ZON

Whole House
Digital Audio

ZAC-60 Controller/Amplifier

ZIR-232 Device Commander User's Guide

ZR-98 Router

OXMOOR®

www.zonaudio.com

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ZIR-232 Device Commander
Installation and User's Guide

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REVISION DATE: October, 2004

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INTRODUCTION

The ZON Device Commander is a new generation of home theater and multi-media device controllers. The ZIR-232 controls nearly all of today's popular brands of home theater and multi-media devices, all from a module designed exclusively for the ZON ZR-98 Router.

The ZIR-232 provides unprecedented flexibility. External devices can be controlled via IR, RS-232 or a combination of both. The Device Commander comes with an extensive pre-programmed library of the most often-used home theater and multi-media IR codes. And for speciality equipment, there is a simple to use learning feature, which will memorize most any remote's IR codes and store them in on-board non-volatile memory.

In addition to IR control, the Device Commander features a bidirectional RS-232 port to extend control capabilities to home automation and home entertainment devices. Control commands stored in the ZIR-232 are integrated with the ZON ZAC-60's revolutionary user interface and the ZON Router's on board RS-232 port. Icons are assigned to stored commands and can be selected directly from a ZAC-60 display.

Configuring the ZIR-232 is accomplished via the ZON Serial Configuration Utility ("ZON Config").

In this guide, you will learn how to:

- Install the ZIR-232 in your ZON Router
- Define the device(s) connected to your system via ZIM-4 input modules
- Locate, test and select device codes for your target hardware
- Learn IR keys
- Design controls that will be displayed on the ZAC-60 for a particular device
- Build scripts that include multiple IR keys and/or RS-232 strings
- Save your configuration settings to the module and ZAC-60s in your system

For more information on the operation and installation of the ZON system, please consult the ZON Installation and Operation Manual that came with your system. For more information on using the ZON Serial Configuration Utility, please see the Serial Configuration Software User's Guide.

ZON SYSTEM REQUIREMENTS AND SETUP

The following instructions will guide you through installing the ZIR-232 Device Commander in your system. After installation, refer to this manual for information on how to configure and use the module in your system.

ZON System Requirements

- ZON Config version 1.5.0 (Build 124) or later and a computer that meets operational requirements of ZON Config.
- A ZON Router (ZR-98) with the following firmware levels:

  MB 1.50 or later

  FB 1.50 or later

  FPGA version 112
- ZAC-60 Controllers that have firmware version 2.02 or later.
- IR flashers ("IR bugs") connected to ZIM-4 Input modules and/or the ZON router's LOCAL INPUT.
- An open expansion bay slot on the ZON Router.
- The Serial (DB-9) to RS-232 adapter and RJ-11 cable that was included with your ZON router (to connect your computer to the ZON router).

You may also need the following items:

- The factory-supplied IR remote for the device(s) you wish to control via the ZIR-232 (to learn keys not included in the on-board database).
- The installation and user's guide for the device(s) you wish to control via the ZIR-232.

Pre-Installation Information

When installing the ZIR-232 make certain that the router's AC power cord is disconnected. Never install or remove expansion bay covers with the router connected to AC power.

Likewise, ***never*** connect/disconnect the ZIR-232 with a live (powered) ZON router. Doing so will cause permanent damage to your expansion module and could damage your ZON router.

The ZIR-232 requires the router it is installed in have a certain firmware level to operate properly. It is recommended that your ZON router's firmware be compatible with the expansion module ***before*** you install the hardware.

ZON SYSTEM REQUIREMENTS AND SETUP

Installing your ZIR-232

1. Disconnect the AC power cord from the ZON router.
2. Remove the expansion bay cover plate. Using a #2 Phillips screwdriver, remove the cover screw and remove the cover plate. Figure 1 shows a ZON router with the "A" port cover removed.
3. Connect the 40-pin ribbon cable to the module. The cable provided with the module is the proper length and form factor for the router. The cable is "keyed" to allow for the proper pin placement (as illustrated in Figure 2 and 3).
4. Connect the ribbon cable to the router, making sure the key on the cable is aligned with the key slot on the router.

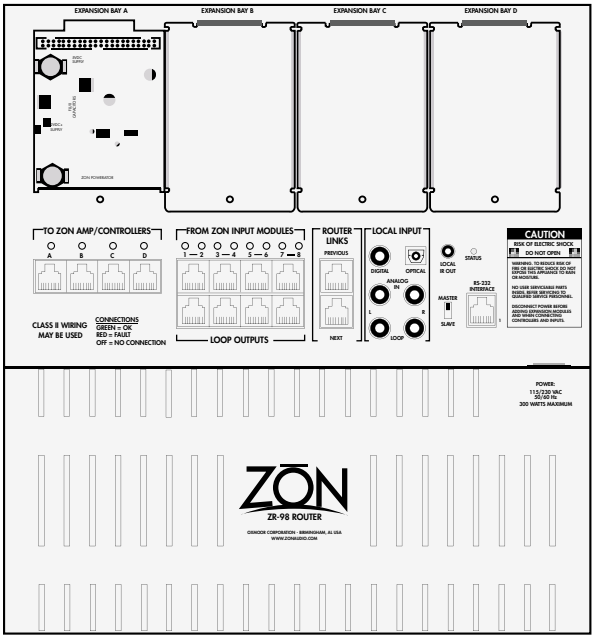


Figure 1

5. Insert the module into the router. Align the tab on the module's top with the tab opening on the router's frame
6. Re-install the screw removed in step 1 above. When the module is properly installed, the screw hole on the bottom tab of the module will be aligned with the threaded hole on the router's frame.
7. Re-connect power to the ZON router.

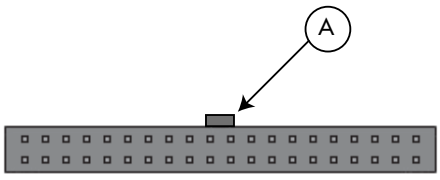


Figure 2

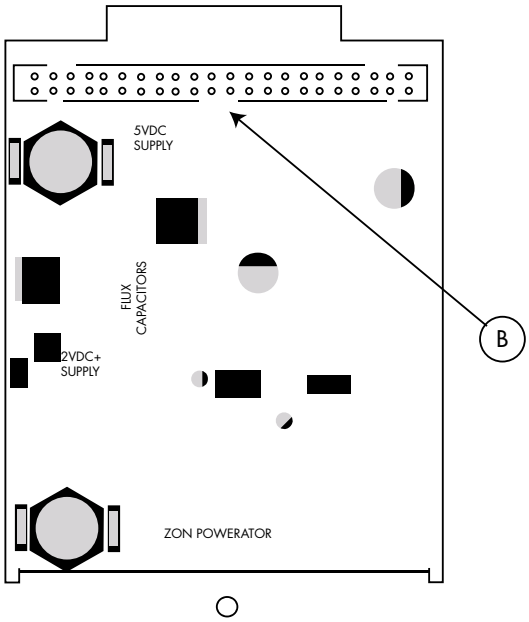


Figure 3

ZIR-232 CONFIGURATION BASICS

Overview

The software required to configure your ZIR-232 Device Commander is a part of the ZON Serial Configuration Utility. To configure your module, connect your computer to the ZON router and launch ZON Config. When you are connected to your ZON router, go to the EXPANSION MODULES screen to gain access to the ZIR-232 configuration screens. Figure 4 shows a typical EXPANSION MODULES screen for a ZON router that has the ZIR-232 installed in Expansion Bay "A".

Figure 4

The ZIR-232 configuration screens in ZON Config are broken down into the following sections:

1. Select Initial Data Source - Lets you choose what data ZON Config will write to the configuration screens (e.g., system defaults, data from a previously written ZIR-232 configuration or data that is currently stored in the module.
2. Main Configuration Screen - Similar to the Master Source Table in ZON Config, shows a tabular summary of the available inputs to the ZON system. Also provides a way to save and load ZIR-232 configuration files and apply firmware updates.
3. Define Device Screen - Ties your target device to the on-board library of IR key codes, and provides a way to learn IR keys from a remote and have the stored in the module.
4. Define Controls Screen - Configure and manage the on-screen icons and the commands tied to them.

ZIR-232 CONFIGURATION BASICS

When your configurations are complete, you can save them to the ZIR-232's main memory area. Following a save to the module's memory, you can archive your configuration settings to a special ZIR-232 configuration file (highly recommended) and update your connected controllers with their share of the ZIR-232 configuration data ("Load ZIR-232 Data to Controllers").

Saving configuration changes and making those changes take effect is a two-step process. Figure 4b shows a flow diagram of the two-step saving process.

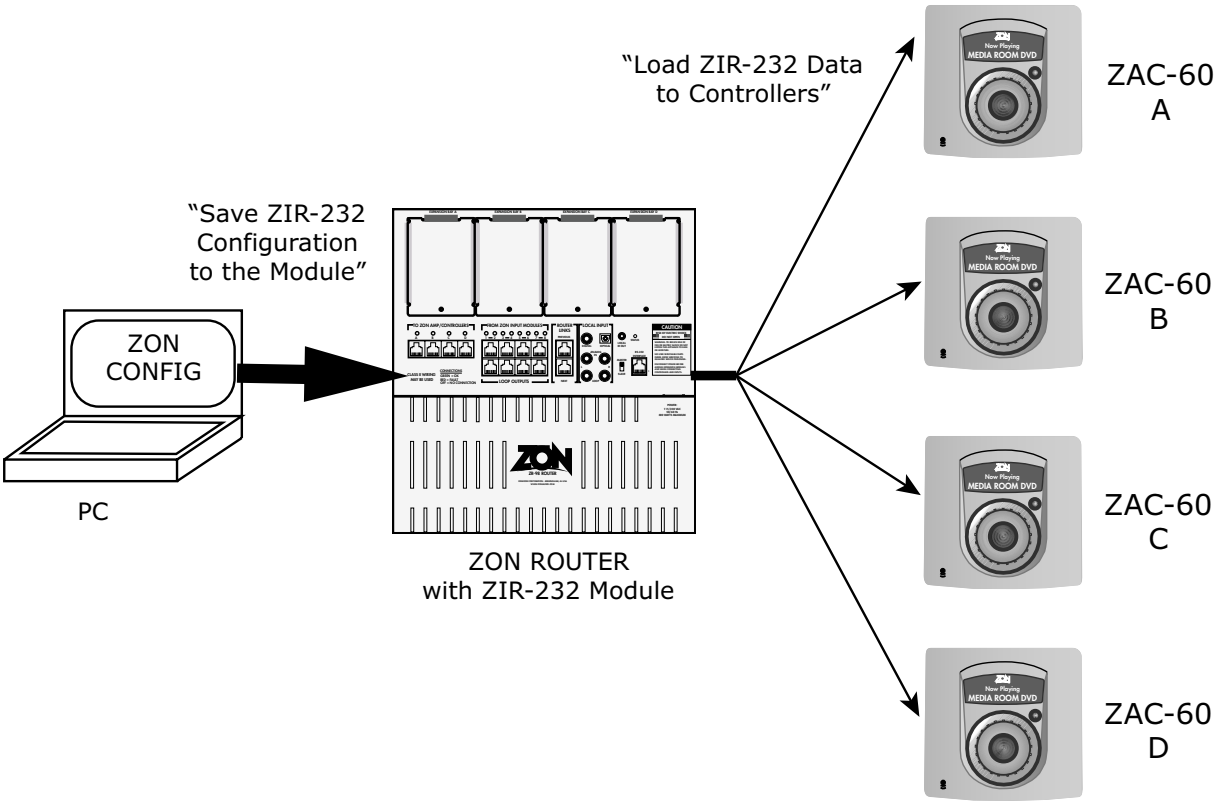


Figure 4

The configuration information you work with (and provide) on your PC is moved to the ZIR-232's main memory area with the "Save ZIR-232 Configuration to the Module" option. The module's main memory area is comprised of the commands you have configured, as well as icon assignments for those commands. In order for your ZAC-60 controllers to use the commands stored in the ZIR-232, the "Load ZIR-232 Data to Controllers" option loads the icons (and their labels) to the connected controllers.

The section "Configuration Settings: Saving ZIR-232 Data to the Module and a File" on page 26 describes the process of saving ZIR-232 configurations to the module. The section "Saving ZIR-232 Data to Connected Controllers" on page 28 provides instructions on loading ZIR-232 data to your ZAC-60 controllers.

ZIR-232 CONFIGURATION BASICS

Working With The Onboard IR Library

The ZIR-232 contains an onboard library of literally thousands of known device codes for IR enabled hardware. The software helps you determine the four-digit device code for your hardware by allowing you to select your device type (DVD Player, CD Player, TV, Cable Box, etc.). After selecting the device type, the search is further refined by selecting the manufacturer of your device from the available choices. The known four-digit device codes for your particular device and manufacturer are then presented to you for further testing and verification.

See the section, "Defining a Device for a Particular Input" on page 11 for more details on how to define your device for use with the ZIR-232.

Working With Learned Keys

In the event that your device is not available in the onboard library, or if you have a need for a particular IR key that is not offered in the known keys for a specific device code, you can learn IR keys for your configuration. Using the software, the IR learning window on the module, and a device remote, you can learn keys for the device. These keys are stored in the ZIR-232's onboard memory. See the section, "Learning IR Keys" on page 13 for more details.

You use the functions in ZON Config to activate the IR learning window on the ZIR-232 module. When a key is learned, it is stored in the ZIR-232 module. For example, if you are learning the "tray open" key for your Blue Widget CD Player, the ZIR-232 will store the key as Learned Key: Tray Open for the Blue Widget CD Player. Each time you work with the Blue Widget CD player inside the configuration screens, the software presents the availability of this key to you.

Learned keys are saved (or, stored) by the hardware, not by ZON Config - just like known IR keys, which are stored in the onboard database. This means that hex values for the keys you have learned reside in the hardware, not in the software. When you save a ZIR-232 configuration to a file, the file keeps track of all of the used keys (learned or otherwise) for each of your devices, and leaves instructions on where, in the hardware, the keys can be found by the software.

Because learned keys are module-specific, saved configuration files will only function as programmed with the module that learned the keys. This is important to remember when working with saved configuration files.

ZIR-232 CONFIGURATION BASICS

Connecting Your Computer to a ZON Router

Before connecting your computer to a ZON router:

1. Verify your computer meets the system requirements for ZON Config. See the ZON Serial Configuration Utility User's guide for more information.

2. Locate the DB-9 to RJ-11 adapter and RJ-11 cable that was provided with your ZON router.

Connect the adapter to your computer's serial port. Connect the supplied RJ-11 cable to the adapter and to the ZON router's RS-232 Serial Interface jack. The RS-232 Interface Jack on the router will light the connector when properly connected. Some computers (e.g., IBM lap tops) will only light the connector when the software is running.

Advanced Installation Note: You should use the DB-9 to RJ-11 adapter and RJ-11 cord that is provided with the ZON router to prevent connection and communication problems. If the RJ-11 cable supplied with the router is not suitable for your particular situation, you can use a standard 4 wire RJ-11 telephone cable. RJ-11 cables with six conductors will not work with the ZON router.

