

Test Solutions - User Guide

RCM-100 & RCM-200 Series Compact Modular Test Systems



RCM-100 Series Programmable Attenuator Modules
RCM-200 Series Multi-Function Switching Systems



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1. INTRODUCTION

Thank you for choosing Mini-Circuits RCM Series modular test systems to meet your needs! The purpose of the RCM Series User's Manual is to instruct you on basic installation and setup of your equipment, to advise you on general precautions to be taken when installing and handling your RCM unit, and to provide instruction on installing and using the control software for this unit on your PC. This manual applies to:

- **RCM-100 Series** - *Multi-Channel Programmable Attenuators*
- **RCM-200 Series** - *Multi-Function Switching Systems*

We're here to support you every step of the way. For technical support and assistance, please find the following points of contact for your convenience:

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2. WARNINGS

2.1. Safety Precautions

 **Electric Shock:** To prevent risk of electrocution, only the supplied Mini-Circuits AC/DC power adapter and mains cable should be used. Ensure that the cable and connections are in good condition and only use with a grounded AC main supply.

2.2. Additional Precautions

 **Opening & Tampering:** This equipment is designed to be serviced only by professional electrical technicians. Case openings by any person other than qualified personnel authorized by Mini-Circuits or the customer will void any and all terms of the Limited Warranty.¹

3. PHYSICAL DESCRIPTION

3.1. RCM-100 Series

Mini-Circuits' RCM-100 Series multi-channel attenuator systems are housed in a compact aluminum case measuring 8.25" wide x 4.25" high x 8.25" deep (210 x 108 x 210 mm). The front panel is fabricated with three windows, each measuring 2.43" wide x 3.35" high (62 x 85mm), which can be specified with the required RF programmable attenuator components. 3 corresponding windows on the rear panel house the second connector for each programmable attenuator channel. All RF connections are SMA female.

The rear panel of the unit includes inputs for a standard 24V DC power supply (AC mains adapter included), USB and Ethernet connections for software control and a hardware power switch. The identification sticker at the left edge contains the model name, serial number, and control board number.

The modular chassis structure allows a variety of custom attenuator configurations to be built and shipped to customers within 2 weeks or less. Each hardware window may be configured with the user's choice of 1 or 2 programmable attenuators from the following models:

- 0 to 30 dB range, 0.25 dB step size, 1 to 6000 MHz
- 0 to 60 dB range, 0.25 dB step size, 1 to 6000 MHz
- 0 to 90 dB range, 0.25 dB step size, 1 to 6000 MHz
- 0 to 110 dB range, 0.25 dB step size, 1 to 6000 MHz
- 0 to 120 dB range, 0.25 dB step size, 1 to 4000 MHz
- Additional models up to 8 GHz are also available on request

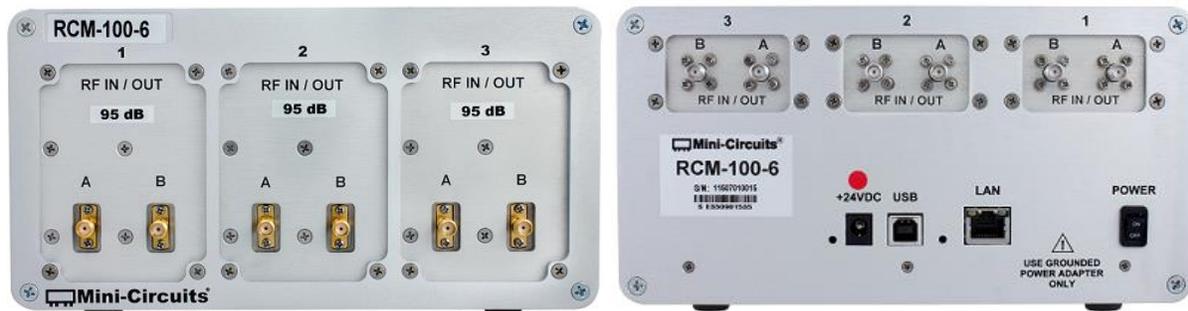


Figure 1: Front & rear panel of RCM-100-6 multi-channel programmable attenuator

3.2. RCM-200 Series

Mini-Circuits' RCM-200 Series multi-function switch systems are housed in the same compact aluminum case measuring 8.25" wide x 4.25" high x 8.25" deep (210 x 108 x 210 mm). The front panel is fabricated with three windows, each measuring 2.43" wide x 3.35" high (62 x 85mm), which can be specified with the required RF switch components.

