the text effect. The Text Effect is specified by name and can be found in TPD4.
	Syntax:
	`"'^TEF-<vt addr range>,<button states range>,<text effect name>'"`
	Variable:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• text effect name = Refer to theText Effects table on page 61 for a listing of text effect names.
	Example:
	`SEND_COMMAND Device,"'^TEF-500.504&510.515,1&2,Soft Drop Shadow 3'"`
	Sets the text effect to Soft Drop Shadow 3 for the button with variable text range 500-504 and 510-515.

?TEF	Get the current text effect name.
	Syntax:
	`SEND_COMMAND <DEV>,"'?TEF-<vt addr range>,<button states range>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• custom event type = 1008:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string
	Value3 - Zero
	Text - String that represents the text effect name
	Text length - Text effect name length
	Example:
	`SEND COMMAND Device,"'?TEF-529,1'"`
	Gets the button 'OFF state' text effect name information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1008
	Flag = 0
	VALUE1 = 1
	VALUE2 = 18
	VALUE3 = 0
	TEXT = Hard Drop Shadow 3
	TEXT LENGTH = 18

Button Commands (Cont.)	

^TXT	Assign a text string to those buttons with a defined address range. Sets Non-Unicode text.
	Syntax:
	`"'^TXT-<vt addr range>,<button states range>,<new text>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 2 (1 = Off state, 2 = On state).
	• new text = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'^TXT-500.504&510.515,1&2,Test Only'"`
	Sets the On and Off state text for buttons with the variable text ranges of 500-504 & 510-515.

?TXT	Get the current text information.
	Syntax:
	`SEND_COMMAND <DEV>,"'?TXT-<vt addr range>,<button states range>,<optional index>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• optional index = This is used if a string was too long to get back in one command. The reply will start at this index.
	• custom event type = 1001:
	Flag - Zero
	Value1 - Button state number
	Value2 - Actual length of string
	Value3 - Index
	Text - Text from the button
	Text length - Button text length
	Example:
	`SEND COMMAND Device,"'?TXT-529,1'"`
	Gets the button 'OFF state' text information.
	The result sent to the Master would be:
	ButtonGet Id = 529 Type = 1001
	Flag = 0
	VALUE1 = 1
	VALUE2 = 14
	VALUE3 = 1
	TEXT = This is a test
	TEXT LENGTH = 14

^UNI	Set Unicode text. For the ^UNI command (%UN and ^BMF command), the Unicode text is sent as ASCII-HEX nibbles.
	Syntax:
	`"'^UNI-<vt addr range>,<button states range>,<unicode text>'"`
	Variables:
	• variable text address range = 1 - 4000.
	• button states range = 1 - 2 (1 = Off state, 2 = On state).
	• unicode text = Unicode HEX value.
	Example:
	`SEND_COMMAND Device,"'^UNI-500,1,0041'"`
	Sets the button's unicode character to 'A'.
	Note: To send the variable text 'A' in unicode to all states of the variable text button 1, (for which the character code is 0041 Hex), send the following command:
	`SEND_COMMAND Device,"'^UNI-1,0,0041'"`
	Note: Unicode is always represented in a HEX value.

"^" Button Commands with Embedded Codes

These Button Commands are used in the NetLinx protocol and are case insensitive.

All commands that begin with "^" have the capability of assigning a variable text address range and button state range. **A device must first be defined in the NetLinx programming language with values for the Device: Port: System** (in all programming examples - *Remote* is used in place of these values).

- **Variable text ranges** allow you to target 1 or more variable text channels in a single command.
- **Button State ranges** allow you to target 1 or more states of a variable text button with a single command.

The **"."** Character is used for the 'through' notation, also the "**&**" character is used for the 'And' notation.

"^" Button Commands with Embedded Codes	

^BMF	Set any/all button parameters by sending embedded codes and data.
	Syntax:
	`"'^BMF-<vt addr range>,<button states range>,<data>'"`
	Variables:
	• variable text address char array = 1 - 4000.
	• button states range = 1 - 256 for multi-state buttons (0 = All states, for General buttons 1 = Off state and 2 = On state).
	• level range = 1 - 600 (level value is 1 - 65535).
	• data:
	• '%B<border style>' = Set the border style name. See the Border Styles by Numbers table on page 60.
	• '%B',<border 0-27,40,41> = Set the border style number.
	• '%DO<1-5><1-5><1-5><1-5><1-5> = Set the draw order. Listed from bottom to top. Refer to the ^BDO command on page 36 for more information.
	• '%F',<font 1-8,10,11,20-29,32-xx> = Set the font.
	• '%F<font 01-08,10,11,20-29,32-xx>' = Set the font.
	• '%MI<mask image>' = Set the mask image.
	• '%T<text >' = Set the text using ASCII characters (empty is clear).
	• '%P<bitmap>' = Set the picture/bitmap filename (empty is clear).
	• '%I',<icon 01-9900, 0-clear>' = Set the icon using values of 01 - 9900 (icon numbers are assigned in the TPDesign4 Resource Manager tab - Slots section).
	• '%I<icon 01-9900, 0-clear>' = Set the icon using values of 01 - 9900 (icon numbers are assigned in the TPDesign4 Resource Manager tab - Slots section).
	• '%J',<alignment of text 1-9> = As shown the following telephone keypad alignment chart:
	• '%JT<alignment of text 0-9>' = As shown the above telephone keypad alignment chart, **BUT** the 0 (zero) is absolute and followed by **',<left>,<top>'**
	• '%JB<alignment of bitmap/picture 0-9>' = As shown the above telephone keypad alignment chart BUT the 0 (zero) is absolute and followed by **',<left>,<top>'**
	• '%JI<alignment of icon 0-9>' = As shown the above telephone keypad alignment chart, **BUT** the 0 (zero) is absolute and followed by **',<left>,<top>'**
	• '%R<left>,<top>,<right>,<bottom>' = Set rectangle.
	For some of these commands and values, refer to RGB Values for all 88 Basic Colors on page 58.
	• '%CF<on fill color>' = Set Fill Color.
	• '%CB<on border color>' = Set Border Color.
	• '%CT<on text color>' = Set Text Color.
	• '%SW<1 or 0>' = Show/hide a button.
	• '%ST<style>' = Button style.
	• '%EN<1 or 0>' = Enable/disable a button.
	• '%WW<1 or 0>' = Word wrap ON/OFF.
	• '%GH<bargraph hi>' = Set the bargraph upper limit.
	• '%GL<bargraph low>' = Set the bargraph lower limit.
	• '%GN<bargraph slider name>' = Set the bargraph slider name/Joystick cursor name.
	• '%GC<bargraph slider color>' = Set the bargraph slider color/Joystick cursor color.
	• '%GI<bargraph invert>' = Set the bargraph invert/noninvert or joystick coordinate (0,1,2,3). *^GIV* section on page 42 more information.
	• '%GU<bargraph ramp up>' = Set the bargraph ramp up time in intervals of 1/10 second.
	• '%GD<bargraph ramp down>' = Set the bargraph ramp down time in 1/10 second.
	• '%GG<bargraph drag increment> = Set the bargraph drag increment. Refer to the ^GDI command on page 42 for more information.
	• '%OT<feedback type>' = Set the Feedback (Output) Type to one of the following: None, Channel,Invert, ON (Always ON), Momentary, or Blink.
	• '%SM' = Submit a text for text area button.
	• '%SF<1 or 0>' = Set the focus for text area button.
	• '%OP<0-255>' = Set the button opacity to either Invisible (value=0) or Opaque (value=255).
	• '%OP#<00-FF>' = Set the button opacity to either Invisible (value=00) or Opaque (value=FF).
	• '%UN<Unicode text>' = Set the Unicode text. See the *^UNI* section on page 48 for the text format.
	• '%EF<text effect name>' = Set the text effect.
	• '%EC<text effect color>' = Set the text effect color.
	• '%ML<max length>' = Set the maximum length of a text area.
	• '%MK<input mask>' = Set the input mask of a text area.
	Example:
	`SEND_COMMAND Device,"'^BMF-500,1,%B10%CFRed%CB Blue %CTBlack%Ptest.png'"`
	Sets the button OFF state as well as the Border, Fill Color, Border Color, Text Color, and Bitmap.