The software requires a dedicated serial port. It cannot share a port with an internal modem or other device. If you are unsure about the exact location of the serial port on your computer, refer to the user's manual supplied with the computer.

ZON Config will use COM1 as the default port for a connection with the router. If you are unsure about your computer's COM port assignment, refer to the owner's manual supplied with your operating system to learn more. In the event that COM1 cannot be used in your particular situation, ZON Config provides an option to change the serial port used for the connection.

Advanced Installation Note: If you computer does not have a serial port (a nine-pin male, or known as a DB-9), we recommend that you use either a PCI (for desktops) or PCMCIA (for lap tops) serial adapter card. You should not use a USB serial adapter. USB serial adapters are unreliable, and can cause intermittent character loss during serial communications.

Most technical support calls made to Oxmoor regarding connection problems with ZON Config are the result of using a non-Oxmoor supplied DB-9 to RJ-11 connector, using a 6-wire RJ-11 cable or using a USB Serial adapter.

ZIR-232 CONFIGURATION BASICS

The following steps will help you make a direct (serial) connection with a ZON router:

1. Verify that you have AC power connected to the ZON router.

2. Connect your computer to the ZON router via the serial to RS-232 connection accessories as described on page 6.

3. Launch the ZON Config program. (The main executable for the software is typically found in C:/Program Files/ZON Audio/ZON Config.) You will see the "Select Connection Method" screen as shown in Figure 1 below:

Figure 5

4. The "Connect to a router on serial port..." option should be selected. Make sure that the right COM port for your computer is listed at the end. Click "OK" to connect.

Advanced Installation Note: You must have a direct connection with the ZIR-232 installed ZON router to gain access to the ZIR-232 configuration screens included in ZON Config.

ZIR-232 CONFIGURATION BASICS

Connecting to a ZIR-232 Device Commander

Once you have made a successful connection to your ZIR-232 installed ZON router, select EXPANSION MODULES from the ZON Config menu. You will see the main Expansion Modules screen (refer to Figure 4 on page 4). The software recognizes installed expansion modules and "writes" their device and connection details in the EXPANSION MODULES main screen. Expansion bays that do not have modules installed will be "grayed out" and blank.

Locate the expansion bay block that corresponds to your module's installed location and click "Configure..." to begin working with the ZIR-232. You will see a screen (Figure 6) that will ask you to select the initial data source for your configuration:

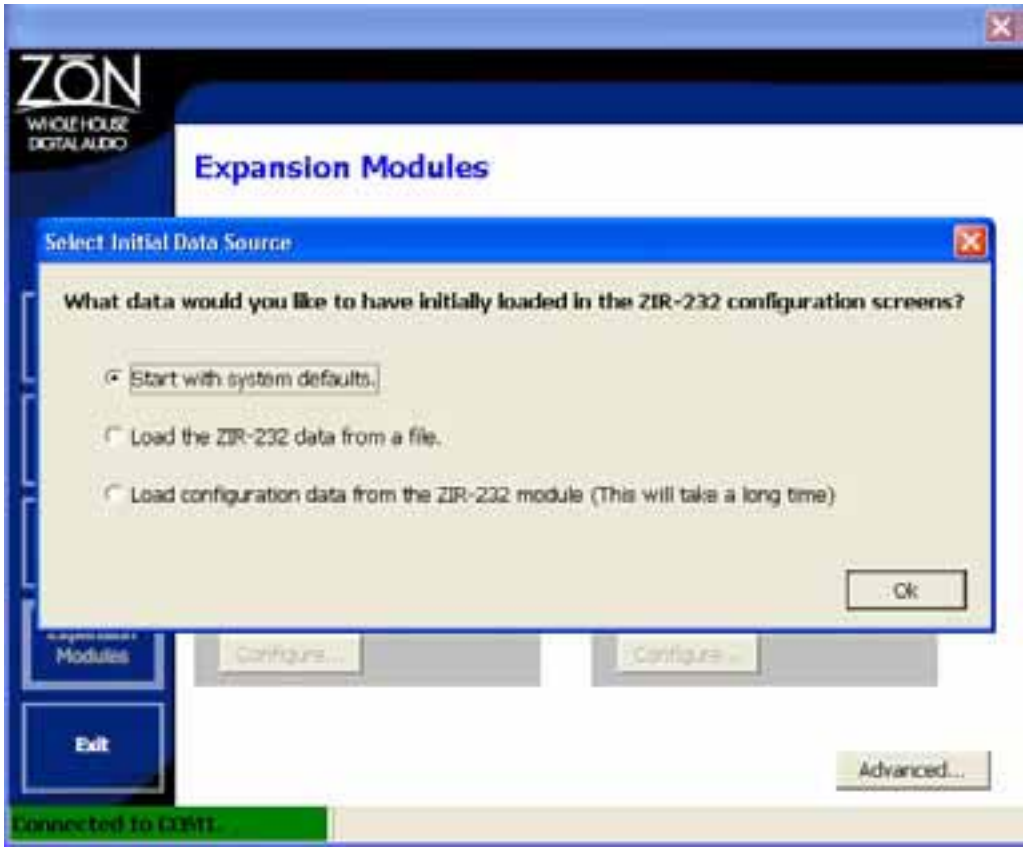


Figure 6

Your options for selecting an "Initial Data Source" are:

- Start with system defaults - The "Define Device" and "Design Controls" screens contain no device-specific information, including learned keys, icon selections, etc.
- Load the ZIR-232 data from a file - Writes device-specific information to the configuration screens.
- Load configuration data from the ZIR-232 module - Causes ZON Config to read the stored data in the module's memory and writes this information to the configuration screens.

Make your selection and click "OK" to begin the configuration process.

ZIR-232 CONFIGURATION BASICS

Working with the Main ZIR-232 Configuration Screen

After you select the initial data source, you will see the main ZIR-232 configuration screen (Figure 7). This screen allows you to configure ZIR-232 data for all of the ZON router inputs. In Figure 7, the main ZIR-232 screen shows the input names that were previously saved to the router using ZON Config. Connected devices are named by their physical input (Input 1, Input 2, ...) and their label (MEDIAROOM DVD, or the default, INPUT ONE).

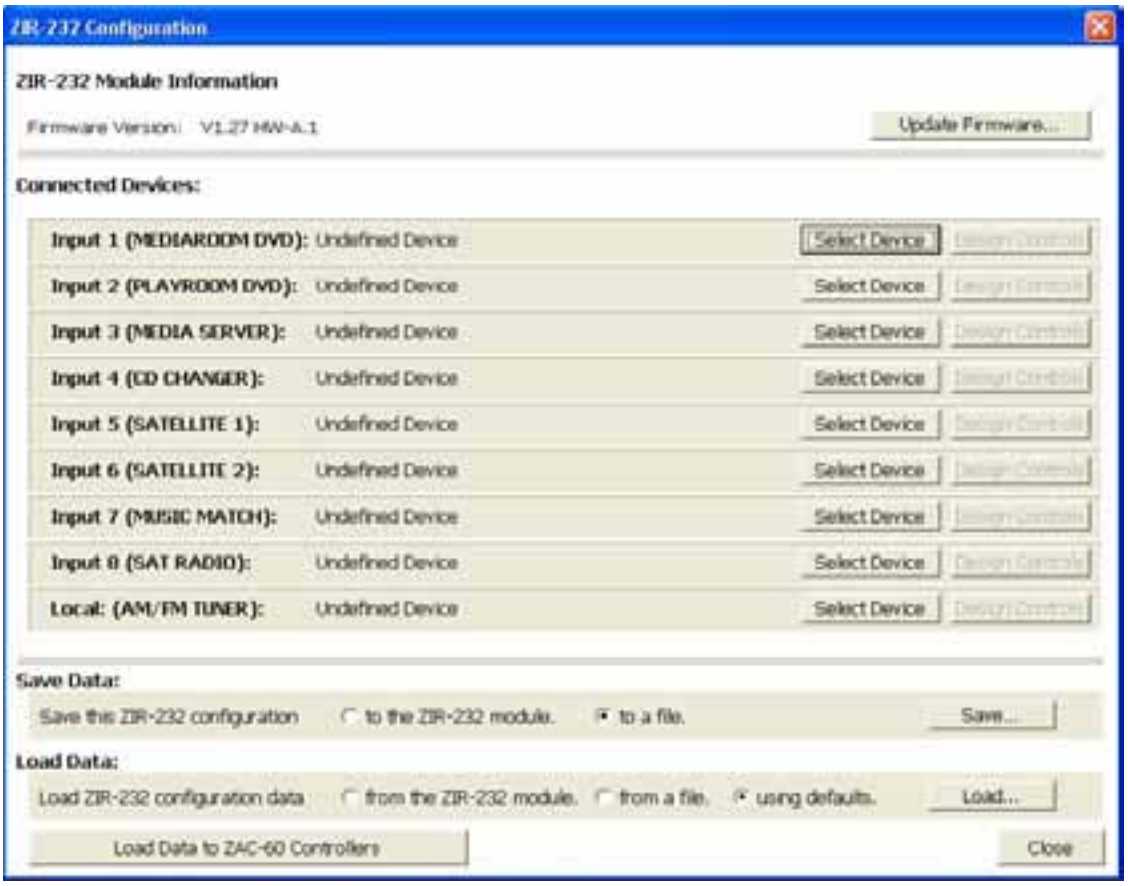


Figure 7

From the main "ZIR-232 Configuration Screen" you can do the following:

- Select Device - Tell the software the type and manufacturer of your device to determine and test the right four-digit device code for that device. Also lets you learn keys not present in the device code, or learn keys for devices not in the database.
- Design Controls - Choose and layout icons for ZAC-60 pages, as well as assign IR keys and/or macros to icons.
- Save data to the ZIR-232 module and/or save to a file.
- Load ZIR data from the module, from a file or system defaults.
- Load ZIR-232 data to ZAC-60 controllers.
- Update ZIR-232 Firmware.

CONFIGURATION SETTINGS: DEFINE DEVICE

Defining a Device for a Particular Input

To define a device for a particular input, choose "Select Device" for that input on the main ZIR-232 configuration screen. Figure 8 shows a typical "Define Device" screen. In the illustration, we chose to define the device that is connected to Input 1 on the ZON router, labeled as the MEDIAROOM DVD player.

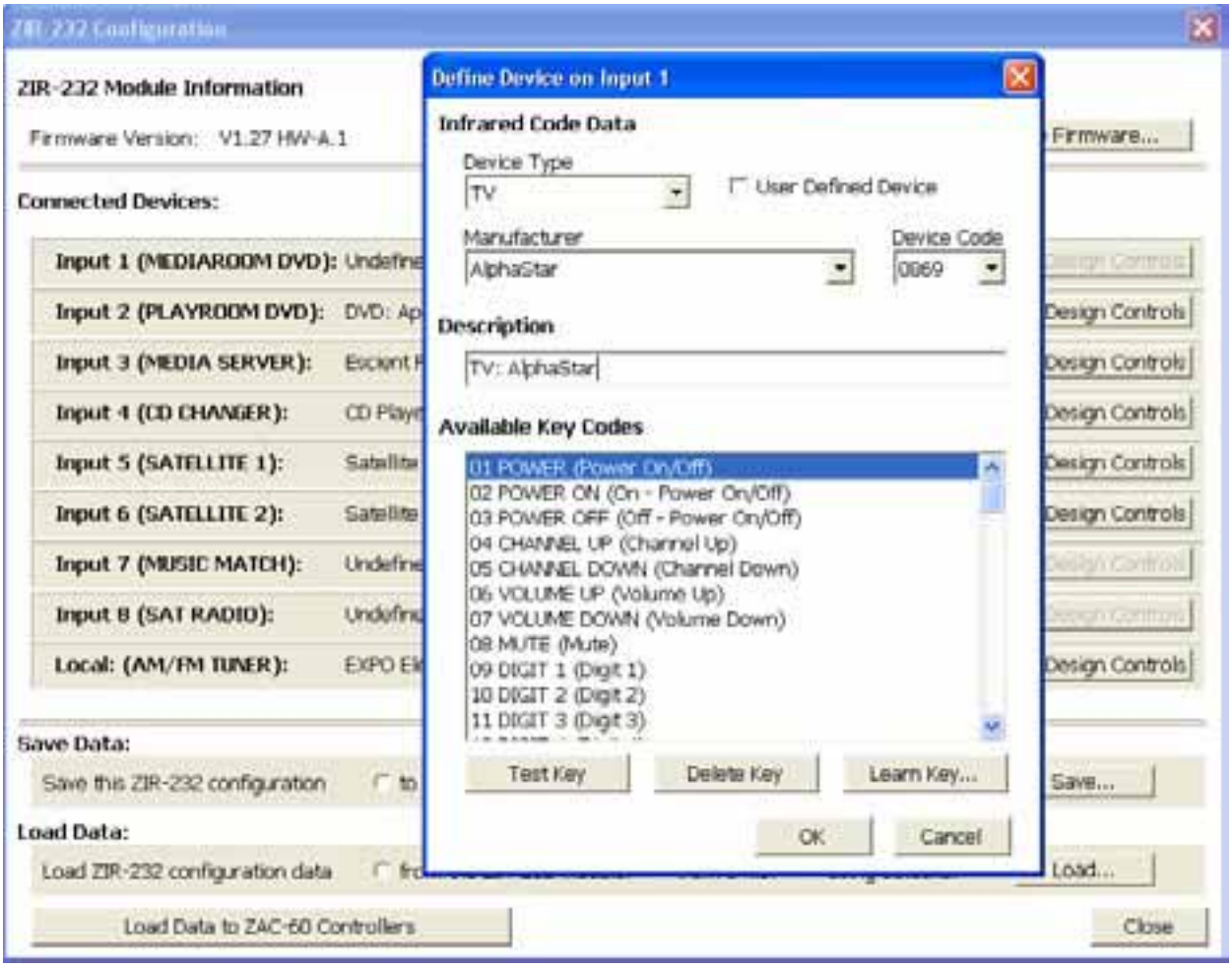


Figure 8

To define the device on Input 1 for the ZIR-232, do the following:

1. Select the device type from the "Device Type" pull down menu. If your device type is not listed in the available choices, check the "User Defined Device" box. When doing so, all of the Infrared Code data fields will be "grayed out" and read "User Defined".
2. Select the manufacturer from the "Manufacturer" pull down menu. If your manufacturer is not listed in the available choices, check the "User Defined Device box. When doing so, all of the Infrared Code data fields will be "grayed out" and read "User Defined".
3. Type in a description. The default description lists the device type first, then the manufacturer, separated by a comma. This field can be changed to meet your needs.

CONFIGURATION SETTINGS: DEFINE DEVICE

If your device type and manufacturer was available in the IR code database, the "Device Code" drop down menu was populated with one or more four-digit device codes. These codes are the basic "containers" for the IR keys known to work with the device you have selected. The key codes for the four-digit device code are presented in the "Available Key Codes" window.