The rear panel of the unit includes inputs for a standard 24V DC power supply (AC mains adapter included), USB and Ethernet connections for software control and a hardware power switch. The identification sticker at the left edge contains the model name, serial number, and control board number.

The modular chassis structure allows a variety of custom switch configurations to be built and shipped to customers within 2 weeks or less. Each hardware window may be configured with the user's choice of switch components, from:

- 1 or 2 mechanical SPDT switches (DC-18 GHz)
- 1 or 2 mechanical transfer switches (DC-18 GHz)
- 1 SP4T switch (DC-18 GHz)
- 1 SP6T switch (DC-12 GHz)



Figure 2: Front panel of RCM-200 Series multi-function switch system, configured with 1 x SP6T, 2 x SPDT, 2 x transfer switches

3.3. RCM-200 Series (SP8T Switches)

The RCM-200 Series is also available in a configuration with either 1 or 2 SP8T switches populated on the front panel. Since these switch components are larger than the standard RCM Series windows, the SP8T switch models cannot be combined with other models.

The rear panel of the unit includes inputs for a standard 24V DC power supply (AC mains adapter included), USB and Ethernet connections for software control and a hardware power switch. The identification sticker at the left edge contains the model name, serial number, and control board number.

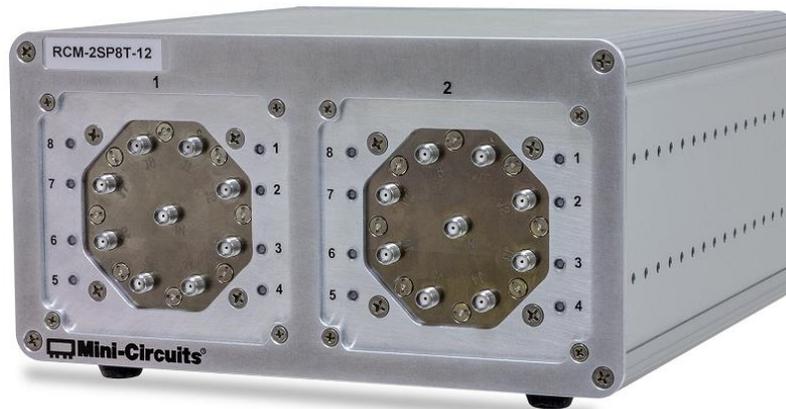


Figure 3: Front panel of RCM-2SP8T-12 with 2 x SP8T switches

4. FUNCTIONAL DESCRIPTION

Mini-Circuits' RCM Series compact modular test systems are designed to simplify and accelerate the development of custom test solutions.

The equipment may be controlled via USB or Ethernet (HTTP and Telnet Protocols), allowing setup flexibility and easy remote test management. All units come supplied with Mini-Circuits' user-friendly Graphical User Interface (GUI) software and DLLs for 32-bit and 64-bit Windows® operating systems. Full programming support is provided for a wide range of programming environments on both Windows and Linux® operating systems, supporting control through your native test software.

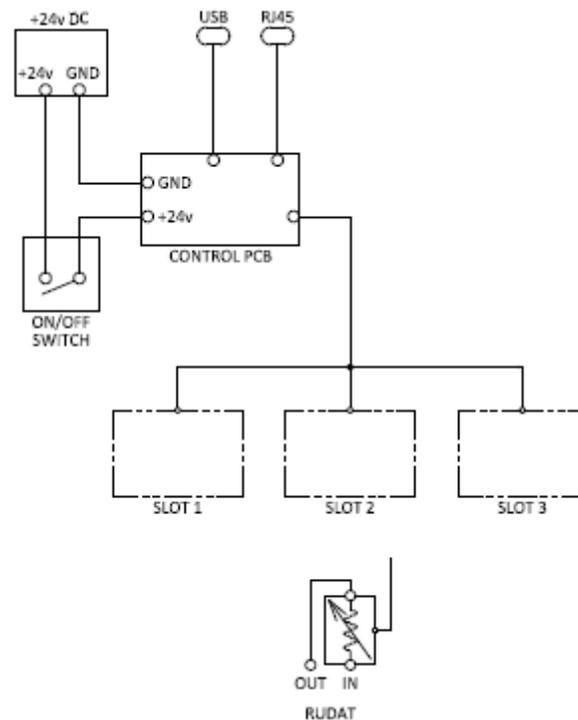


Figure 2: RCM Series modular test system block diagram

5. PERFORMANCE SPECIFICATIONS

5.1. DC Power Specifications

Supply Voltage: 24V DC

Operating Current will vary based on the number and type of components in your system.