Remote Run Time Commands

A device must first be defined in the NetLinx programming language with values or the Device: Port: System. In all programming examples - Remote is used in place of these values.

Serial Commands are used in the AxcessX Terminal Emulator mode. These commands are case insensitive.

Remote Run Time Commands	

ABEEP	Output a single beep even if beep is Off.
	Syntax:
	`SEND_COMMAND <DEV>,"'ABEEP'"`
	Example:
	`SEND_COMMAND Device,"'ABEEP'"`
	Outputs a beep of duration 1 beep even if beep is Off.

ADBEEP	Outputs a double beep even if beep is off.
	Syntax:
	`SEND_COMMAND <DEV>,"'ADBEEP'"`
	Example:
	`SEND_COMMAND Device,"'ADBEEP'"`
	Outputs a double beep even if beep is Off.

AKEYR	Remove the Keyboard/Keypad. Remove keyboard or keypad that was displayed using 'AKEYB', 'AKEYP', 'PKEYP', @AKB, @AKP, @PKP, @EKP, or @TKP commands.
	Syntax:
	`SEND_COMMAND <DEV>,"'AKEYR'"`
	Example:
	`SEND_COMMAND Device,"'AKEYR'"`
	Removes the Keyboard/Keypad.

@AKP	Pop up the keypad icon and initialize the text string to that specified. Keypad string is set to null on power up and is stored until power is lost. The Prompt Text is optional.
	Syntax:
	`SEND_COMMAND <DEV>,"'@AKP-<initial text>;<prompt text>'"`
	Variables:
	• initial text = 1 - 50 ASCII characters.
	• prompt text = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'@AKP-12345678;ENTER PASSWORD'"`
	Pops up the Keypad and initializes the text string '12345678' with prompt text 'ENTER PASSWORD'.

@AKR	Remove the Keyboard or Keypad. Remove keyboard or keypad that was displayed using 'AKEYB', 'AKEYP', 'PKEYP', @AKB, @AKP, @PKP, @EKP, or @TKP commands.
	Syntax:
	`SEND_COMMAND <DEV>,"'@AKR'"`
	Example:
	`SEND_COMMAND Device,"'@AKR'"`
	Removes the Keyboard/Keypad.

BEEP	Output a beep.
	Syntax:
	`SEND_COMMAND <DEV>,"'BEEP'"`
	Example:
	`SEND_COMMAND Device,"'BEEP'"`
	Outputs a beep.

BRIT	Set the remote brightness.
	Syntax:
	`"'BRIT-<brightness level>'"`
	Variables:
	• brightness level = 0 - 100.
	Example:
	`SEND COMMAND Device,"'BRIT-50'"`
	Sets the brightness level to 50.

DBEEP	Output a double beep.
	Syntax:
	`SEND_COMMAND <DEV>,"'DBEEP'"`
	Example:
	`SEND_COMMAND Device,"'DBEEP'"`
	Outputs a double beep.

Remote Run Time Commands (Cont.)	

@EKP	Extend the keypad. Pops up the keypad icon and initializes the text string to that specified. The Prompt Text is optional.
	Syntax:
	`SEND_COMMAND <DEV>,"'@EKP-<initial text>;<prompt text>'"`
	Variables:
	• initial text = 1 - 50 ASCII characters.
	• prompt text = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'@EKP-33333333;Enter Password'"`
	Pops up the Keypad and initializes the text string '33333333' with prompt text 'Enter Password'.

PKEYP	Present a private keypad. Pops up the keypad icon and initializes the text string to that specified. Keypad displays a '*' instead of the numbers typed. The Prompt Text is optional.
	Syntax:
	`SEND_COMMAND <DEV>,"'PKEYP-<initial text>'"`
	Variables:
	• initial text = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'PKEYP-123456789'"`
	Pops up the Keypad and initializes the text string '123456789' in '*'.

@PKP	Present a private keypad. Pops up the keypad icon and initializes the text string to that specified. Keypad displays a '*' instead of the numbers typed. The Prompt Text is optional.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PKP-<initial text>;<prompt text>'"`
	Variables:
	• initial text = 1 - 50 ASCII characters.
	• prompt text = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'@PKP-1234567;ENTER PASSWORD'"`
	Pops up the Keypad and initializes the text string 'ENTER PASSWORD' in '*'.

SETUP	Send remote to Setup page.
	Syntax:
	`SEND_COMMAND <DEV>,"'SETUP'"`
	Example:
	`SEND_COMMAND Device,"'SETUP'"`
	Sends the remote to the Setup Page.

SLEEP	Force the remote into screen saver mode.
	Syntax:
	`SEND_COMMAND <DEV>,"'SLEEP'"`
	Example:
	`SEND_COMMAND Device,"'SLEEP'"`
	Forces the remote into screen saver mode.

@TKP	Present a telephone keypad. Pops up the keypad icon and initializes the text string to that specified. The Prompt Text is optional.
	Syntax:
	`SEND_COMMAND <DEV>,"'@TKP-<initial text>;<prompt text>'"`
	Variables:
	• initial text = 1 - 50 ASCII characters.
	• prompt text = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'@TKP-999.222.1211;Enter Phone Number'"`
	Pops-up the Keypad and initializes the text string '999.222.1211' with prompt text 'Enter Phone Number'.

TPAGEON	Turn On page tracking. This command turns On page tracking, whereby when the page or popups change, a string is sent to the Master. This string may be captured with a CREATE_BUFFER command for one panel and sent directly to another remote.
	Syntax:
	`SEND_COMMAND <DEV>,"'TPAGEON'"`
	Example:
	`SEND_COMMAND Device,"'TPAGEON'"`
	Turns On page tracking.