To test the device code(s) presented, do the following:

1. Make sure that you have an input device connected to the appropriate input module. If you are working with Input 1, you will be working with the first ZIM-4 input module connected to the ZON router. You should also have an IR flasher ("IR bug") connected the ZIM-4 and the device's IR receiver.
2. Select an available key code from the menu. Typically, the POWER key is used for this type of test. Feel free to choose any/all that you feel necessary.
3. With your key selected, press the TEST KEY button at the bottom left of the window. This will instruct the ZIR-232 to send that key's IR data to the device on Input 1. You will notice that the red LED on the face of the ZIR-232 module will briefly illuminate red. This indicates that the module is generating and sending IR to the ZON system.
4. If the tested key(s) provides the appropriate results, then you have the right device code selected for your hardware. Customarily, the available keys listed in the window are also valid for your device, however, some may not be. This is a limitation of your hardware manufacturer, and not a failure of the ZIR-232.

Figure 9

5. If the tested key(s) do not render the results you were expecting, you will need to select a different device code (if available). Figure 9 shows a case where there are more than one device code for a particular device. Select an alternate code and re-test.
6. In the event that the device code(s) do not render the expected results (e.g., the key causes a different command to be executed or the device does not respond to the key) you may need to check your IR bug for proper connection to the ZIM-4 input module and/or the bug's placement on the device's IR receiver.
7. After checking your connections in step 6 above, and you still do not get the desired results, check the "User Defined Device" check box. Your device may not be compatible with the registered device code found in the onboard database.

CONFIGURATION SETTINGS: DEFINE DEVICE

Learning IR Keys

If you choose a "User Defined Device" or if your list of available codes do not contain all of the keys you will need to configure your device, use the LEARN KEY option to learn keys from the device's remote and save them in the module's memory. The "Learn Key" button is found on the "Define Device" screen for your particular input. Figure 10 shows a typical "Learn Key" window:

To learn an IR key, follow these steps:

1. Provide a name for your key in the "Key Name" field.
2. Select a learning method. The default method is to learn the key from the IR Input (learning window on the module) and save it for use.
3. Place the device's remote very close to the learning window on the module.
4. Press the "Begin Learning" button. The module will now begin to flash it's status led between amber, green and red rapidly. This is your indication that the module has been placed in the "learning" mode.
5. Before the learning mode times out, press the desired key on the device's remote to transmit the IR code to the learning window.

Figure 10

Figure 11

7. If your key was learned successfully, the status LED will light steady green and you will see "Key saved successfully" on the status line (Figure 10). The key is now placed in the module's memory, and is listed in the "Available Key Codes" list.
8. If your key was not learned successfully, the status LED will be off, and you will see messages similar to Figure 11. You will need to repeat the steps 4 through 7.

The "Learn key from the IR input and display the Hex code below" option will aid you in "looking" at the IR code that is being transmitted by the device remote. If you know the hex code that should be transmitted for the key you are trying to learn, you can compare that to what the learning window is receiving. Try the learning process again to test.

CONFIGURATION SETTINGS: DEFINE DEVICE

Limitations to Learned Keys

On average, the ZIR-232 can store 15 to 25 learned keys. The exact amount depends up on the size of each learned key.

Because of the finite amount of learned key memory, you may see error codes similar to "-5" or "-1" while trying to learn a new key. These error codes indicate that the module does not have available space in memory to store the key. If this happens with your intallation, you should consider only learning keys that are absolutely necessary for your device control design.

Define Device Helpful Hints

1. The onboard database is one of the most comprehensive collections of know device codes, however, due to manufacturing and/or design changes by the manufacturer of your device, what the database understands to be accurate for your device may not actually be the case. You should test your "Available IR Key Codes" thoroughly to make sure that what you are working with will provide you with the desired results.
2. A user defined device will require you to learn the keys needed/desired for the next steps of the configuration process. While you can spend the time to learn every key on the device's remote, it may not be necessary. You should determine what types of control you will want for the device, and learn the keys needed for those goals.
3. Use the proper IR flashers for the job. Oxmoor recommends that you use an IR flasher that can be affixed to the device's IR receiver. There are numerous types of IR flashers, those that allow IR to pass through them (so you can use the remote in conjunction with the bug) and those that are solid, which keeps the window blocked to external IR signals. IR blasters, flood emitters and other types of IR transmission devices may not give you the desired results immediately. If your system design requires the use of these types of devices, you should thoroughly test the operation and performance of those devices before using them with the ZON system.
4. Testing IR key codes is a necessity, but can be frustrating, especially if you have a room full of IR bouncing around. Remember that the IR receivers on your devices (including any ZAC-60s that you may have close by and connected to the ZON router) don't discriminate - they "see" all IR energy passing by. Stray and superfluous IR signals can cause unpredictable and undesirable performance of your devices.
5. Once you successfully learn an IR key, you have to exit the "Learn Key" window and re-enter it again to learn subsequent keys. If you don't' exit the learning screen, you'll just keep writing over the same memory location each time you press "Begin Learning" button.

CONFIGURATION SETTINGS: DESIGN CONTROLS

Designing Controls for a Defined Input

To design the controls for a particular input, choose "Design Controls" for that input on the main ZIR-232 configuration screen. You can only design controls for devices that you have define. See the section "Configuration Settings: Define Device" on page 11 for more information on how to define a device. Figure 12 shows the "Design Controls" screen:

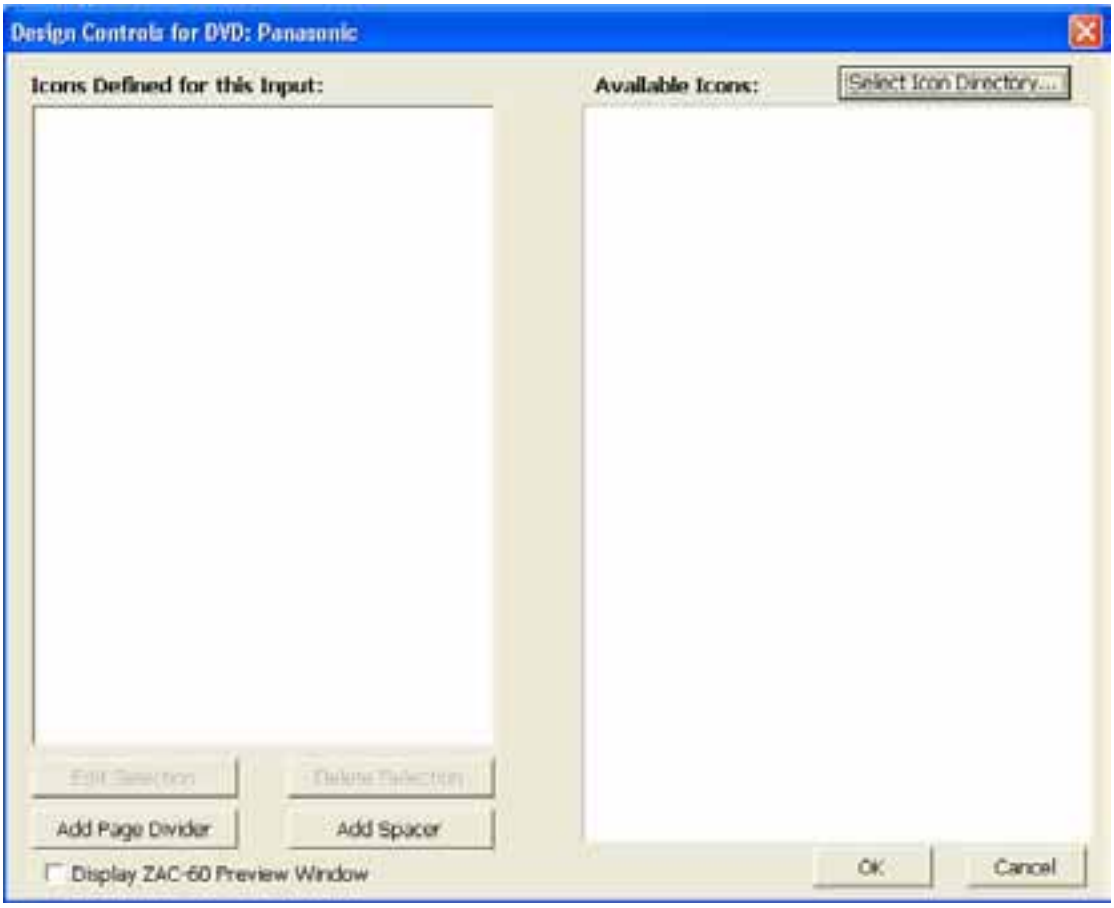


Figure 12

The "Design Controls" screen is divided into two areas: The "Available Icons" area, which serves as your icon pallet; and the "Icons Defined for this Input" area, which serves as the main "work" area for your commands and on-screen layout.

The basic workflow for designing controls is much like the following:

1. Choose an icon from the "Available Icons" area, click and drag the desired icon to the left-hand pane.
2. Working with icons in the left-hand pane, you tell the module what command or commands (scripts) will be sent to the connected device when someone selects that icon from the ZAC-60 IR COMMANDS menu.
3. Move, add, delete icons as needed, as well as display a preview of how the icons and icon pages are seen on the ZAC-60 controller.

CONFIGURATION SETTINGS: DESIGN CONTROLS

Choosing an Icon Collection

The "Design Controls" screen starts with popular transport controls as its default set of icons. The SELECT ICONS DIRECTORY button lets you choose other sets of icons to work with. Figure 13 shows the "Browse for Folder" box that appears:

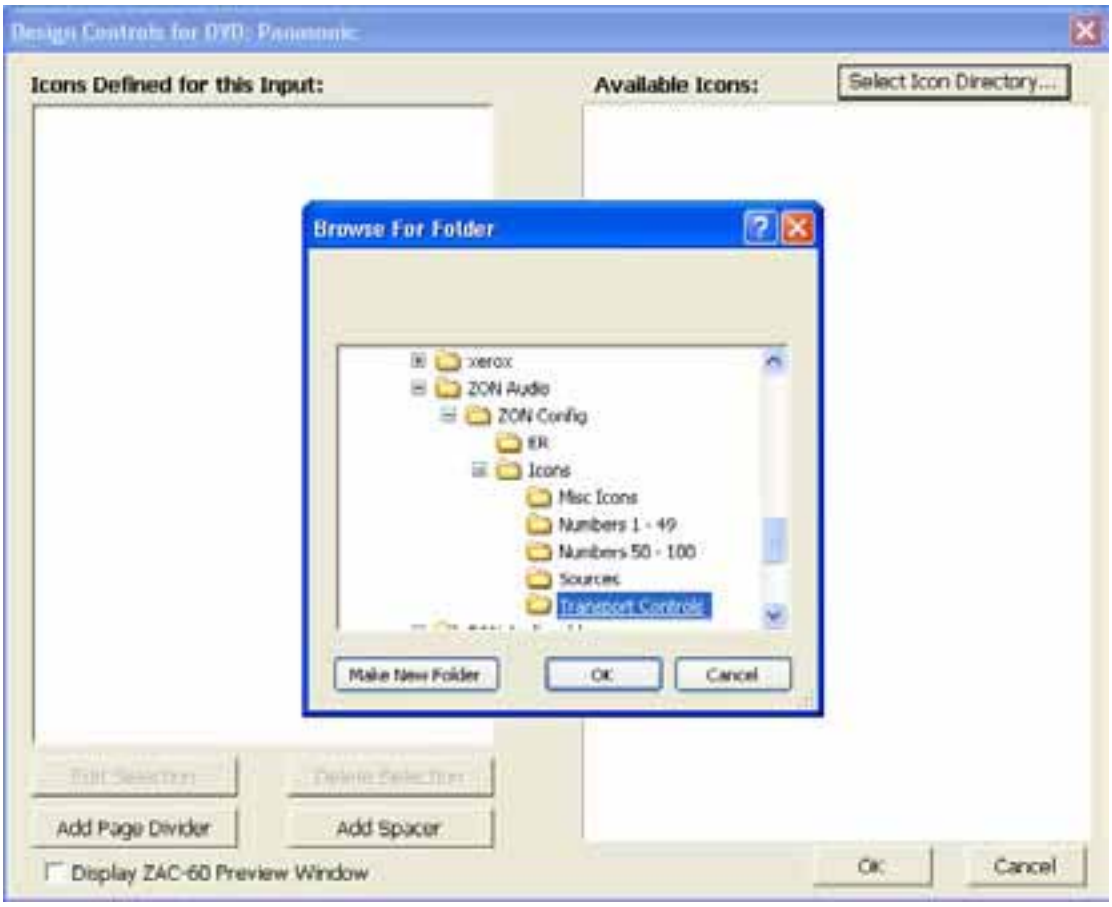


Figure 13

There are several icon collections included with the ZON Config installer. The icon directories are located at: C:\Program Files\ZON Audio\ZON Config\Icons, providing that you used drive C as your install folder.

The following are some examples of the available icon sets (directories) available for your configuration uses:

- Miscellaneous Icons - "Dingbat-style" icons (lamps, flames, light bulbs, etc.)
- Numbers 1 - 49 - A collection of numerals in different formats
- Numbers 50 - 100 - A collection of numerals in different formats
- Sources - A collection of icons to represent popular sources (TV, DVD, etc.)
- Transport Controls - A expanded collection of transport-style icons.

You can pick and choose any icons that you want from any of the directories.

CONFIGURATION SETTINGS: DESIGN CONTROLS

Working with Icons

To work with an icon, click and drag one from the "Available Icons" side of the screen and place it on the left-hand pane. Once you drop an icon in the "Icons Defined for this Input" pane, you will notice that the key name and label are listed in red type. This indicates that the icon is undefined. Figure 14 shows what the "Design Controls" screen looks like after selecting several icons:

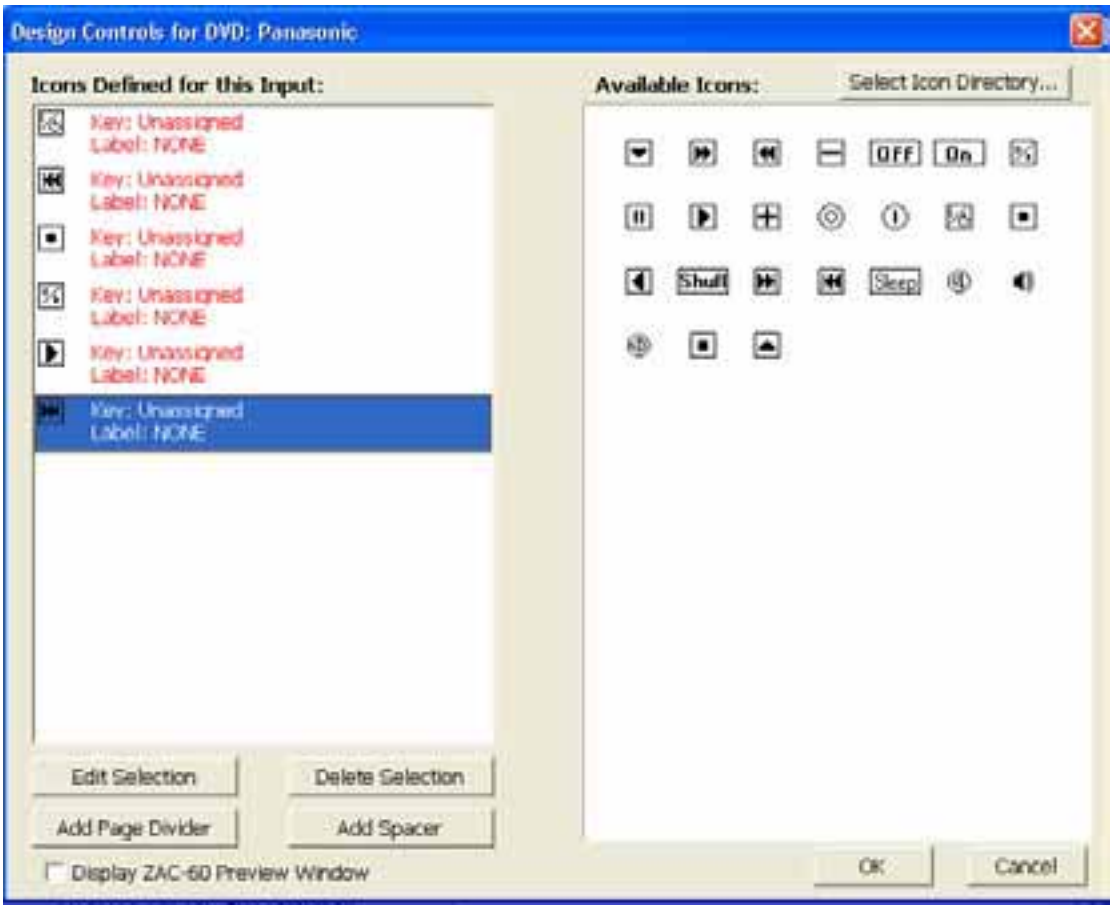


Figure 14

There are several tools available to you to help with your icon presentation:

- You can drag and drop icons in the left-hand pane from one place to another.
- You can delete an icon that you don't want in the icon queue by selecting the icon and pressing the "Delete Selection" button.
- You can add 1/2 icon-width spacers where needed. This helps with the visual presentation of the icons.