5.2. RF Specifications

For RF specifications of your RCM Series unit, please refer to the model data sheets for the individual components within your system configuration.

Table 1: RF specifications for component hardware

Component	Link to Datasheet
Programmable Attenuator (0 - 30 dB)	https://www.minicircuits.com/pdfs/RUDAT-6000-30.pdf
Programmable Attenuator (0 - 60 dB)	https://www.minicircuits.com/pdfs/RUDAT-6000-60.pdf
Programmable Attenuator (0 - 90 dB)	https://www.minicircuits.com/pdfs/RUDAT-6000-90.pdf
Programmable Attenuator (0 - 110 dB)	https://www.minicircuits.com/pdfs/RUDAT-6000-110.pdf
Programmable Attenuator (0 - 120 dB)	https://www.minicircuits.com/pdfs/RUDAT-4000-120.pdf
Mechanical SPDT Switch (DC-18 GHz)	https://www.minicircuits.com/pdfs/MSP2TA-18XL+.pdf
Mechanical SP4T Switch (DC-18 GHz)	https://www.minicircuits.com/pdfs/MSP4TA-18+.pdf
Mechanical SP6T Switch (DC-12 GHz)	https://www.minicircuits.com/pdfs/MSP6TA-12+.pdf
Mechanical SP8T Switch (DC-12 GHz)	https://www.minicircuits.com/pdfs/MSP8TA-12-12D+.pdf
Mechanical Transfer Switch (DC-18 GHz)	https://www.minicircuits.com/pdfs/MTS-18XL-B+.pdf

6. UNPACKING

6.1. Unpacking

The equipment ships in a single large cardboard carton measuring 7 x 13 x 13" pictured in the figure below.

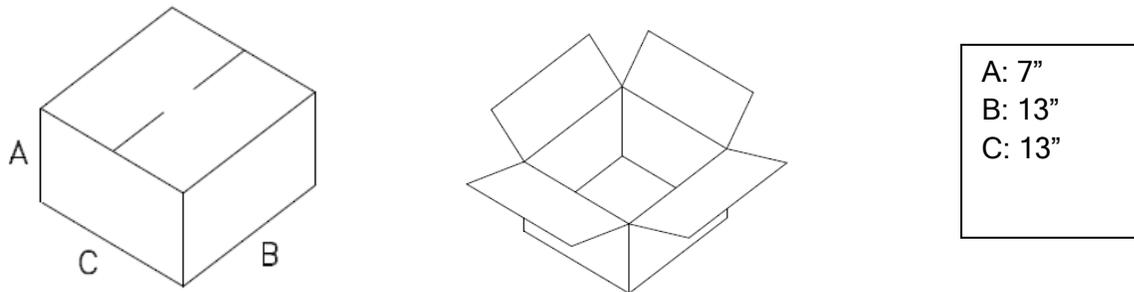


Figure 5: Shipping carton

Within the carton, the RCM unit is protected by pink foam inserts on the top and bottom, left and right sides, and a pink anti-static bubble bag.

6.2. Package Contents

The box contains 6 items which are listed below in table 2:

Table 2: Package contents

Item Description	Quantity
RCM Series Unit	1
AC/DC-24-3W1 AC/DC 24V power adapter	1
CBL-3W-X AC power cord (7.5 ft.) with local AC mains plug option	1
USB-CBL-AB-7+ USB cable (6.8 ft.)	1
HT-4-SMA SMA cable connector wrench	1



We've included the SMA connector wrench as a gift just to make your life easier.

This tool simplifies and expedites removal and tightening of cable connectors in crowded port configurations.

7.1. Software Overview

Mini-Circuits RCM Series test systems are supplied with user-friendly GUI software and a complete set of DLLs to write your own control software in 32-bit and 64-bit Windows operating systems. Full programming support is provided for a wide range of programming environments on both Windows and Linux operating systems. This section will cover the features of Mini-Circuits' GUI program in detail. For detailed instructions on programming, please refer to section 8.6, which provides a link to Mini-Circuits' complete programming manual for RCM Series test systems.