TPAGEOFF	Turn Off page tracking.
	Syntax:
	`SEND_COMMAND <DEV>,"'TPAGEOFF'"`
	Example:
	`SEND_COMMAND Device,"'TPAGEOFF'"`
	Turns Off page tracking.

Remote Run Time Commands (Cont.)	

@VKB	Popup the virtual keyboard.
	Syntax:
	`SEND_COMMAND <DEV>,"'@VKB'"`
	Example:
	`SEND_COMMAND Device,"'@VKB'"`
	Pops-up the virtual keyboard.

WAKE	Force the remote out of screen saver mode.
	Syntax:
	`SEND_COMMAND <DEV>,"'WAKE'"`
	Example:
	`SEND_COMMAND Device,"'WAKE'"`
	Forces the remote out of the screen saver mode.

Input Commands

A device must first be defined in the NetLinx programming language with values for the Device: Port: System. In all programming examples, Remote is used in place of these values.

Input Commands	

^CAL	Put remote in calibration mode.
	Syntax:
	`"'^CAL'"`
	Example:
	`SEND_COMMAND Device,"'^CAL'"`
	Puts the remote in calibration mode.

Remote Setup Commands

A device must first be defined in the NetLinx programming language with values for the Device: Port: System (in all programming examples, Panel is used in place of these values). These commands are case insensitive.

Remote Setup Commands	

^MUT	Set the remote mute state.
	Syntax:
	`SEND_COMMAND <DEV>,"'^MUT-<mute state>'"`
	Variables:
	• mute state = 0 = Mute Off and 1 = Mute On.
	Example:
	`SEND_COMMAND Device,"'^MUT-1'"`
	Sets the remote's master volume to mute.

@PWD	Set the page flip password. @PWD sets the level 1 password only.
	Syntax:
	`SEND_COMMAND <DEV>,"'@PWD-<page flip password>'"`
	Variables:
	• page flip password = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'@PWD-Main'"`
	Sets the page flip password to 'Main'.

^PWD	Set the page flip password.
	Password level is required and must be 1 - 4.
	Syntax:
	`SEND_COMMAND <DEV>,"'^PWD-<password level>,<page flip password>'"`
	Variables:
	• password level = 1 - 4.
	• page flip password = 1 - 50 ASCII characters.
	Example:
	`SEND_COMMAND Device,"'^PWD-Main'"`
	Sets the page flip password on Password Level 1 'Main'.

Listboxes

Listboxes provide flexibility to remote pages once constrained by physical display areas. Both static and dynamic tables can display multiple devices and items when used with proper navigation tools. List Box commands can be used in conjunction with the application *TPDesign4* to create both static and dynamic commands.

Any data field (including primary data) may be enclosed in double quotes so that commas within that data field will not be interpreted as delimiters. Within the double quotes in such a field, the backslash (\) is treated as an escape character so that double quote literals can still be used within the field. When a backslash is encountered, it is discarded and the following character is treated as a literal. This meansthat if a backslash is part of the data field, it needs to be escaped with a preceding backlash as well.

When a column or row number is required as a field in any command, note that the numbering begins at 1, not 0 (i.e. the first column is column 1 and the first row is row 1).

There are no hard limits enforced for the number of list boxes and such list box parameters as list address and column count. The range is determined by available memory, which is affected by things like how many lists are defined and how many items will be added for each list.

List Box Commands

The Mio R-4 supports Data List Box Commands.

Data List Commands	

^LDN	Creates a new data list. Unique list addresses and names are handled programmatically.
	It is up to the program to make sure the list address and name are unique.
	Syntax:
	`"'^LDN-<list port>,<list address>,<column count>,<list name>'"`
	Variables:
	• list port = 1-100. Port where data resides
	• list address = address where data resides
	• column count = the number of data columns (includes hidden columns)
	• list name = User specified name for the data list
	Example:
	`SEND_COMMAND Device, "'^LDN-5,1,4,my songs'"`
	Creates a data list of **4** columns named "**my songs**" and places it at port **5**, address **1**.

^LDA	Adds a new row to an existing data list. Primary data is required.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LDA-<list address>,<uniflag>,<primary data>,<data2>…'"`
	Variables:
	• list address = address where data resides
	• uniflag = indicates unicode; 0 - No unicode, 1 - Uses unicode
	• primary data = the "key" data column. The information in this column provides each row with its uniqueness.
	• data2 = variable, column data information. The number of data fields is limited only to the number of columns in the data list.
	Example:
	`SEND_COMMAND Device,"'^LDA-1,0,Entry5,Meatloaf,Best of,Anything for Love'"`
	Adds a text row to the data list located at address 1. The primary data is set as Entry5. Meatloaf, Best of, and Anything for Love are all cells within the new row.
	Example (unicode):
	`SEND_COMMAND Device,"'^LDA-1,1,0045006E0074007200790035,004D006500610074006C006F00610061,004200650073007400200006F0066,0041006E007900740068006900 6E006700200066006F00720020004C006F00760065'"`
	Adds a unicode text row to the data list located at address 1. The primary data is set as Entry5. Meatloaf, Best of, and Anything for Love are all cells within the new row.

^LDR	Removes a row from an existing data list.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LDR-<list address>,<uniflag>,<primary data>'"`
	Variables:
	• list address = address where data resides
	• uniflag = indicates unicode; 0 - No unicode, 1 - Uses unicode
	• primary data = the "key" data column. The information in this column provides each row with its uniqueness.
	Example:
	`SEND_COMMAND Device,"'^LDR-1,0,Entry5'"`
	Removes the text row with primary data Entry5 from an existing data list at address 1.

Data List Commands (Cont.)	

^LDC	Clears all rows in a given list.
	
	Syntax:
	`"'^LDC-<list address>'"`
	Variables:
	• list address = address where data resides
	Example:
	`SEND_COMMAND Device, "'^LDC-1'"`
	Clears all rows in data list located at address **1**.

^LDD	Deletes the data list
	Syntax:
	`"'^LDD-<list address>'"`
	Variables:
	• list address = address where data resides
	Example:
	`SEND_COMMAND Device, "'^LDD-1'"`
	Deletes the data list located at address **1**.

^LDT	Set the column type for a data list by modifying its column type. Column is the index of the first type to set. Additional types sent will be set in this order:
	0 - Text
	1 - Reserved
	2 - Reserved
	3 - Channel
	4 - Page
	Syntax:
	`SEND_COMMAND <DEV>,"'^LDT-<list address>,<column>,<type>,<type>…'"`
	Variables:
	• list address = address where data resides
	• column = the starting column number (first column is 1)
	• type = subsequent columns. 0 - Text; 3 - Channel; 4 - Page
	Example:
	`SEND_COMMAND Device,"'^LDT-1,1,0,0,0'"`
	Sets the column type for the data list located at address 1. The column type starts at column 1, the first column is Text, the second and third columns are also Text.