The left-hand pane grows as you add icons. Vertical scroll bars appear as the list grows beyond it's initial length. You may find it easier to drop all of the icons you need from the various icon directories, then work with the basic layout tools to arrange your icons in the desired order.

Advanced Layout Options

To aid you layout design, the "Design Controls" screen provides a way to preview the icon presentation as seen on the ZAC-60 display. Click the box beside "Display ZAC-60 Preview Window". You will see a preview box "ZAC-60 Preview" on your desktop. Figure 15 shows a typical ZAC-60 preview box:

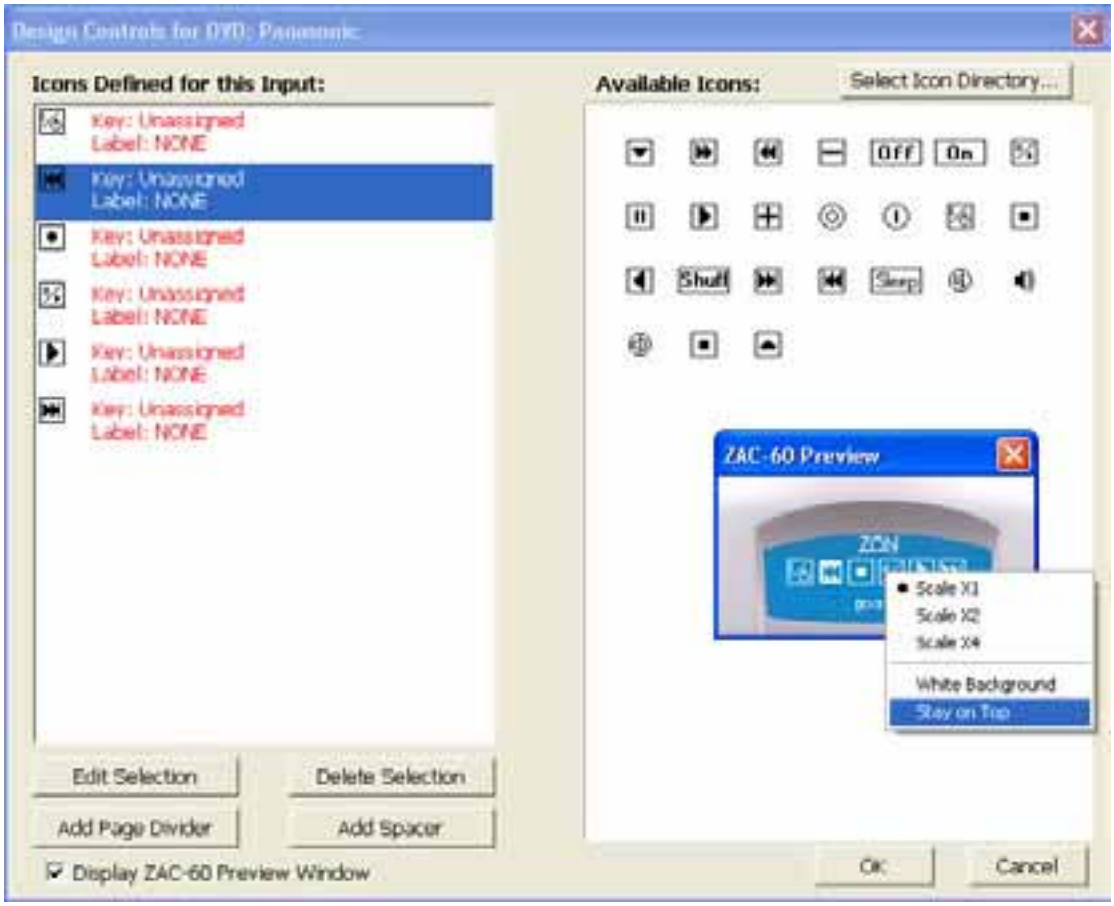


Figure 15

The preview box shows you what the icons on the left-hand pane look like in their static and selected state. To see what an icon looks like in its selected state, single-click on the icon in the left-hand pane.

Figure 15 shows the preview box with its options selected. To see the preview box options, right click on the "ZAC-60 Preview" box. You can scale the box to 1, 2 or 4 times, change the blue background to white, and choose whether or not to keep the box always visible on the top of the screen.

The ZAC-60 display will accommodate 6 single-width icons across, or three double-width icons across. If you have more icons than will fit the maximum screen width, you will need to add page dividers to break them up into sections.

CONFIGURATION SETTINGS: DESIGN CONTROLS

Figure 16 shows the "Add Page Divider" option being applied to the left-hand pane. To add your page break, click on the "Add Page Divider" button. This places a "PAGE BREAK" in line with the icons. The PAGE BREAK can be moved and placed anywhere in the list by clicking and dragging.

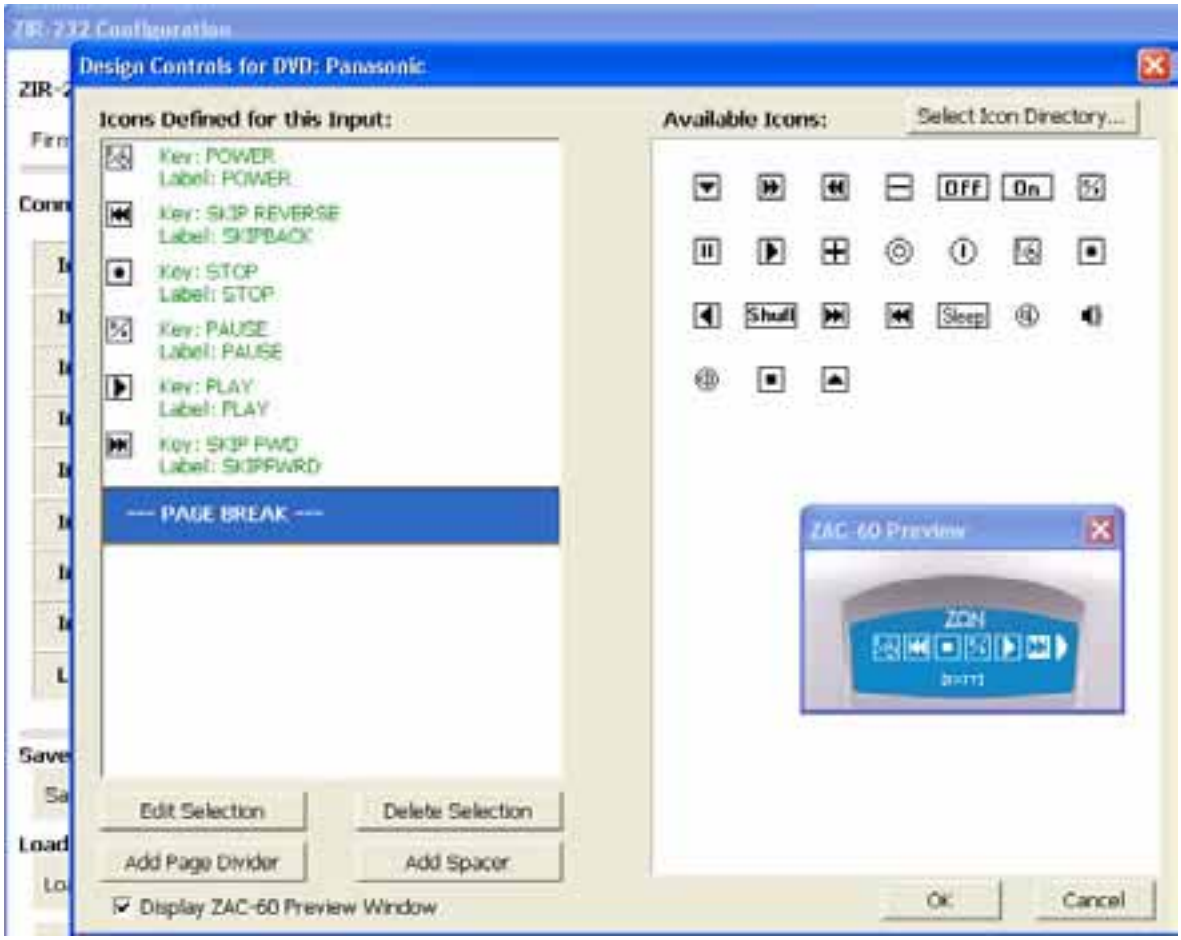


Figure 16

In Figure 16, you will notice the tall, narrow triangle that was added to the display when you placed the PAGE BREAK in the icon queue. Selecting this icon on the controller will take the user to the next page of icons configured for the particular input. Likewise, when you navigate the second page of icons, the tall, narrow triangle will be placed a at the head of the line of icons to indicate that there are more icons proceeding these.

It is recommended that you experiment with the layout and presentation of your icons. Try placing double-width icons with single-width icons and using the spacer option to develop your own preferences and style.

It is a good idea to place the most frequently used icons on the first page, then work down in frequency from there. Keep in mind that the on-screen controls you add to the system are there for increasing the flexibility and usability of the system - too many icons and controls can detract from the conveniences that the ZIR-232 offers the end user.

Defining an Icon for an Input

To define the commands that will be assigned to the icon, in the left-hand pane select the icon and click "Edit Selection" or double-click on the icon. You will see the "New Command" window (Figure 17):

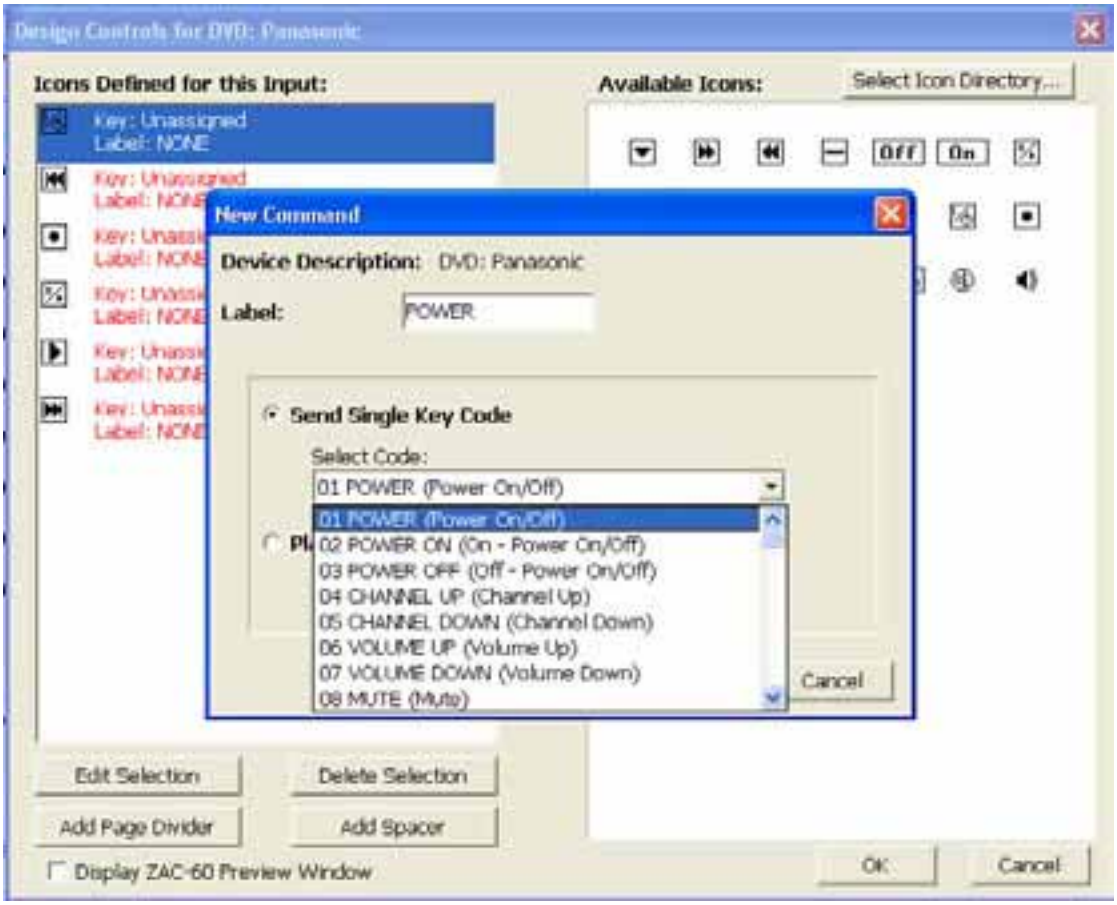


Figure 17

From the "New Command" window, you can do the following:

1. Give the icon a label - In our example in Figure 17, we are defining an icon for the DVD player's power button. So, our label is "POWER". This label will be seen on the ZAC-60 display window in the left-hand corner of the screen under the line of icons. Labels can be a combination of up to 8 letters/numbers.

2. Select the command - You have the option of sending a single key code, or writing a script involving multiple key codes, delays and possibly, RS-232 data. Our example is for the device's power toggle, which is a single key code. Select "Send Single Key Code" (the default options each time you enter this screen). The drop down menu shows you all of the available key codes for the particular device you are working with. It includes all of the known key codes you worked with in the "Define Device" screens, as well as all of the learned keys you may have created. Choose the appropriate key from the list and press "OK".