7.2. Installing Mini-Circuits' GUI Software

- 1) Save all work and close any other open applications.
- 2) Download the latest version of the GUI software, unzip to your PC, and run the setup program.

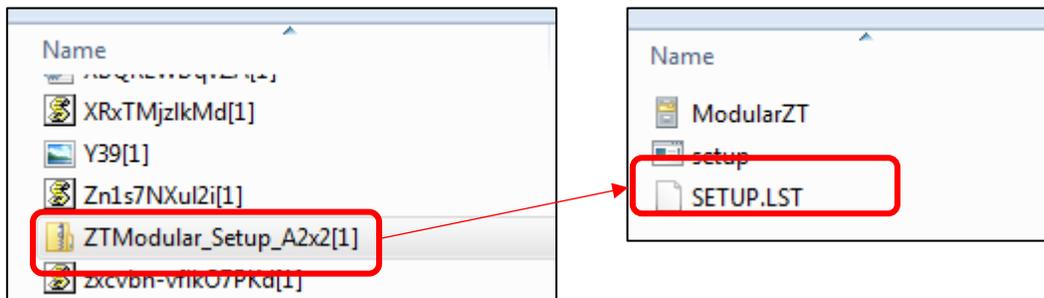


Figure 3: Installing RCM GUI software

- 3) The Product Install prompt will appear. Click "Install Now" to begin the software installation.

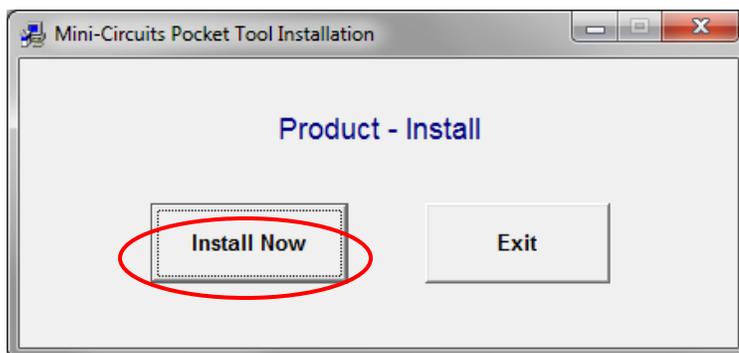


Figure 4: Product - Install prompt

- 4) The software license agreement will appear. Review the agreement, select “I agree,” and click “Continue.”

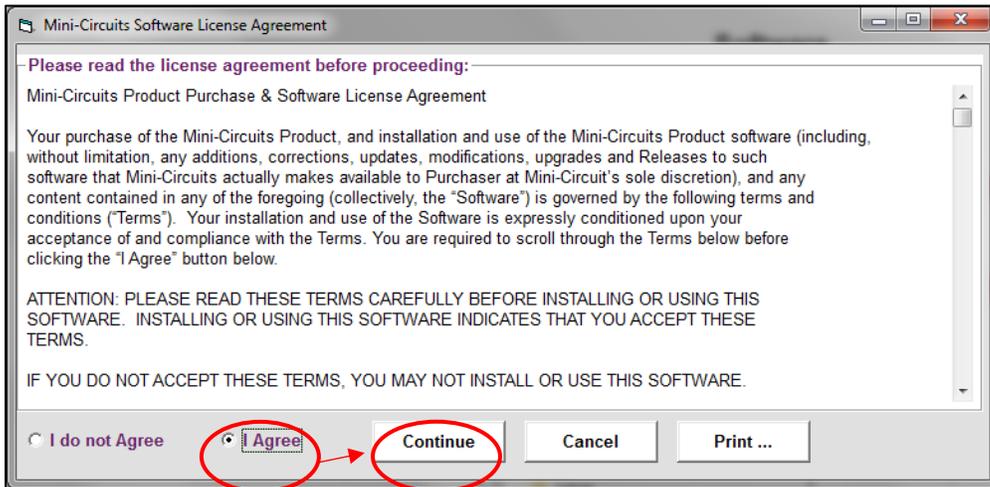


Figure 5: Software license agreement

- 5) Be sure all your work in other applications has been saved and closed. Click “OK” to proceed.