^LDL	Modifies the data in a single column field. This can be used to load a data list that has long text fields.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LDL-<list address>,<column>,<uniflag>,<primary data>, <data column>'"`
	Variables:
	• list address = address where data resides
	• column = the starting column number (first column is 1)
	• uniflag = indicates unicode; 0 - No unicode, 1 - Uses unicode
	• primary data = the "key" data column. The information in this column provides each row with its uniqueness.
	• new cell data = data information for a single field or "cell"
	Example:
	`SEND_COMMAND Device,"'^LDL-1,1,0,Entry5,Music'"`
	The field located in column 1, in the row with the primary data "Entry5" and in the data list located at the address of 1 is a text value of Music.
	Example (unicode):
	`SEND_COMMAND Device, "'^LDL-1,1,1,0045006E0074007200790035,004D0075007300690063'"`
	The field located in column 1, in the row with the primary data "Entry5" and in the data list located at the address of 1 is a text value of Music.

^LVC	Set the table column display order according to the order of the entered column values.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVC-<view address>,<column>,<column>…'"`
	Variables:
	• view address = the address of the view definition
	• column = the column number to display (first column is 1)
	Example:
	`SEND_COMMAND Device,"'^LVC-3,5,2,1'"`
	Sets the column display order to column 5 first, then column 2 and then column 1. The data list is displayed according to the view definitions located at address 3.

Data List Commands (Cont.)	

^LVF	Filter a list by setting what column to use and what string to compare. Note that setting column to zero or data to none makes the filtered ordering the same as sorted ordering. Update must be called for changes to take effect.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVF-<view address>,<uniflag>,<column>,<search data>'"`
	Variables:
	• view address = the address of the view definition
	• uniflag = indicates unicode; 0 - No unicode, 1 - Uses unicode
	• column = the starting column number (first column is 1)
	• search data = the data on which to filter
	Example:
	`SEND_COMMAND Device,"'LVF-1,0,2,Smith'"`
	Filters list based on column 2 such that only those rows whose column 2 contains Smith are displayed. The data is displayed according to the view definitions located at address 1. Filter is case sensitive.

^LVL	Set the data list to be displayed.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVL-<view address>,<list port>,<list address>'"`
	Variables:
	• view address = the address of the view definition
	• list port = 1-100. port where data resides
	• list address = address where data resides
	Example:
	`SEND_COMMAND Device,"'^LVL-5,my songs'"`
	Sets the data list viewed to my songs and displays it according to the view definitions located at address 5.

^LVM	Display a new position. If select is set, then select that new position.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVM-<view address>,<offset>'"`
	Variables:
	• view address = the address of the view definition
	• offset = + / - numeric display shift
	Example:
	`SEND_COMMAND Device,"'^LVM-2,-4'"`
	Shifts the display -4 and displays the list according to the view definitions located at address 2.

^LVO	Display a data list according to a preset sort/ordering view definition. This command tells the view which of the possible orderings to use. Note that the <sort> field is a bitmask, so that the 3 bit positions may be combined.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVO-<view address>,<sort>'"`
	Variables:
	• view address = the address of the view definition
	• sort = bitmask with the following bit assignments:
	0x0001 = Sort
	0x0002 = Reverse
	0x0004 = Filter
	Note: Of special note is the reverse bit (0x0002), which reverses the list no matter what order it is currently in. When used on a sorted list, it results in a reverse sort. When used on a reverse sorted list, it results in a forward sorted list. In most cases, the reverse bit should not be used alone, but should be used in combination with the sort bit (0x0003) such that it always results in a reverse sorted list.
	Possible values for the sort field:
	0 = None
	1 = Forward Sort
	2 = Reverse the current list ordering (may or may not be sorted)
	3 = Reverse Sort
	4 = Filter
	5 = Forward Sort + Filter
	6 = Reverse current + filter
	7 = Reverse sort + filter
	Example:
	`SEND_COMMAND Device,"'^LVO-1,7'"`
	Displays the data list according to the view definitions located at address 1 and filters and reverse sorts the list.

Data List Commands (Cont.)	

^LVP	Display a new position. If the select option is set, then select that position.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVP-<view address>,<index>'"`
	Variables:
	• view address = the address of the view definition
	• index = the row number in sequential order (first row is 1)
	Example:
	`SEND_COMMAND Device,"'^LVP-5,3'"`
	Sets the display position starting at the third row and displays it according to the view definitions located at address 5.

^LVS	Set the column order for sorting. Update must be called for changes to take effect.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVS-<view address>,<column>,<column>…'"`
	Variables:
	• view address = the address of the view definition
	• column = the starting column number (first column is 1)
	Example:
	`SEND_COMMAND Device,"'^LVS-3,5,2,1'"`
	Sets the column sort order to column 5 first, then column 2 and then column 1. The data list is displayed according to the view definitions located at address 3.

List View Commands

List View Commands	

^LVU	Update any view currently looking at this list.
	Note: This must be called after changes to list data.
	Syntax:
	`SEND_COMMAND <DEV>,"'^LVU-<view address>'"`
	Variables:
	• view address = the address of the view definition
	Example:
	`SEND_COMMAND Device,"'LVU-3'"`
	Updates the data list and displays it according to the view definitions located at address 3.

List Box Command: My Music

Track Number	Artist	Album	Title	Channel
1	The Shins	Chutes Too Narrow	Kissing the Lipless	10,1
2	The Shins	Chutes Too Narrow	Mine's Not a High Horse	10,2
3	The Shins	Chutes Too Narrow	So Says I	10,3
4	The Shins	Chutes Too Narrow	Young Pilgrim	10,4
5	The Shins	Chutes Too Narrow	Saint Simon	10,5
6	The Shins	Chutes Too Narrow	Fighting in a Sack	10,6
7	The Shins	Chutes Too Narrow	Pink Bullets	10,7
8	The Shins	Chutes Too Narrow	Turn a Square	10,8
9	The Shins	Chutes Too Narrow	Gone for Good	10,9
10	The Shins	Chutes Too Narrow	Those to Come	10,10

Data Rows

Displayed Data

"'^LDN-1,1,5,my music'"

"'^LDT-1,1,0,0,0,0,3'"

"'^LDA-1,0,1,The Shins,Chutes Too Narrow,Kissing the Lipless,"10,1"'"

"'^LDA-1,0,2,The Shins,Chutes Too Narrow,Mine's Not a High Horse,"10,2"'"

"'^LDA-1,0,3,The Shins,Chutes Too Narrow,So Says I,"10,3"'"

"'^LDA-1,0,4,The Shins,Chutes Too Narrow,Young Pilgrim,"10,4"'"

"'^LDA-1,0,5,The Shins,Chutes Too Narrow,Saint Simon,"10,5"'"