Repeat the process for the rest of the icons in your list. You will notice that after you define the icon, it's key and label name are presented in a green font. This indicates that you have successfully defined the icon.

Working with Scripts

Some of your commands may require a combination of several keys and/or RS-232 strings. To add a script to an icon, from the left-hand pane select the icon and click "Edit Selection", or double-click. You will see the "New Command" window. Type in the appropriate label and then click the "Play Script" radio button (as shown in Figure 18 below).

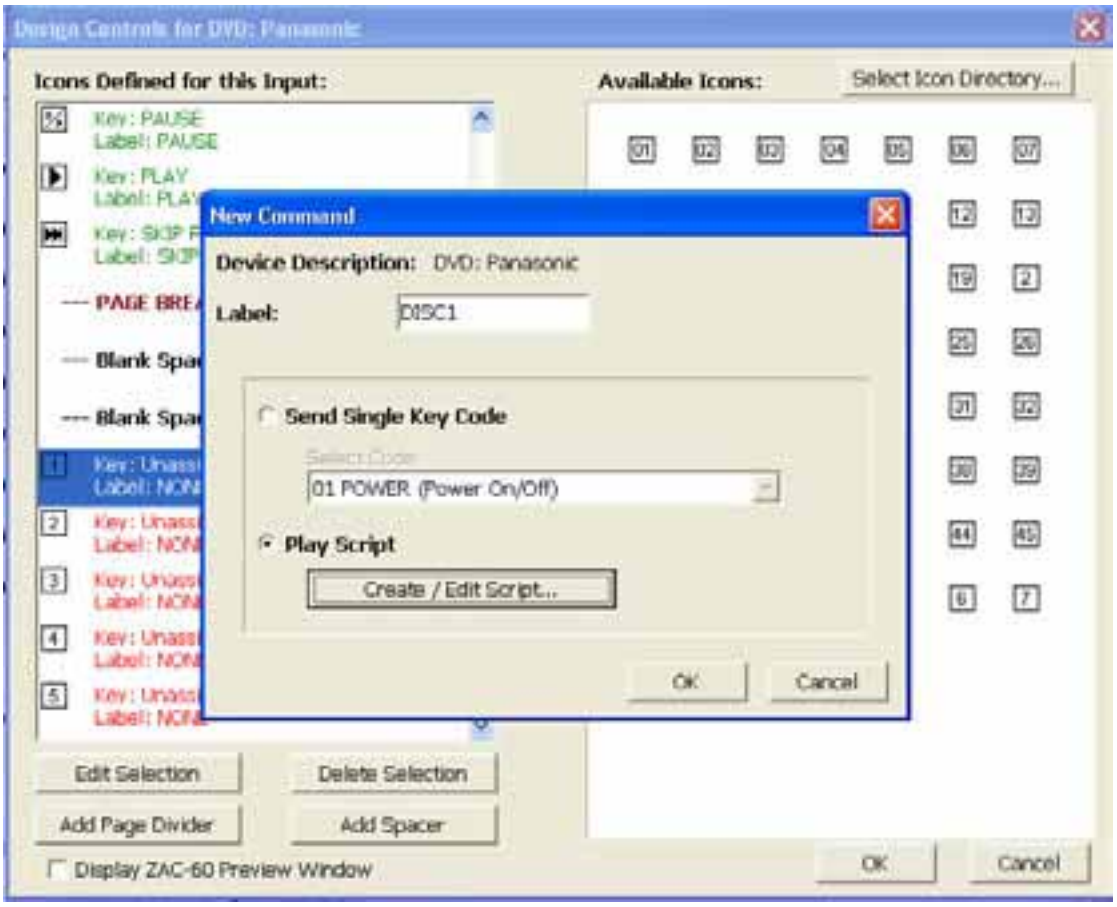


Figure 18

Press the "Create/Edit Script" button to see the script editor.

The ZIR-232 script editor is a table-based program that assembles a script in a line-by-line format. Each line is a row in the table. You can add or delete lines, move lines around (clicking and dragging) and you can test the script at any time to see how your commands work with the device.

CONFIGURATION SETTINGS: DESIGN CONTROLS

From the ZIR-232 Script Editor window you define the command (in the left-most column) and then provide the parameter of the command (in the right-most column). The ZIR-232 Script Editor is shown in Figure 19.

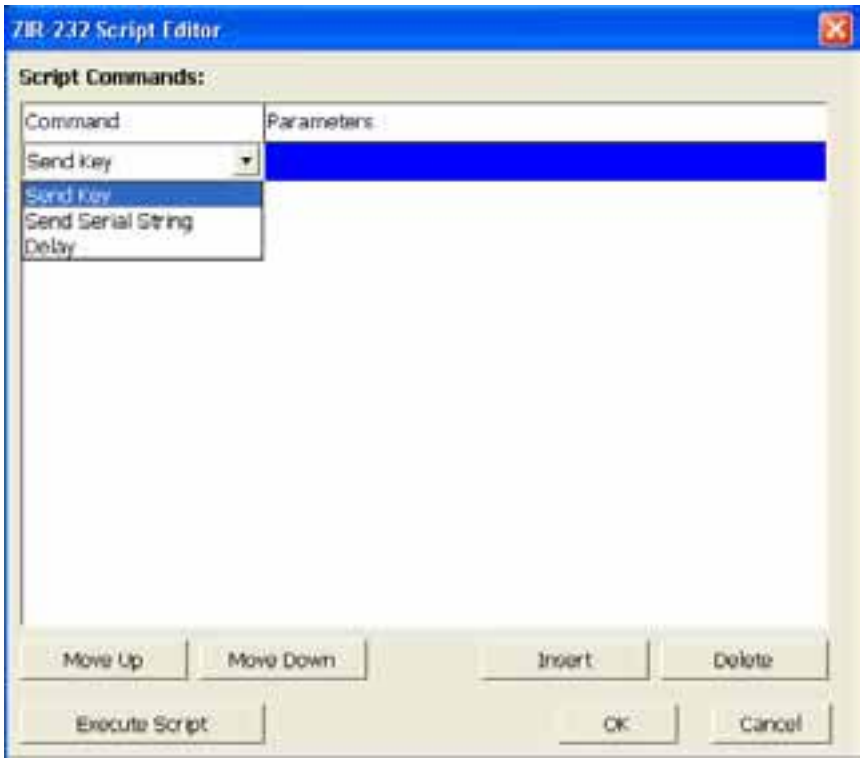


Figure 19

The options for commands are:

- Send Key - Lets you choose an available key previously defined for the device in the "Define Device" screens.
- Send Serial String - Provides a means to define a serial string (ASCII text) that will be sent via the module's RS-232 output.
- Send Delay - Lets you choose the number of milliseconds the system will "wait" or "pause" before moving to the next line in the script.

Depending upon the command option you choose, the parameters window changes:

- When you select the "Send Key" option, the parameters cell adjacent shows a "Select Key" button. Click this button to choose from the available keys.

- When you select the "Send Serial String" option, the parameters cell adjacent shows a solid blue fill. Click on the cell to add your serial command.

- When you select the "Send Delay" option, the parameters cell defaults to 10000 ms. Click the cell to change the delay value (in milliseconds).

CONFIGURATION SETTINGS: DESIGN CONTROLS

The following example shows you an example of building a script using the ZIR-232 script editor:

1. Click on the first column of the first row to view the drop down menu of commands. Choose "Send Key" from the drop down menu. You will see the "Parameters" cell adjacent to it change to a button. (Figure 20a)

2. Click on the "Select Key" button. You will the "Select Key" window (Figure 20b). This window shows you the device that you are configuring (the name you may have assigned it in the MASTER SOURCE TABLE, and the description of the device you provided in the "Define Device" screens, separated by a colon. This helps you remember which device you are working with. Below the device name, you will see all of the available key codes for the particular device you are working with. This list includes both known and any learned codes you may have provided.

   If you determine that you don't have a key you need, you can press the "Edit Device" button. This will automatically take you to the "Define Device on Input..." screen (Figure 9 on page 12). Make your additions/changes in this screen and press "OK" to return to the script editor.

3. Make your key code selection and press "OK". A new, blank line is added in the script editor. Click the first cell of the new row to add another command and parameter.

4. Figure 20c demonstrates the use of a delay. Choose "Send Delay". The parameter window now shows "1000 ms". You can use the up and down arrows to increment the value, or just type in the value you need.

Test your script for accuracy. When you are through, click the "OK" button to return to the "Design Controls" main screen.

Figure 20a

Figure 20b

Figure 20c

CONFIGURATION SETTINGS: DESIGN CONTROLS

Working with Serial Commands in the ZIR-232 Script Editor

Serial (RS-232) strings can be a part of a script, or used by themselves in your list of commands for a particular device. Serial strings that you provide the module are sent out it's bidirectional RS-232 port. To work with serial strings, you will need to double click an icon, choose "Edit/Create" script from the "New Command" window. This launches the ZIR-232 script editor.

Choose an open command cell and click to see the command options pull down menu. Choose "Send Serial String". You will see the "Parameters" cell fill with blue. Click on the parameters cell. You will see the "Enter Serial Command" window (Figure 21):

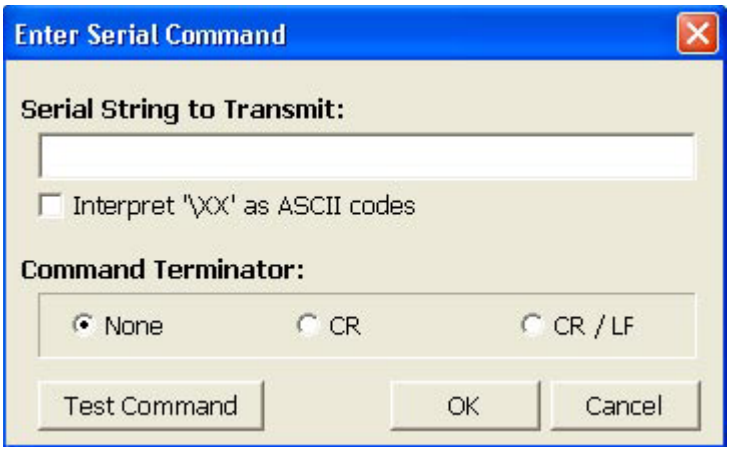


Figure 21

Enter the serial string that you need in the "Serial Sting to Transmit" box. The serial string you provide depends upon the device(s) you have connected to the ZIR-232's serial jack. For more information on using serial commands for your particular device, refer to the owner's manual that was provided for the device.

If your serial string format requires the use of a backward-slash (e.g., \ ), you will need to check the box next to "Interpret "\XX" as ASCII codes".

You also have options for what to do for default command terminators:

- None - (The default) adds nothing to the command terminator.
- CR - Carriage Return, issues a carriage return at the end of the string.
- CR/LF - Carriage Return / Line Feed, issues a carriage return and line feed at the end of the string.

Using the "Test Command" button sends the serial string you have provided (along with the other settings you have selected) out the module's RS-232 jack. It is recommended that you test your strings for accuracy and performance.

CONFIGURATION SETTINGS: DESIGN CONTROLS

Design Controls Helpful Hints

1. Don't be tempted to "over design". The ZIR-232 adds exceptional flexibility and functionality to your system. The end user will appreciate being able to easily find and use the commands that they need, rather than scroll through endless pages of icons.
2. Learn how your device works with it's factory-supplied remote. You can't design flawless ZIR-232 commands unless you spend the time to learn how your device(s) work with their own remote(s). Some devices are very particular about the sequence, timing and organization of the commands it receives via IR.
3. Testing IR key codes and scripts is a necessity, but can be frustrating, especially if you have a room full of IR bouncing around. Remember that the IR receivers on your devices (including any ZAC-60s that you may have close by and connected to the ZON router) don't discriminate - they "see" all IR energy passing by. Stray and superfluous IR signals can cause unpredictable and undesirable performance of your devices.
4. Commands are device-specific. If you select the MEDIA ROOM DVD player on the ZAC-60 controller, the IR COMMANDS shown in the functions menu are all the commands you configured and defined for the MEDIA ROOM DVD player. If you have serial commands, for example, that need to be seen no matter source you have selected, you will need to define that command for all of the sources in your system.
5. Choose and organize your icons in the left-hand pane first - then define them. This will help you not only stay organized, but will help keep your work accurate and complete.

CONFIGURATION SETTINGS: SAVING ZIR-232 DATA

Saving ZIR-232 Data to the Module and a File

When your configuration tasks are complete (or at any time during the configuration process) the main ZIR-232 configuration screen provides you with a method to save your data. You can save your data to a file and to the ZIR-232 module.

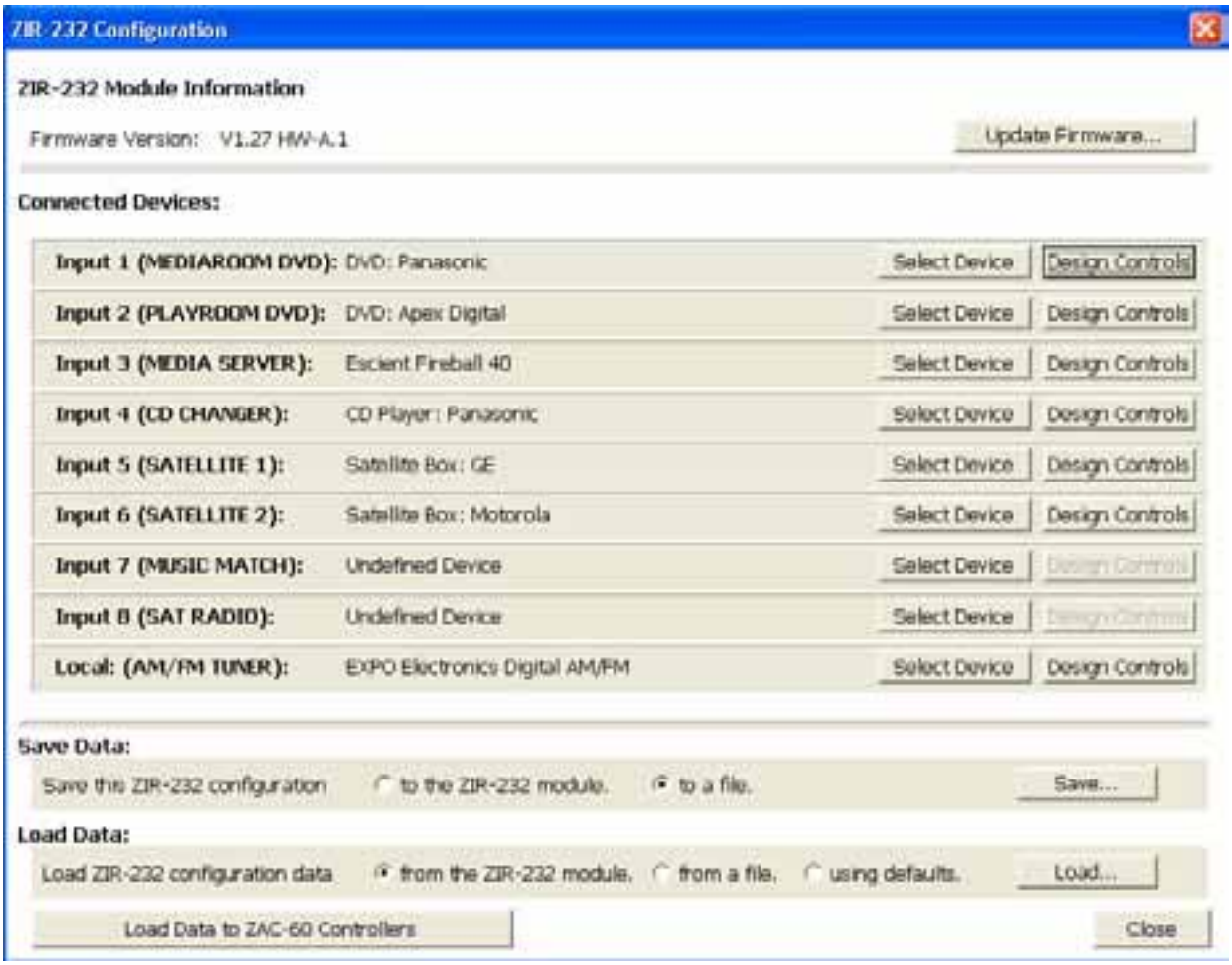


Figure 22

Before the system can recognize your ZIR-232 data, you will need to save it to the ZIR-232 module. You will also need to save the data to a file so the software can automatically generate the ZAC-60 data files that correspond to your configurations.