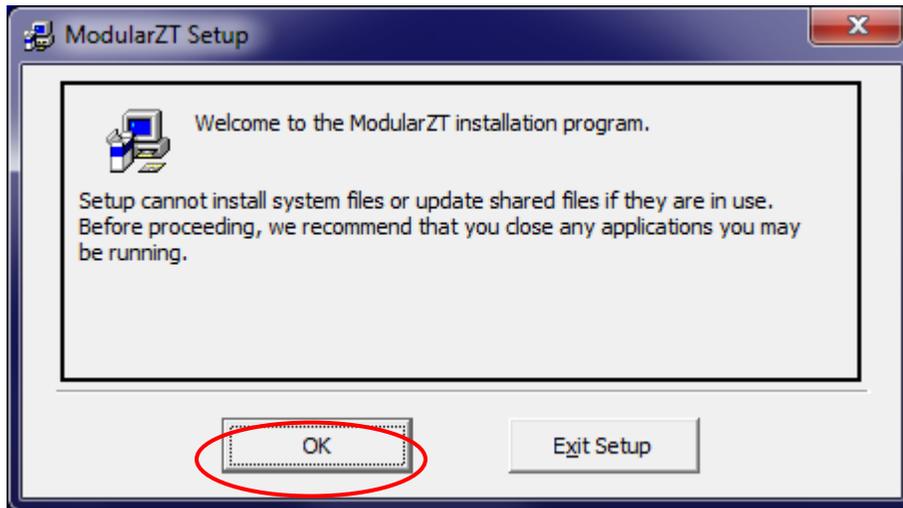


Figure 6: Close other applications

- 6) The destination directory prompt will appear. This allows you to specify where the GUI software will be saved on your computer’s hard drive. At this point, it’s a good idea to take a second and confirm the full destination address for the software. Change the destination if you prefer, and record the full destination address for your records. Then click the large button at the left of the window to continue.

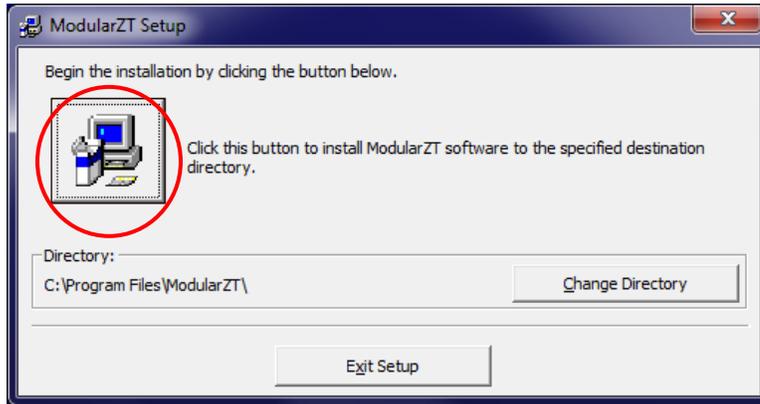


Figure 7: Destination directory prompt

- 7) The program group prompt will then pop up. The Program Group prompt allows you to select the program group under which the link for the signal generator GUI program in the Start Menu will be created. If you change the Program Group for this software, be sure to record that information together with your destination address for your own reference. Click on “Continue” to proceed.

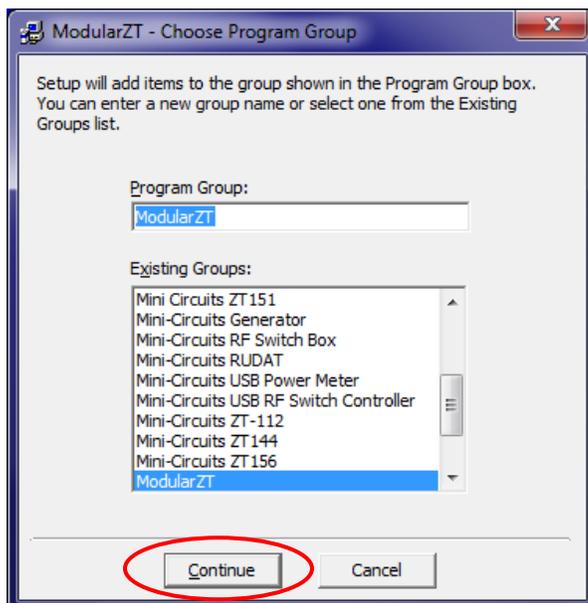


Figure 8: Program group prompt

- 8) An “Installation Complete” message will appear once the software is successfully installed. Click “OK” to close the installer.