"'^LDA-1,0,6,The Shins,Chutes Too Narrow,Fighting in a Sack,"10,6"'"

"'^LDA-1,0,7,The Shins,Chutes Too Narrow,Pink Bullets,"10,7"'"

"'^LDA-1,0,8,The Shins,Chutes Too Narrow,Turn a Square,"10,8"'"

"'^LDA-1,0,9,The Shins,Chutes Too Narrow,Gone for Good,"10,9"'"

"'^LDA-1,0,10,The Shins,Chutes Too Narrow,Those to Come,"10,10"'"

"'^LVC-2,4'"

"'^LVU-2'"

FIG. 24 List Box Command: My Music

List Box Command: My Music with Changes

"'^LDR-1,0,4'"

"'^LDL-1,1,0,5,4'"

"'^LDL-1,1,0,6,5'"

"'^LDL-1,1,0,7,6'"

"'^LDL-1,1,0,8,7'"

"'^LDL-1,1,0,9,8'"

"'^LDL-1,1,0,10,9'"

"'^LVC-2,4'"

"'^LVU-2'"

Displayed Data

Track Number	Artist	Album	Title	Channel
1	The Shins	Chutes Too Narrow	Kissing the Lipless	10,1
2	The Shins	Chutes Too Narrow	Mine's Not a High Horse	10,2
3	The Shins	Chutes Too Narrow	So Says I	10,3
4	The Shins	Chutes Too Narrow	Saint Simon	10,5
5	The Shins	Chutes Too Narrow	Fighting in a Sack	10,6
6	The Shins	Chutes Too Narrow	Pink Bullets	10,7
7	The Shins	Chutes Too Narrow	Turn a Square	10,8
8	The Shins	Chutes Too Narrow	Gone for Good	10,9
9	The Shins	Chutes Too Narrow	Those to Come	10,10

Row has been removed

Modified Data

FIG. 25 List Box Command: My Music with Changes

Programming Numbers

The following information provides the programming numbers for colors, fonts, and borders. Colors can be used to set the colors on buttons, sliders, and pages. The lowest color number represents the lightest color-specific display; the highest number represents the darkest display. For example, 0 represents light red, and 5 is dark red.RGB Triplets and Names For Basic 88 Colors

RGB Values for all 88 Basic Colors

RGB Values for all 88 Basic Colors

Index No.	Name	Red	Green	Blue	Index No.	Name	Red	Green	Blue
00	Very Light Red	255	0	0	45	Medium Aqua	0	80	159
01	Light Red	223	0	0	46	Dark Aqua	0	64	127
02	Red	191	0	0	47	Very Dark Aqua	0	48	95
03	Medium Red	159	0	0	48	Very Light Blue	0	0	255
04	Dark Red	127	0	0	49	Light Blue	0	0	223
05	Very Dark Red	95	0	0	50	Blue	0	0	191
06	Very Light Orange	255	128	0	51	Medium Blue	0	0	159
07	Light Orange	223	112	0	52	Dark Blue	0	0	127
08	Orange	191	96	0	53	Very Dark Blue	0	0	95
09	Medium Orange	159	80	0	54	Very Light Purple	128	0	255
10	Dark Orange	127	64	0	55	Light Purple	112	0	223
11	Very Dark Orange	95	48	0	56	Purple	96	0	191
12	Very Light Yellow	255	255	0	57	Medium Purple	80	0	159
13	Light Yellow	223	223	0	58	Dark Purple	64	0	127
14	Yellow	191	191	0	59	Very Dark Purple	48	0	95
15	Medium Yellow	159	159	0	60	Very Light Magenta	255	0	255
16	Dark Yellow	127	127	0	61	Light Magenta	223	0	223
17	Very Dark Yellow	95	95	0	62	Magenta	191	0	191
18	Very Light Lime	128	255	0	63	Medium Magenta	159	0	159
19	Light Lime	112	223	0	64	Dark Magenta	127	0	127
20	Lime	96	191	0	65	Very Dark Magenta	95	0	95
21	Medium Lime	80	159	0	66	Very Light Pink	255	0	128
22	Dark Lime	64	127	0	67	Light Pink	223	0	112
23	Very Dark Lime	48	95	0	68	Pink	191	0	96
24	Very Light Green	0	255	0	69	Medium Pink	159	0	80
25	Light Green	0	223	0	70	Dark Pink	127	0	64
26	Green	0	191	0	71	Very Dark Pink	95	0	48
27	Medium Green	0	159	0	72	White	255	255	255
28	Dark Green	0	127	0	73	Grey1	238	238	238
29	Very Dark Green	0	95	0	74	Grey3	204	204	204
30	Very Light Mint	0	255	128	75	Grey5	170	170	170
31	Light Mint	0	223	112	76	Grey7	136	136	136
32	Mint	0	191	96	77	Grey9	102	102	102
33	Medium Mint	0	159	80	78	Grey4	187	187	187
34	Dark Mint	0	127	64	79	Grey6	153	153	153
35	Very Dark Mint	0	95	48	80	Grey8	119	119	119
36	Very Light Cyan	0	255	255	81	Grey10	85	85	85
37	Light Cyan	0	223	223	82	Grey12	51	51	51
38	Cyan	0	191	191	83	Grey13	34	34	34
39	Medium Cyan	0	159	159	84	Grey2	221	221	221
40	Dark Cyan	0	127	127	85	Grey11	68	68	68
41	Very Dark Cyan	0	95	95	86	Grey14	17	17	17
42	Very Light Aqua	0	128	255	87	Black	0	0	0
43	Light Aqua	0	112	223	255	TRANSPARENT	99	53	99
44	Aqua	0	96	191					

Fixed Fonts and ID Numbers

Font styles can be used to program the text fonts on buttons, sliders, and pages. The following chart shows the default font type and their respective ID numbers generated by TPDesign4.

Fixed Fonts and ID Numbers

Font ID #	Font type	Size	Font ID #	Font type	Size
1	Courier New	9	19	Arial	9
2	Courier New	12	20	Arial	10
3	Courier New	18	21	Arial	12
4	Courier New	26	22	Arial	14
5	Courier New	32	23	Arial	16
6	Courier New	18	24	Arial	18
7	Courier New	26	25	Arial	20
8	Courier New	34	26	Arial	24
9	AMX Bold	14	27	Arial	36
10	AMX Bold	20	28	Arial Bold	10
11	AMX Bold	36	29	Arial Bold	8
			32 - Variable Fonts start at 32.		

NOTE: *You must import fonts into a TPDesign4 project file. The font ID numbers are assigned by TPDesign4. These values are also listed in the Generate Programmer's Report.*

Slider/Cursor Names

Slider/Cursor Names

Bargraph Slider Names	Joystick Cursor Names
None	None
Ball	Arrow
Circle -L	Ball
Circle -M	Circle
Circle -S	Crosshairs
Precision	Gunsight
Rectangle -L	Hand
Rectangle -M	Metal
Rectangle -S	Spiral
Smart Button Bubbled - L	Smart Button Bubbled
Smart Button Bubbled - S	Target
Windows	View Finder
Windows Active	

Border Styles by Name and Numbers

Border Styles by Name

The TPDesign4 Touch Panel Design program has pre-set border styles that are user selectable. You cannot use number values for programming purposes when changing border styles. TPD4 border styles can ONLY be changed by using the name.