To save data to a file, click the radio button next to "to a file" in the "Save Data" area and then click "Save...". You will see a standard save window. Provide the name and location to save your data. ZON Config will save your file as a (*.MCF) file. The default location is "C:\Program Files\ZON Audio\ZON Config\".

To save data to the ZIR-232, click the radio button next to "..the ZIR-232 module" and then click "Save...". You will see a ZON Config's standard load/save data window, along with the warning not to disconnect the serial or any other cables from the ZON system. Click "Start Download" to continue.

CONFIGURATION SETTINGS: SAVING ZIR-232 DATA

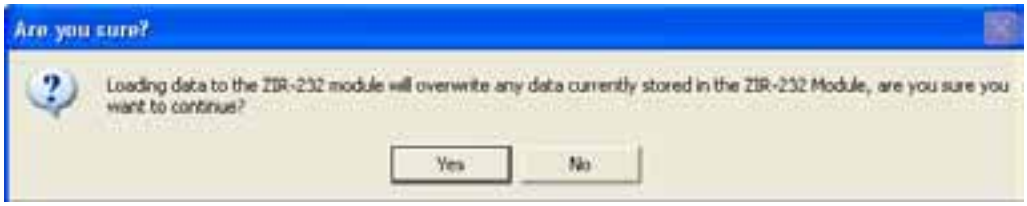


Figure 23

Figure 23 shows a typical "Are you sure?" dialog box. Saving data to the ZIR-232 module will erase all the data that may be currently stored within. Click "Yes" to continue.

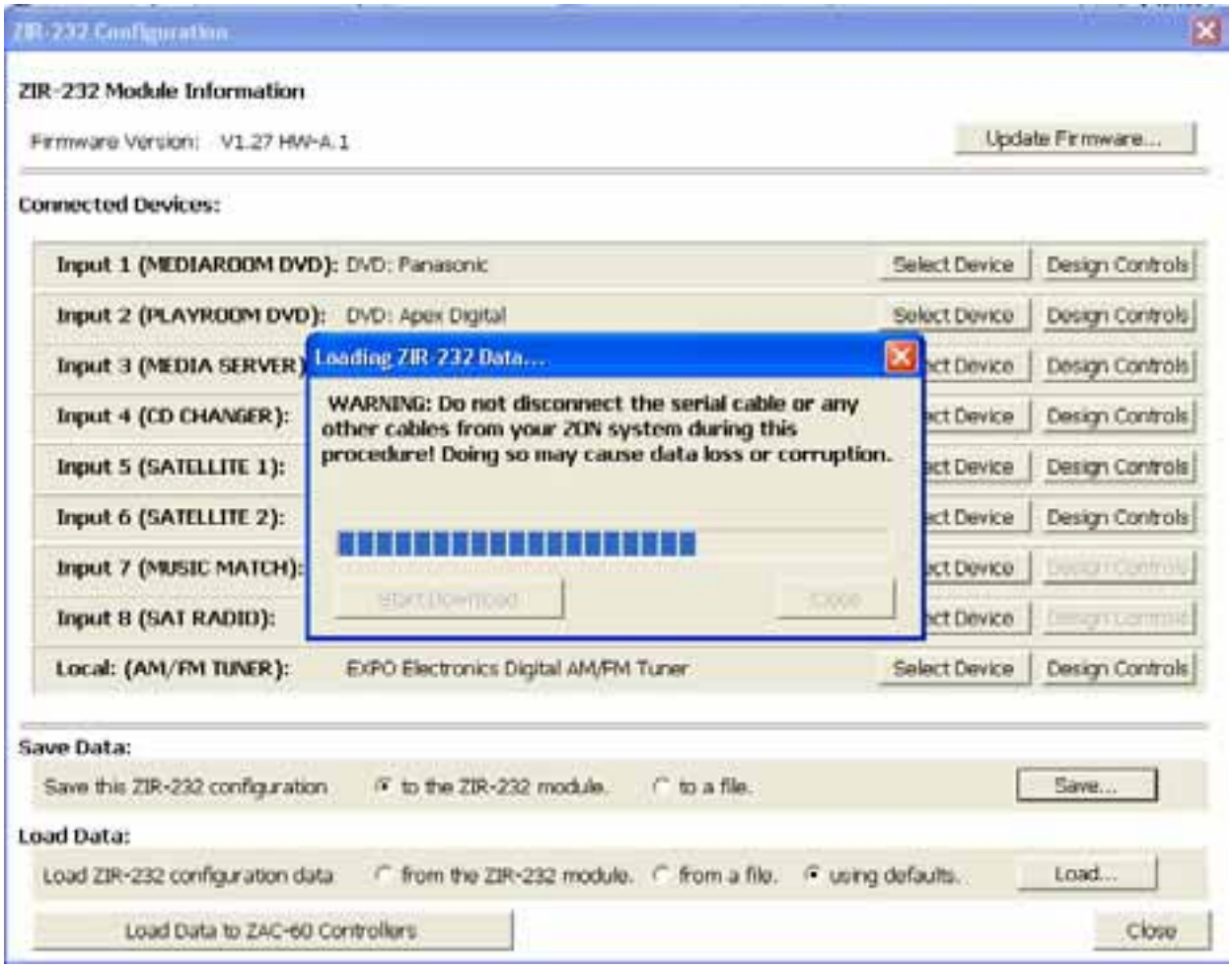


Figure 24

Figure 24 shows the load/save data window with progress bar. When the process is complete, you will receive a message from the system telling you the save was complete. Click "OK" to acknowledge the message and continue.

Your module now has all of your configuration settings stored within. In order for the system to be able to access the data you just saved, the connected controllers will need to be provided with their share of the ZIR-232 configuration data.

CONFIGURATION SETTINGS: SAVING ZIR-232 DATA

Saving ZIR-232 Data to Connected Controllers

When you save your ZIR-232 configurations to a file, ZON Config creates a special ZAC-60-specific data file that contains the information a ZAC-60 needs to request services from the ZIR-232, as well as your icons and display preferences.

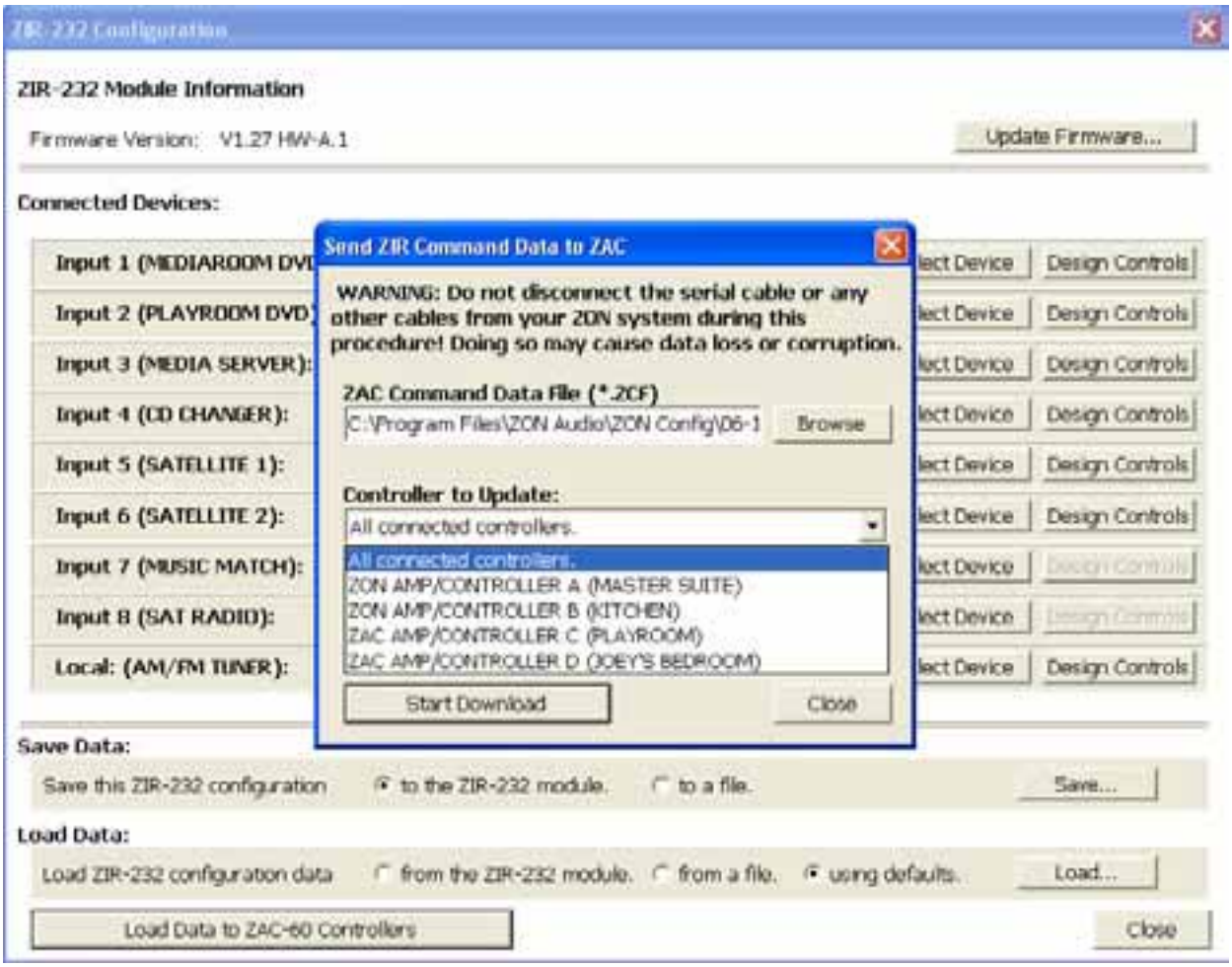


Figure 25

To send the configuration to the ZAC-60s in your system, click the "Load Data to ZAC-60 Controllers" in the bottom-left of the main ZIR-232 configuration screen. You will see Figure 25, "Send ZIR Command Data to ZAC".

Locate the (*.ZCF) file that was created for your current configuration. If you saved your ZIR-232 configuration file as "XYZ.MCF", the file you are looking for is "XYZ.ZCF". The default location ZON Config uses for saving your files is "C:\Program Files\ZON Audio\ZON Config".

Select which controller(s) to update. You can select individual controllers connected to your ZON system from the drop down menu, or elect to sequential update all the connected controllers. Make your selection and click "Start Download" to continue.

CONFIGURATION SETTINGS: SAVING ZIR-232 DATA

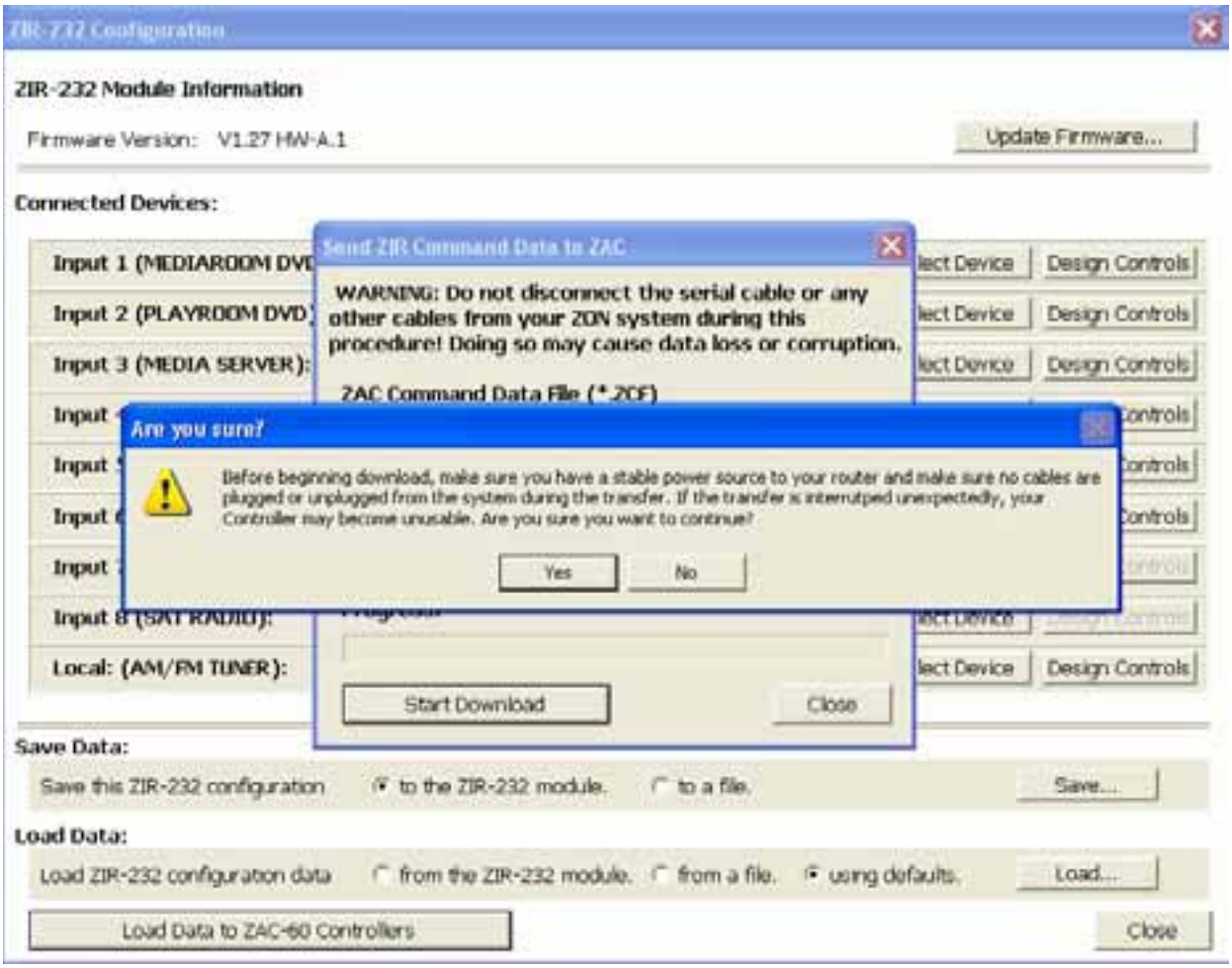


Figure 26

Figure 26 shows the standard ZON Config "Are you Sure?" dialog box. It is important to note that you must have a stable power source and a stable data connection during the update process. Interrupting the loading of data to the ZAC-60 can cause your controller to become unstable, and may require factory service. Click "Yes" to continue.