Border Styles by Name

No.	Border styles	No.	Border styles	No.	Border styles	No.	Border styles
1	None	33	Cursor Right	65	Neon Inactive -L	97	Menu Bottom Rounded 185
2	AMX Elite -L	34	Cursor Right with Hole	66	Neon Inactive -S	98	Menu Bottom Rounded 195
3	AMX Elite -M	35	Custom Frame	67	Oval H 60x30	99	Menu Top Rounded 15
4	AMX Elite -S	36	Diamond 15	68	Oval H 100x50	100	Menu Top Rounded 25
5	Bevel -L	37	Diamond 25	69	Oval H 150x75	101	Menu Top Rounded 35
6	Bevel -M	38	Diamond 35	70	Oval H 200x100	102	Menu Top Rounded 45
7	Bevel -S	39	Diamond 45	71	Oval V 30x60	103	Menu Top Rounded 55
8	Circle 15	40	Diamond 55	72	Oval V 50x100	104	Menu Top Rounded 65
9	Circle 25	41	Diamond 65	73	Oval V 75x150	105	Menu Top Rounded 75
10	Circle 35	42	Diamond 75	74	Oval V 100x200	106	Menu Top Rounded 85
11	Circle 45	43	Diamond 85	75	Picture Frame	107	Menu Top Rounded 95
12	Circle 55	44	Diamond 95	76	Quad Line	108	Menu Top Rounded 105
13	Circle 65	45	Diamond 105	77	Single Line	109	Menu Top Rounded 115
14	Circle 75	46	Diamond 115	78	Windows Style Popup	110	Menu Top Rounded 125
15	Circle 85	47	Diamond 125	79	Windows Style Popup (Status Bar)	111	Menu Top Rounded 135
16	Circle 95	48	Diamond 135	80	Menu Bottom Rounded 15	112	Menu Top Rounded 145
17	Circle 105	49	Diamond 145	81	Menu Bottom Rounded 25	113	Menu Top Rounded 155
18	Circle 115	50	Diamond 155	82	Menu Bottom Rounded 35	114	Menu Top Rounded 165
19	Circle 125	51	Diamond 165	83	Menu Bottom Rounded 45	115	Menu Top Rounded 175
20	Circle 135	52	Diamond 175	84	Menu Bottom Rounded 55	116	Menu Top Rounded 185
21	Circle 145	53	Diamond 185	85	Menu Bottom Rounded 65	117	Menu Top Rounded 195
22	Circle 155	54	Diamond 195	86	Menu Bottom Rounded 75	118	Menu Right Rounded 15
23	Circle 165	55	Double Bevel -L	87	Menu Bottom Rounded 85	119	Menu Right Rounded 25
24	Circle 175	56	Double Bevel -M	88	Menu Bottom Rounded 95	120	Menu Right Rounded 35
25	Circle 185	57	Double Bevel -S	89	Menu Bottom Rounded 105	121	Menu Right Rounded 45
26	Circle 195	58	Double Line	90	Menu Bottom Rounded 115	122	Menu Right Rounded 55
27	Cursor Bottom	59	Fuzzy	91	Menu Bottom Rounded 125	123	Menu Right Rounded 65
28	Cursor Bottom with Hole	60	Glow-L	92	Menu Bottom Rounded 135	124	Menu Right Rounded 75
29	Cursor Top	61	Glow-S	93	Menu Bottom Rounded 145	125	Menu Right Rounded 85
30	Cursor Top with Hole	62	Help Down	94	Menu Bottom Rounded 155	126	Menu Right Rounded 95
31	Cursor Left	63	Neon Active -L	95	Menu Bottom Rounded 165		
32	Cursor Left with Hole	64	Neon Active -S	96	Menu Bottom Rounded 175		

Border Styles by Numbers

Border styles can be used to program borders on buttons, sliders, and popup pages.

Border Styles by Numbers

No.	Border styles	No.	Border styles
0-1	No border	10-11	Picture frame
2	Single line	12	Double line
3	Double line	20	Bevel-S
4	Quad line	21	Bevel-M
5-6	Circle 15	22-23	Circle 15
7	Single line	24-27	Neon inactive-S
8	Double line	40-41	Diamond 55
9	Quad line		

Text Effects Names

The following is a listing of text effects names associated with the **^TEF** command.

Text Effects		
• Glow -S	• Medium Drop Shadow 1	• Hard Drop Shadow 1
• Glow -M	• Medium Drop Shadow 2	• Hard Drop Shadow 2
• Glow -L	• Medium Drop Shadow 3	• Hard Drop Shadow 3
• Glow -X	• Medium Drop Shadow 4	• Hard Drop Shadow 4
• Outline -S	• Medium Drop Shadow 5	• Hard Drop Shadow 5
• Outline -M	• Medium Drop Shadow 6	• Hard Drop Shadow 6
• Outline -L	• Medium Drop Shadow 7	• Hard Drop Shadow 7
• Outline -X	• Medium Drop Shadow 8	• Hard Drop Shadow 8
• Soft Drop Shadow 1	• Medium Drop Shadow 1 with outline	• Hard Drop Shadow 1 with outline
• Soft Drop Shadow 2	• Medium Drop Shadow 2 with outline	• Hard Drop Shadow 2 with outline
• Soft Drop Shadow 3	• Medium Drop Shadow 3 with outline	• Hard Drop Shadow 3 with outline
• Soft Drop Shadow 4	• Medium Drop Shadow 4 with outline	• Hard Drop Shadow 4 with outline
• Soft Drop Shadow 5	• Medium Drop Shadow 5 with outline	• Hard Drop Shadow 5 with outline
• Soft Drop Shadow 6	• Medium Drop Shadow 6 with outline	• Hard Drop Shadow 6 with outline
• Soft Drop Shadow 7	• Medium Drop Shadow 7 with outline	• Hard Drop Shadow 7 with outline
• Soft Drop Shadow 8	• Medium Drop Shadow 8 with outline	• Hard Drop Shadow 8 with outline
• Soft Drop Shadow 1 with outline		
• Soft Drop Shadow 2 with outline		
• Soft Drop Shadow 3 with outline		
• Soft Drop Shadow 4 with outline		
• Soft Drop Shadow 5 with outline		
• Soft Drop Shadow 6 with outline		
• Soft Drop Shadow 7 with outline		
• Soft Drop Shadow 8 with outline		

Getting The Most From Your Mio Modero R-4

Overview

One of the strengths of the Mio Modero R-4 is its flexibility. Not only may a user change the Mio R-4's basic functionality, such as changing presets, but it also has the capacity for upgrades to add or improve other abilities. These upgrades are available by direct uploading of new firmware via the USB programming jack (see the *Using the Programming Jack on the Mio R-4* on page 26 for more information).

Getting the Most From the Mio R-4

The Mio R-4 uses a new wireless personal network technology (802.15.4) and protocol (ZigBee) to transmit and receive information. With the advent of new technologies that surpass previous ones both in speed and in data transmission, the average user is accustomed to a design philosophy of "smaller, better, and faster". Because ZigBee and its underlying protocol were designed for a mesh- type network topology, low power consumption, and interoperability, not for bandwidth, that philosophy cannot be applied to this technology. WiFi (802.11b/g) products from AMX are wireless Ethernet devices and can sustain speeds in the tens of megabits per second, while ZigBee was designed for small, low-power devices with minimal bandwidth requirements. The best way to approach the use of AMX ZigBee devices is to treat them as if they were AMX AXLink devices. AXLink devices can only handle a specific amount of data at one time due to bandwidth limitations, and ZigBee devices must be treated in the same way.

To optimize the functionality and extend the battery life of the Mio R-4, several things should be considered when programming its interface. (For more information on programming the Mio R-4, see the *Programming the Mio R-4* on page 26.)

- Installations using standard wireless must adhere to precautions, just as in WiFi installations. Proper placement of the ZigBee network gateway and repeater(s) is critical for reliable coverage. Just as in WiFi, avoid placing these devices near large metal objects, behind, under, or on top of metal objects, or any other place where interference could be an issue. Due to the wireless nature of the ZigBee network, temporary interference (such as leaving a room or having objects pass between the Mio R-4 and its gateway device) may prevent a command from reaching the NetLinx master.
- Because of temporary interference issues (such as leaving a room or large objects passing between the Mio R-4 and its gateway device) preventing commands from reaching the NetLinx master, special attention must be paid to volume control.

  NOTE: *If a remote command is lost while increasing volume, the master may receive the command to increase the volume but not the command to stop increasing it.*

  Programmers should consider setting safeguards for volume control (either established volume limits or timeouts with the NetLinx master, or more interactive adjustment from the Mio R-4 such as direct volume control) to prevent issues with lost commands.
- To avoid a frustrating user experience, a programmer's understanding of the type of device being used and the amount of data being sent to and from the device is crucial. While a touch panel can handle large amounts of data for functions such as list boxes, variable text fields, and commands to alter button behavior, the Mio R-4 cannot. The programmer must always be aware of how many messages will be sent to the remote for any given event (online/offline events, button push/release, channel updates, variable text field updates, etc.). Sending many commands at one time over a low bandwidth interface will cause the commands to back up and updates will occur more slowly.
- Care should be taken when sending device updates to a remote. For instance, many MP3 players constantly send status updates: when a song is being played, the time remaining may be updated once per second along with the song title and artist. The title and artist do not change during the course of the song, so those fields on the remote do not need to be updated. Likewise, instead of sending updates for time remaining on a song once per second, the updates could be sent to the remote once every five seconds.
- As with any wireless device, the farther away from the receiving point (either gateway or repeater access point), the lower the available bandwidth. Try to limit the number of hops between the remote and the master, as each hop will increase the response time (for example, 2 hops = 2x response time, 3 hops = 3x response time, etc.).
  "Hops" are defined as the number of gateways or repeaters the data must travel through to get to the master. As an example, consider a simple system with one gateway. Events on the remote are communicated to the gateway and then to the master, which constitutes one hop. Two hops would occur if an event must go through a repeater to a gateway, and then to a master. Limiting the number of hops made greatly improves the user experience.
- Levels designed on the Mio R-4 panel pages generate a large number of messages between the R-4 and the master. If other remotes are in use at the same time, this could limit the bandwidth available for all devices. The amount of messages generated by a level can be artificially limited by the programmer/designer by adjusting the time up and time down values in the programming properties for the level button in TPDesign4. For example, assume a volume level ranging from 1-100. If the time up/time down for this is set to 5 seconds, the remote must generate messages very frequently within that time span to cover 100 discrete points of volume. If this was spread to 10 or 15 seconds, it would cut in half (10 seconds) or one-third (15 seconds) the bandwidth required. Another option is to step the volume in increments of two by setting the level range to 1-50. Whenever a level_event is processed in the NetLinx program, the programmer would multiply the level value by 2 before it is sent to the volume control device. If the ramp time is left the same, it would cut in half yet again the bandwidth required.
- When loading custom images, use graphic files the same size as the original image button into which it was designed to fit. Images too large must be scaled to fit and will use more processing power, slowing the loading of pages.
- To optimize page loading speed, use JPEG files for images instead of PNG files when possible.

- Minimize the number of borders displayed on a single page. One border will always load faster than two or three. Consistent use of borders will also make for a better look and feel.
- Keep the number of fonts used on the Mio R-4 to a minimum, as each unnecessary font file takes space in the device's memory that could be used for other files or functions.
- Try to use no more than one or two animated images per page. Animations use considerable amounts of processing power and slow the response time for the user.
- Do not set timeouts for popups containing level/bar graph controls tied to external buttons to a short time limit. If the popup times out before the button is released, the button release is missed by the control on the popup and the level will continue to be adjusted in the last active direction. This can be a problem when the popup control is for volume, among other possibilities.
- Sending consecutive listbox update send_commands too closely together can adversely affect the performance of the data transfer when sending a large number of update commands. Up to 20 listbox update commands probably could be sent very quickly. However, if sending more than 20 updates, the master code should be set up to insert an approximate 1/2-second delay between the commands. Otherwise, too many commands can be queued on the gateway in too short a time. The end result is that messages could be lost. Because of this, dynamic listboxes should be kept somewhat limited in size. Scrolling through a list of 20 or 30 items is also easier for the user than a list of 100 or 1000 items.
- The amount of traffic generated for online events is connected to the number of ports and channels that are opened up. Start at a low port number and increment port numbers by 1 when needed, and do the same for channels. This will ease the load on the ZigBee network and the Mio R-4 and will consume fewer resources on the NetLinx master.
- The bottom line is to understand what the remote is being designed to interface with, design the pages to limit the amount of data required from any particular device, and write the NetLinx program to minimize data traffic and to maximize efficient use of bandwidth. To accomplish this, the programmer must be aware of the amount of traffic the NetLinx program will generate to the device.

The ZigBee Network Calculator

The ZigBee Network Calculator, available at http://www.amx.com, is a Microsoft Excel® spreadsheet that gives a base guideline to the number of NetLinx messages that can pass between a ZigBee remote and the gateway under given wireless environmental conditions. By entering the number of Mio R-4 devices to be used on the network and the number of hops to the gateway, the calculator can help assess the number of messages that respectively can be handled by the entire network and by each Mio R-4 on the network.