This process will take a few moments for each connected controller. You will notice that the ZAC-60 controller will display "Saving Command Data" (or similar) on the screen, and it's backlight will flash on and off. When the process is complete, the controller will auto-reset.

It is a good idea to reset the ZON router (remove the AC power for 60 or more seconds) after you have updated all of the controllers.

CONFIGURATION SETTINGS: SAVING ZIR-232 DATA

Loading Data to ZAC-60s on Slave Routers

The special software for the ZIR-232 is only available to you when you connect to a ZON router that has the module installed. Because of this, you will not be able to connect to slave routers in the system and see the "Load Data to ZAC-60 Controllers" option (because it is a part of the main ZIR-232 configuration screen).

The following steps will help you load ZIR-232 data to ZAC-60 controllers on slave routers in the system:

Laptop Method:

Use this method if you have a laptop, and can easily move it around without having to exit ZON config:

1. Once you have updated the controllers on the Master Router, disconnect the RS-232 cable from the router. Leave ZON Config in it's present state. You should see a screen similar to Figure 25 on page 28).
2. Move to the next router in the system, re-connect the RS-232 serial cable.
3. If you have the same number of controllers on this router as the Master, select "All Connected Controllers" from the list to update on the "Send ZIR Command Data to ZAC" screen. If you have less (e.g., the slave only uses ZAC "A" and ZAC "B"), choose ZAC A and ZAC B individually.
5. Repeat steps 1-3 above for all routers in the system.

Alternate Method:

The alternate method is to uninstall the ZAC-60s from their locations and move them to where the ZIR-232 router is installed. Once you have updated the first four controllers on the Master Router, exit ZON Config, power down the ZON router, disconnect the newly-updated controllers, and re-connect with to-be-updated controllers.

Power up the ZON router, and re-launch ZON Config. Go to the main ZIR-232 configuration screen and repeat the process for "Load Data to ZAC-60 Controllers".

Repeat this as many times as necessary to update all of the controllers in the system.

Advanced Configuration Note: Loading Data to ZAC-60 Controllers - Loading ZIR-232 data to ZAC-60 controllers will not change any Master Source Table settings you may have saved to them via ZON Config. If you had previously saved ZIR-232 data to a controller, that data will be overwritten with the new data.

APPENDIX A: IN CASE OF DIFFICULTY

Resolving Connection Issues

If you are experiencing difficulties connecting to a ZON router from your computer, you should first check the following:

1. System Requirements - Make sure that your computer meets the system requirements listed on page 2.

2. Cables and Connectors - You should be using the Oxmoor provided DB-9 to RJ-11 adapter. You should also use the RJ-11 cable shipped with the router, or use a standard RJ-11 4 conductor telephone cable to connect between the adapter and the RS-232 jack on the ZON router.

3. Power - Make sure that you have a stable power source for your ZON router and your computer.

4. Serial Port and COM Port Assignments - Consult the owner's manual for your computer and operating system to verify the proper installation and configuration of your serial port.

The following information should help you further diagnose your connection issue in the event that the above items do not help:

1. "No Response" Error Message - Receiving this error message when trying to connect is typically the result of a hardware or connection issue. You should verify that the ZON router has AC power and that you have properly connected your computer to the ZON router.

2. "Could Not Open Serial Port" Error Message - Receiving this error message when trying to connect is typically the result of an improperly configured or installed serial port on your computer. You should try to connect to a ZON router on different COM ports. See the section "Working with a Direct Connection" on page xxx.

3. "Communications Failure" Error Message - Receiving this error message when trying to connect is typically the result of a hardware failure with either the ZON router or your computer. You should try to eliminate the root cause of the problem by checking your computer, the connection between the computer and the ZON router, and also verify that you have a stable power source for both the computer and the router.

APPENDIX A: IN CASE OF DIFFICULTY

Troubleshooting a Connection Issue

Before you contact Oxmoor technical support to report a connection issue, you can use Hyper Terminal (a communications application that is installed on most all computers) to help troubleshoot your connection to a ZON router.

1. With the AC power disconnected on the ZON router, connect your computer to the router using the provided adapter and cable. If the supplied RJ-11 cable does not suit your particular application, you should use a known working, 4 conductor RJ-11 cable. (A 6 or 2 conductor RJ-11 cable will not work, and will result in a connection failure.

2. Launch Hyper Terminal on your computer. This is typically found under the COMMUNICATIONS menu in the ACCESSORIES main menu of your operating system.

3. When prompted, provide a name for the new connection, and click OK to continue.

4. In the "Connect To" screen, use the pull-down menu to select the COM port you have determined is assigned to your serial port. Click "OK" to continue.

5. In the "COM Properties" dialog box set the following:
   Bits per Second: 9600
   Data Bits: 8
   Parity: None
   Stop Bits: 1
   Flow Control: None

6. Click "OK". You should now see the terminal screen. Reconnect the AC power to the ZON router. If the COM port you used in the connection is working, you should see a block of data from the router that begins with "MOTHERBRAIN"….

If you do not see any data on the terminal screen, try disconnecting and reconnecting the AC power to the ZON router. In the event that this does not provide you with desired results, you will need to exit Hyper Terminal and try the test again, this time choosing a different COM port from Hyper Terminal's "Connect To" menu.

Once you see a response from the ZON router on the terminal screen, you have confirmed that the connection is successful and the ZON router is capable of serial communications. Should you not be able to communicate with a ZON router using this Hyper Terminal test, you should contact Oxmoor technical support for assistance.

When you contact Oxmoor technical support, you will need to have component serial numbers and a listing of any/all error messages you have received.

APPENDIX A: IN CASE OF DIFFICULTY

Resolving Software Issues

Before contacting Oxmoor technical support, review the following items to see if your particular issue can be resolved:

1. Missing and/or outdated Master Source Table - The software found the router's memory area to be empty or in an obsolete format. If you are connecting to a new ZON router for the first time, you may receive this message by default. You should allow the software to use the default table.

2. Missing Inputs on the MASTER SOURCE TABLE screen - The software has the ability to filter the inputs on the table by their "Active" status. Check whether or not you have a list filter in place. See page 15 for more information.

3. Changes You Supplied Not Present - You should verify that you have saved your data to the router and have also updated your ZAC-60 controllers with the data. Refer to Figure 4b and the information on page 5 for information on how the software's "two-step" save and update procedure works. For directions on how to save and apply settings to your hardware see page 16. You should also make sure that you properly reset the ZON system following the save and update procedure.

4. Unwanted/Unused Inputs Showing - Unused inputs should have their "Active" status set to "No" on the MASTER SOURCE TABLE screen. See page 16 for instructions on how to do this. Unwanted inputs, such as those that you want to restrict from a controller's SELECT SOURCE menu should be modified with the "Restrict Sources" option in the CONTROLLERS menu. See page 21 for instructions on how to restrict sources from a particular ZAC-60 controller.

5. Cannot Update a ZAC with New Settings - The software was unable to connect to the controller, or failed to put the controller into flash mode. You should verify that the controller has been properly reset following a firmware update or a previously applied settings update. You may also check to see if the controller is operating properly (i.e. it's display and controls respond to your input). If you have a controller that has a blank screen or will not respond, you may have to use the ZAC-60 Emergency Recovery Utility to reset the controller. See the ZON Config User's guide for more information.

6. Names Look Unusual or Wrong on ZAC-60 Display - The ZAC-60 display will accommodate names assigned to inputs that are 16 or less characters. There are some instances, however, where a name containing 16 characters "spills" over the left and right border of the controller display, and is more pronounced when scrolling through menus where the selection markers (solid triangles on the left and right of the display) crowd on top of the long name. The only remedy is to change/shorten the affected name label.

APPENDIX A: IN CASE OF DIFFICULTY

7. Cannot Find a Needed File - If you are having trouble locating a needed file, try searching on your computer for *.YYY" where YYY is the appropriate extension. File types used by the software include: ZIR-232 configuration files (*.MCF) and ZAC-60-specific ZIR-232 configuration files (*.ZCF).

If you do not see your particular issue listed here, you may want to consult the ZON web site (www.zonaudio.com) and the Frequently Asked Questions (FAQ) section for the latest collection of known issues and their resolutions.

If you need to contact Oxmoor technical support to help resolve a software issue, you will need to have the following on hand:

- ZON hardware serial numbers and known firmware levels
- Information about your computer (processor, memory, OS, etc.)
- Text inside any error messages that you have seen

You may also find the official ZON web site (http://www.zonaudio.com) to be of some assistance to you. The site features all of the latest product literature as well as a searchable FAQ section.

Resolving Hardware Issues

Before contacting Oxmoor technical support, review the following items to see if your particular issue can be resolved:

1. ZIR-232 Module status indicator will not light up when ZON router is powered ON - This indicates a possible connection problem between the ZON router and the ZIR-232 module. Re-check the 40-pin ribbon cable on the module and on the ZON router. You may even try to move the module to a different expansion bay on the router to see if the trouble disappears.

2. ZIR-232 Module not recognized by ZON Config - This could indicate either a connection problem between the ZON router and the module. See 1 above. If the green status LED is present on the module, and ZON Config still will not recognize the module, this indicates that you may be using an older version of ZON Config. See page 2 for ZON system requirements.

3. IR keys not working (both known and learned) During Configuration - This could indicate that a ZAC-60's IR receiver is able to pick up the IR emissions from a near-by IR flasher. If you have ZAC-60s in view of IR flashers connected to your hardware, try keeping the emissions from flashers from reaching the IR receiver on the ZAC-60. If you are still having troubles, you may elect to disconnect the ZAC-60s from the ZON router until you have completed all of the configuration tasks.

APPENDIX A: IN CASE OF DIFFICULTY

4. IR keys not working (both known and learned) Post Configuration - This could indicate that a ZAC-60's IR receiver is able to pick up the IR emissions from a near-by IR flasher connected to your equipment. You should try to re-locate the source of the IR emission, or shield it from the ZAC-60 IR receiver.

5. IR commands do not work after selecting an Icon that contains a script - This indicates that the module is still processing the script. The ZIR-232 will not process any requests for commands during the execution of a script. You should check your script for accuracy, and also check that you have not programmed long delays by mistake.

6. Scripts do not test out during the configuration process - This could be an issue pertaining to Item 3 on page 34, or you could be building your script in such a manner that is incompatible with the connected device. If you are certain that you are having an stray IR emission problem, you should make the device perform the task you are programming from it's own remote. Then, closely as possible, emulate your keystrokes on the remote in the script editor.

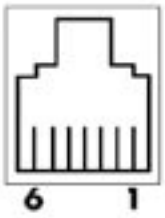
7. Cannot learn IR keys with the Learn New Key window - The ZIR-232 has a finite amount of memory in which to store learned keys. If you were able to learn keys, and then expereience an error code of "-5" when trying to learn a new key, there is not sufficient memory available in the module to store the new key.

   On average, the ZIR-232 can store 15 to 25 learned keys. The exact amount depends on the size of each learned key. You should consider only learning keys that are absolutely necessary for your device control design.

APPENDIX B: RS-232 / SERIAL PINOUTS

RJ-11 Jack on ZIR-232 and ZON Router (RS-232 Interface

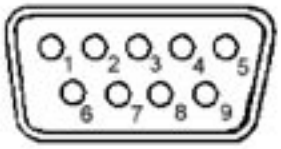
PIN	TYPE	DESCRIPTION
1	Unused	
2	Input	RXD - RS-232 Data In
3	Ground	Signal Common (Ground)
4	Ground	Signal Common (Ground)
5	Output	TXD - RS-232 Data Out
6	Ground	Chassis Ground



Note: Pin reference is as you look into the jack.

DB-9 (Male) Serial Port on Computer

PIN	TYPE	DESCRIPTION
1	Unused	
2	Input	RXD - RS-232 Data In
3	Output	TXD - RS-232 Data Out
4	Unused	
5	Ground	Signal Common (Ground)
6	Unused	



Note: Pin reference is as you look into the jack.

APPENDIX C: DEVICE CODE INDEX

The following index is provided for reference purposes only. Devices, Manufacturers and Device Codes are subject to change without notice. The device codes you receive while defining your device are the most recent and current.

SETUP CODES FOR AMPLIFIERS

GE	0078
Harman/Kardon	0892
JVC	0331
Left Coast	0892
Marantz	0892
Optimus	0395
Philips	0892
Polk Audio	0892
Realistic	0395
Soundesign	0078
Victor	0331
Wards	0078
Yamaha	0354

SETUP CODES FOR CABLE

ABC	0003, 0008, 0014, 0017
Americast	0899
Bell & Howell	0014
Bell South	0899
Director	0476
General Instrument	0476, 0003, 0276, 0810
GoldStar	0144
Hamlin	0009, 0273
Jerrold	0476, 0003, 0276, 0012, 0014, 0810
Memorex	0000
Motorola	0476, 1106, 0276, 0810
Pace	0237
Panasonic	0000, 0107
Paragon	0000
Philips	0305, 0317
Pioneer	0877, 0144, 0533, 1877
Pulsar	0000
Quasar	0000
Regal	0273, 0279
Runco	0000
Samsung	0144
Scientific Atlanta	0877, 0008, 0017, 0477, 1877
Sony	1006
Starcom	0003
Supercable	0276
Tocom	0012
Torx	0003
Toshiba	0000
Zenith	0000, 0525, 0899

SETUP CODES FOR CD PLAYERS

Aiwa	0157
California Audio Labs	0029
Carver	0157, 0179
Classic	1297
DKK	0000
DMX Electronics	0157
Denon	0873
Emerson	0305
Fisher	0179
GPX	1296
Genexxa	0032, 0305
Harman/Kardon	0157, 0173
Hitachi	0032
JVC	0072, 1294
Kenwood	0681, 0826, 0626, 0028, 0037
Koss	1317
Krell	0157
LXI	0305
Linn	0157
MCS	0029
Magnavox	0157, 0305
Marantz	0626, 0029, 0157
Miro	0000
Mission	0157
NSM	0157
Onkyo	0868
Optimus	1063, 0000, 0032, 0037, 0179, 0305
Panasonic	0029
Philips	0626, 0157
Pioneer	1063, 1062, 0032, 0305
Polk Audio	0157
Proton	0157
QED	0157
Quasar	0029
RCA	1062, 0032, 0179, 0305
Realistic	0179
Rotel	0157
SAE	0157
Sansui	0157, 0305
Sanyo	0179
Scott	0305
Sears	0305
Sharp	0861, 0037
Sherwood	1067
Sonic Frontiers	0157
Sony	0490, 0000, 0100
TDK	1208
Technics	0029
Victor	0072
Wards	0157
Yamaha	0888, 1292

SETUP CODES FOR HOME AUTOMATION

Audio Access	0154
Cableshare	0537
Comfortex	0400
Da-Lite	0780
Elero	0434
Evergo	0059
GE	0240
Gewa	0095
Holmes	1215
Hunter Douglas	0433
Lightolier	0184, 1204, 1205, 1206
LiteTouch	0084
Lutron	0597, 0318, 1239, 1597
One For All	0167
RadioShack	0240
Russound	1232, 1233
Sanyo	0336
Security System	0167
Somfy	0780
Universal X10	0167
X10	0167

SETUP CODES FOR LASER DISK

Aiwa	0203

APPENDIX C: DEVICE CODE INDEX

SETUP CODES FOR LASER DISK, CONTINUED

Denon	0059, 0172
Funai	0203
Mitsubish	0059
NAD	0059
Optimus	0059
Panasonic	0204
Pioneer	0059
Quasar	0204
Realistic	0203
Sony	0193, 0201
Technics	0204

SETUP CODES FOR MISC AUDIO

Aiwa	0010, 0159
Jerrold	0520, 0459
Scientific Atlanta	0460
Sony	0010, 0159
Starcom	0459

SETUP CODES FOR VIDEO

AOL	1061
Magnavox	1818
Mitsubishi	1002
Panasonic	1120
Philips	1818, 1061
Pioneer	1010
Princeton	0113, 0295
Samsung	1190, 1204
Sensory Science	1126
Sharp	1010
Sony	0850

SETUP CODES FOR RECEIVERS

ADC	0531
Aiwa	1089, 1405, 0158, 1388
Alco	1390
Anam	1609
Apex Digital	1257
Audiotronic	1189
Audiovox	1390
Bose	1229
Capetronic	0531
Carver	1089, 1189
Denon	1104, 1160, 1360
JBL	1306
JVC	0074
KLH	1390
Kenwood	1313, 1027, 1570, 1569, 0027
Koss	1366
MCS	0039
Magnavox	1089, 1189, 0531
Marantz	1089, 1189, 0039
Musicmagic	1089
Onkyo	0135, 0842, 1298
Optimus	1023, 0531
Panasonic	1518, 0039, 1288
Philips	1089, 1189, 1269, 1283
Pioneer	1023, 0014, 0531
Proscan	1254
Quasar	0039
RCA	1023, 1254, 0531, 1390, 1609
Samsung	1295
Sansui	1089
Sherwood	1653
Sony	1058, 1258, 1158, 0158
Stereophonics	1023
Sunfire	1313
Technics	1308, 1309, 1518, 0039
Thorens	1189
Venturer	1390
Victor	0074
Wards	0014, 0158
Yamaha	0176, 1176

SETUP CODES FOR SATELLITE

AlphaStar	0772
Chaparral	0216
Crossdigital	1109
Echostar	1005, 0775
Expressvu	0775
GE	0566
GOI	0775
General Instrument	0869
HTS	0775
Hitachi	0819
Hughes	1142, 0749, 1749
JVC	0775
Magnavox	0724, 0722
Memorex	0724
Mitsubishi	0749
Motorola	0869
Next Level	0869
Panasonic	0247, 0701
Paysat	0724
Philips	1142, 0749, 0724, 1076, 0722, 1749
Proscan	0392
RCA	0392, 0566, 0855, 0143
RadioShack	0869
Samsung	1109
Sony	0639
Star Choice	0869
Toshiba	0749, 0790, 1749
Uniden	0724, 0722
Zenith	0856, 1856

SETUP CODES FOR TELEVISION

AOC	0030, 0019
Admiral	0093, 0463
Advent	0761
Aiko	0092
Aiwa	0701
Akai	0030
Alaron	0179
America Action	0180
Ampro	0751
Anam	0180
Apex Digital	0748, 0765, 0767
Audiovox	0451, 0180, 0092, 0623
Baysonic	0180
Belcor	0019
Bell & Howell	0154, 0016
Bradford	0180
Brockwood	0019
Broksonic	0236, 0463

APPENDIX C: DEVICE CODE INDEX

SETUP CODES FOR TELEVISION, CONTINUED

CXC	0180
Candle	0030, 0056
Carnivale	0030
Carver	0054
Celebrity	0000
Changhong	0765
Cineral	0451, 0092
Citizen	0060, 0030, 0056, 0092
Concerto	0056
Contec	0180
Craig	0180
Crosley	0054
Crown	0180
Curtis Mathes	0047, 0054, 0154, 0051, 0451, 0093, 0060, 0030, 0145, 0056, 0016, 0166, 0466, 0702, 0747, 1147,1347
Daewoo	0451, 0019, 0092, 0623
Daytron	0019
Denon	0145
Dumont	0017, 0019
Dwin	0720, 0774
Electroband	0000
Emerson	0154, 0236, 0463, 0180, 0178, 0019, 0179, 0623
Envision	0030
Fisher	0154
Fujitsu	0179, 0683
Funai	0180, 0179, 0171
Futuretech	0180
GE	0047, 0051, 0451, 0093, 0178, 0021, 0747, 1147,1347
Gibralter	0017, 0030, 0019
GoldStar	0030, 0178, 0019, 0056
Gradiente	0053, 0056
Grunpy	0180, 0179
Hallmark	0178
Harley Davidson	0179
Harman/Kardon	0054
Harvard	0180
Havermy	0093
Hitachi	0145, 0056, 0016
Infinity	0054
Inteq	0017
JBL	0054
JCB	0000
JVC	0053
KEC	0180
KTV	0180, 0030
Kenwood	0030, 0019
Konka	0628, 0632, 0638, 0703, 0707
LG	0056
LXI	0047, 0054, 0154, 0156, 0178, 0747
Logik	0016
Luxman	0056
MGA	0150, 0030, 0178, 0019
MTC	0060, 0030, 0019, 0056
Magnavox	0054, 0030, 0179, 1254, 1454
Majestic	0016
Marantz	0054, 0030
Matsushita	0250
Megatron	0178, 0145
Memorex	0154, 0250, 0463, 0150, 0178, 0179, 0056, 0016
Midland	0047, 0017, 0051, 0747
Minutz	0021
Mitsubishi	0093, 0150, 0178, 0019
Motorola	0093
Multitech	0180
NAD	0156, 0178, 0166
NEC	0030, 0019, 0056
NTC	0092
Nikko	0030, 0178, 0092
Onwa	0180
Optimus	0154, 0250, 0166
Optonica	0093
Orion	0236, 0463, 0179
Panasonic	0250, 0051
Penney	0047, 0156, 0051, 0060, 0030, 0178, 0021, 0019, 0056, 0747, 1347
Philco	0054, 0463, 0030, 0145, 0019
Philips	0054, 1454
Pilot	0030, 0019
Pioneer	0166, 0679
Portland	0019, 0092
Princeton	0717
Prism	0051
Proscan	0047, 0747
Proton	0178, 0466
Pulsar	0017, 0019
Quasar	0250, 0051
RCA	0047, 0051, 0093, 0019, 0090, 0679, 0747, 1047, 1147, 1247, 1347, 1447
RadioShack	0047, 0154, 0180, 0030, 0178, 0019, 0056, 0747
Realistic	0154, 0180, 0030, 0178, 0019, 0056
Runco	0017, 0030, 0603
SSS	0180, 0019
Sampo	0030
Samsung	0060, 0030, 0178, 0019, 0056, 0702, 0766
Sansei	0451
Sansui	0463
Sanyo	0154
Scimitsu	0019
Scotch	0178
Scott	0236, 0180, 0178, 0019, 0179
Sears	0047, 0054, 0154, 0156, 0178, 0179, 0056, 0171, 0747
Semivox	0180
Semp	0156
Sharp	0093, 0688, 0689
Shogun	0019
Signature	0016
Sony	0000, 1100
Soundesign	0180, 0178, 0179
Squareview	0171
Starlite	0180
Supreme	0000
Sylvania	0054, 0030, 0171
Symphonic	0180, 0171
TMK	0178, 0056
TNCi	0017
Tandy	0093

APPENDIX C: DEVICE CODE INDEX

SETUP CODES FOR TELEVISION, CONTINUED

Technics	0250, 0051
Technol Ace	0179
Techwood	0051, 0056
Teknika	0054, 0180, 0150, 0060, 0019, 0179, 0056, 0016, 0092
Telefunken	0056, 0702
Toshiba	0154, 0156, 0060, 1256
Vector Research	0030
Victor	0053
Vidikron	0054
Vidtech	0178, 0019
Wards	0054, 0030, 0178, 0021, 0019, 0179, 0056, 0016
Waycon	0156
White Westinghouse	0463, 0623
Yamaha	0030, 0019, 0769
Zenith	0017, 0463, 0016, 0092

SETUP CODES FOR VCR

Admiral	0048, 0209
Adventura	0000
Aiko	0278
Aiwa	0037, 0000
Akai	0041
America Action	0278
American High	0035
Asha	0240
Audiovox	0037
Beaumark	0240
Bell & Howell	0104
Broksonic	0184, 0121, 0209, 0002, 0479, 1479
CCE	0072, 0278
Calix	0037
Canon	0035
Carver	0081
Cineral	0278
Citizen	0037, 0278, 1278
Colt	0072
Craig	0037, 0047, 0240, 0072
Curtis Mathes	0060, 0035, 0162, 0041, 0760, 1035
Cybernex	0240
Daewoo	0045, 0278, 1278
Denon	0042
Dynatech	0000
Electrohome	0037
Electrophonic	0037
Emerex	0032
Emerson	0037, 0184, 0000, 0121, 0043, 0209, 0002, 0278, 0479, 1278, 1479
Fisher	0047, 0104
Fuji	0035
Funai	0000
GE	0060, 0035, 0048, 0240, 0760, 0807, 1035, 1060
Garrard	0000
Go Video	0432
GoldStar	0037, 0038, 1237
Gradiente	0000
HI-Q	0047
Harley Davidson	0000
Harman/Kardon	0081, 0038
Harwood	0072
Hitachi	0000, 0042, 0041
Hughes	0042
JVC	0067, 0041
Jensen	0041
KEC	0037, 0278
KLH	0072
Kenwood	0067, 0041, 0038
Kodak	0035, 0037
LXI	0037
Lloyd's	0000
Logik	0072
MEI	0035
MGA	0240, 0043
MGN Technology	0240
MTC	0240, 0000
Magnasonic	0278, 1278
Magnavox	0035, 0039, 0081, 0000, 0149, 0563, 1781
Magnin	0240
Marantz	0035, 0081
Marta	0037
Matsushita	0035, 0162, 0454
Memorex	0035, 0162, 0037, 0048, 0039, 0047, 0240, 0000, 0104, 0209, 0454, 0479, 1037, 1162, 1237, 1262
Minolta	0042
Mitsubishi	0048, 0067, 0043, 0807
Motorola	0035, 0048
Multitech	0000, 0072
NEC	0104, 0067, 0041, 0038
Nikko	0037
Noblex	0240
Olympus	0035
Optimus	1062, 0162, 0037, 0048, 0104, 0432, 0454, 1048, 1162, 1262
Orion	0184, 0209, 0002, 0479, 1479
Panasonic	1062, 0035, 0162, 0225, 0454, 0616, 1035, 1162, 1262
Penney	0035, 0037, 0240, 0042, 0038, 1035, 1237
Pentax	0042
Philco	0035, 0209, 0479
Philips	0035, 0081, 0618, 1081, 1181
Pilot	0037
Pioneer	0067
Polk Audio	0081
Profitronic	0240
Proscan	0060, 0760, 1060
Protec	0072
Pulsar	0039
Quasar	0035, 0162, 0454, 1035, 1162
RCA	0060, 0035, 0048, 0240, 0042, 0149, 0760, 0807, 1035, 1060
RadioShack	0000, 1037
Radix	0037
Randex	0037
Realistic	0035, 0037, 0048, 0047, 0000, 0104
ReplayTV	0614, 0616
Runco	0039
STS	0042
Samsung	0240, 0045
Sanky	0048, 0039
Sansui	0000, 0067, 0209, 0041, 0479, 1479
Sanyo	0047, 0240, 0104
Scott	0184, 0045, 0121, 0043

APPENDIX C: DEVICE CODE INDEX

SETUP CODES FOR VCR, CONTINUED

Sears	0035, 0037, 0047, 0000, 0042, 0104, 1237
Semp	0045
Sharp	0048, 0807, 0848
Shintom	0072
Shogun	0240
Singer	0072
Sonic Blue	0614
Sony	0035, 0032, 0000, 0636, 1032, 1232
Sylvania	0035, 0081, 0000, 0043, 1781
Symphonic	0000
TMK	0240
Tatung	0041
Teac	0000, 0041
Technics	0035, 0162
Teknika	0035, 0037, 0000
Thomas	0000
Tivo	0618, 0636
Toshiba	0045, 0043, 0845
Totevision	0037, 0240
Unitech	0240
Vector	0045
Vector Research	0038
Video Concepts	0045
Videomagic	0037
Videosonic	0240
Villain	0000
Wards	0060, 0035, 0048, 0047, 0081, 0240, 0000, 0042, 0072, 0149, 0760
White Westinghouse	0209, 0072, 0278, 1278
XR-1000	0035, 0000, 0072
Yamaha	0038
Zenith	0039, 0000, 0209, 0479, 1479

SETUP CODES FOR DIGITAL VIDEO DISC

Aiwa	0641
Apex Digital	0672, 0755, 0794, 0795, 0796, 0797, 0830
Blue Parade	0571
Broksonic	0695
Daewoo	0784
Denon	0490, 0634
Emerson	0591
Enterprise	0591
Fisher	0670
GE	0522
Go Video	0715, 0783
Gradiente	0651
Harman/Kardon	0582, 0702
Hitachi	0573, 0664
Hiteker	0672
JBL	0702
JVC	0558, 0623, 0867
Kenwood	0534, 0682
Konka	0711, 0719, 0720, 0721
Koss	0651
Lasonic	0798
Magnavox	0503, 0675
Malata	0782
Marantz	0539
Microsoft	0522
Mitsubishi	0521
Onkyo	0503, 0627
Oritron	0651
Panasonic	0490, 0632
Philips	0503, 0539, 0646, 0854
Pioneer	0525, 0571, 0632
Princeton	0674
Proscan	0522
RCA	0522, 0571, 0822, 1022
Rowa	0823
Sampo	0698
Samsung	0573, 0820
Sansui	0695
Sanyo	0670
Sharp	0630
Sherwood	0633
Sony	0533, 1533
Sylvania	0821
Technics	0490
Techwood	0692
Theta Digital	0571
Toshiba	0503, 0695, 1045
Urban Concepts	0503
Yamaha	0490, 0545, 0817
Zenith	0503, 0591

APPENDIX D: END USER NOTES

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OXMOOR®

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Part Number: 1700065 Revision Date: October, 2004
Optimized for ZON Config Version 1.5.0 (Build 124) and higher