NOTE: *Due to environmental issues, such as the composition of obstacles situated between the Mio R-4 and the access point or interference from appliances, the ZigBee Network Calculator should be used as a guide in conjunction with proper testing for device function at the network site. Factors other than ZigBee or 802.11 noise, including distance to the access point and materials used in building construction, may influence connectivity.*

Zigbee Network Design Assessment	
Input number of R4 Devices on Network	2
Input number of Hops to the Gateway (Gateway = 1)	2

NetLinx Messages Per Second Available	Total System	Average per R4
90% of bandwidth available. Wireless environment with no ZigBee or 802.11 noise present.	26.1	13.1
70% of bandwidth available. Wireless environment with minor ZigBee or 802.11 noise present.	20.3	10.2
50% of bandwidth available. Wireless environment with moderate ZigBee or 802.11 noise present.	14.5	7.3
30% of bandwidth available. Wireless environment with significant ZigBee or 802.11 noise present.	8.7	4.4

FIG. 26 ZigBee Network Calculator

To use the calculator:

1. Enter the number of Mio R-4 devices to be used on the network.
2. Enter the number of hops from the device(s) to the gateway access point.
3. The Calculator will show an average number of NetLinx messages available to the total network and to each Mio R-4, based on available bandwidth. The Calculator displays the network's and devices' potential messages in 30, 50, 70, and 90 percent increments.
4. Confirm the expected number of NetLinx messages to be run through the network to insure that they fall into acceptable levels.

The Mio Modero R-4 Return Button

The **Back/Home** button on the Mio R-4 (FIG. 1 on page 8) is unique to this device. While the button may be programmed with simple push/release actions in NetLinx, programming a hold action to the button will prevent the Mio R-4 from sending a hold, press, or release message to the master whenever that button is pushed.

NOTE: *The Back/Home button should not be programmed for any functions other than the special action for which it is already programmed. Adding any additional NetLinx functions, particularly holds, will affect the button's functionality.*

Mio-RCC - Mio Remote Charging Base

Overview

The Mio remotes are complemented with the Mio-RCC charging base (**FG147-02)**. Begin with *Charging the Mio Remote with the Charging Base* for the Mio-RCC charging base (**FG147-02**).

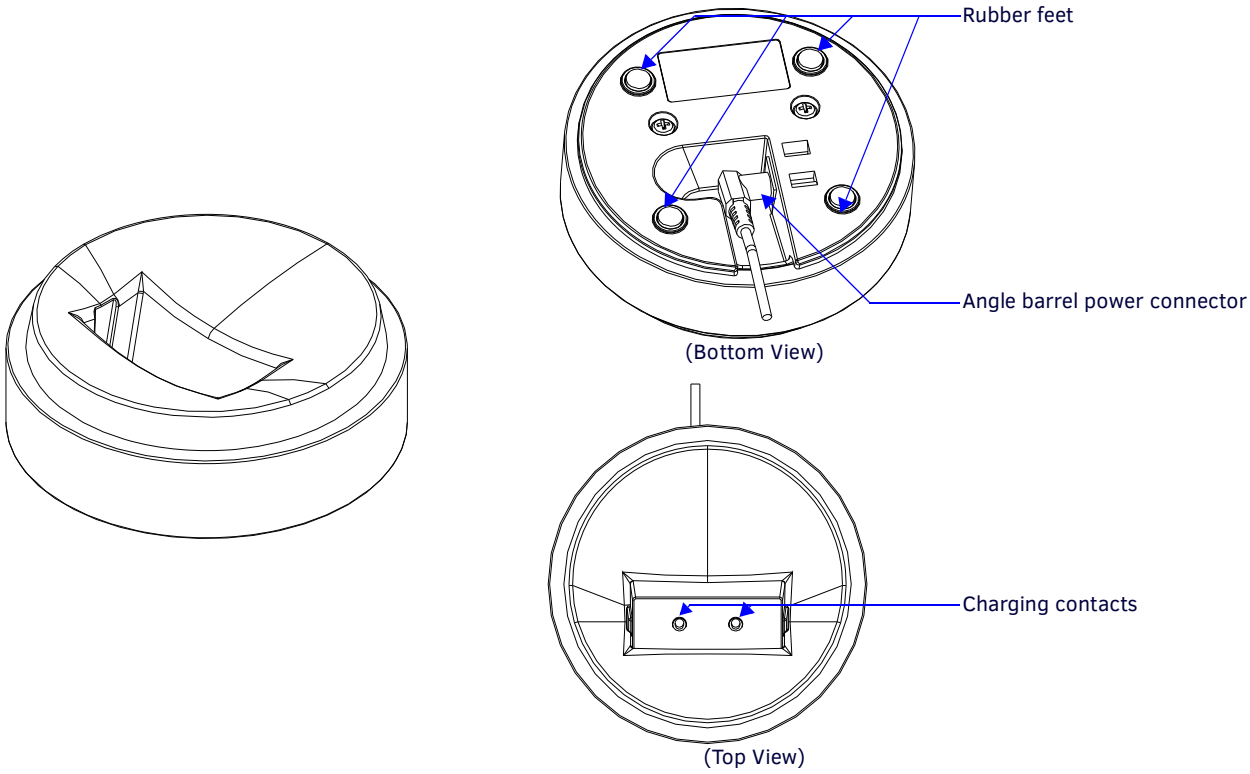


FIG. 27 Mio-RCC Charging Base

Mio-RCC Specifications

Mio-RCC Specifications	
Dimensions (HWD)	Charging Base - 1.61 (4.09 cm) (height); 4.25 (10.80 cm) (diameter) Lithium Ion Battery - 2.13” x 1.38” x .28” (5.41 cm x 3.45 cm x .71 cm)
Weight	• 1.15 lbs (.52 kg) - Remote Charging Cradle • .15 lbs (.07 kg) - Power Supply • .06 lbs (.027 kg) - Rechargeable Lithium Battery
Other AMX Equipment:	• Mio R-1 **(FG147**) • Mio R-2 RF 418 **(FG147-418)** • Mio R-2 RF 433 **(FG147-433)** • Mio R-3 **(FG148-23K)** • Mio R-4 **(FG148-04)** • Mio-RBP Rechargeable Lithium Ion Battery **(FG147-10)**

Charging the Mio Remote with the Charging Base

The Mio remotes receive power for charging from a charging base.

1. Connect the terminal end of the power supply to the bottom external power port on the Mio remote charging base. See FIG. 27 for location.
2. Route the cable through the provided channel so that it comes out the side of the base.
3. Connect the power cord to an external power source.
4. Place the bottom of the Mio remote into the charging base so the contacts on the device are on top of the charging contacts inside the charging base. The Power LED on the Mio remote blinks red to indicate it is charging and illuminates solid red when it is done. A full charge cycle for a depleted battery is approximately 3 hours.

Avoid placing devices equipped with AAA batteries in the charging base.

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