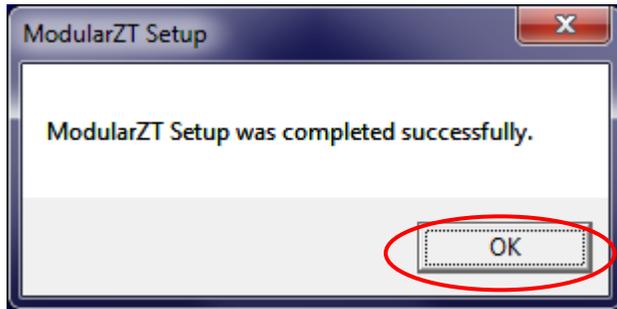


Figure 9: Installation complete

7.3. Connecting to the Hardware

When starting up the GUI software, a window will pop up prompting you to choose how the computer will connect to your RCM Series unit. You have the option to connect via USB, Ethernet-TCP/IP, or to run the program in Demo Mode. Each of these options is discussed below.

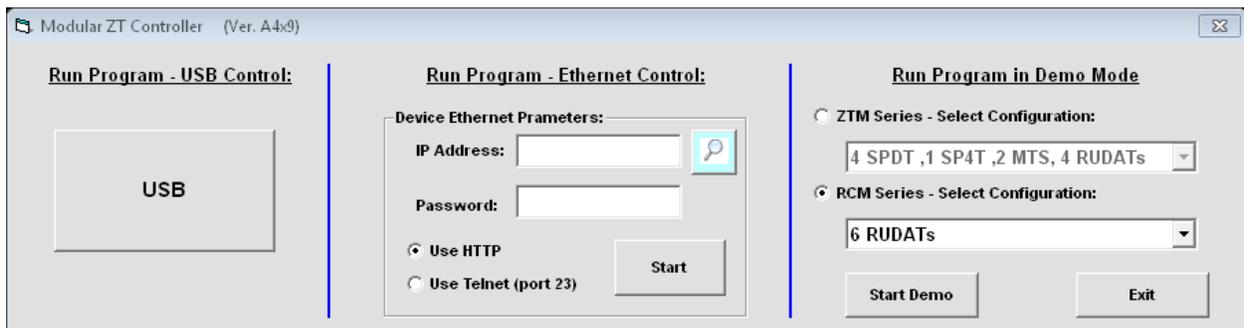


Figure 10: Connection menu

7.3.1. Connecting via USB

If connecting to the hardware via USB, click “USB” on the left side of the connection menu, and the GUI main control will open.

7.3.2. Connecting via Ethernet

- 1) Enter the device IP address into the “IP Address” field (shown above) in the connection menu. If you don’t know the IP address, click on the  button, and the following window will pop up:

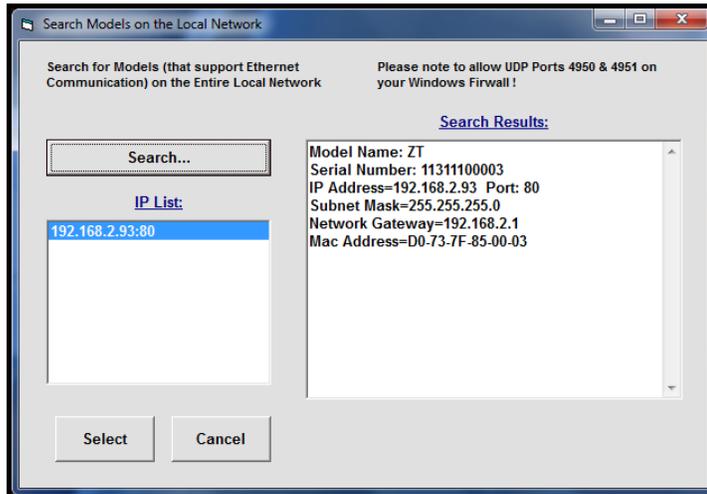


Figure 11: IP search window

► The IP search window displays the following information and controls:

- **IP List:**
 - This field displays the IP address of the hardware when properly connected via Ethernet.
- **Search Results:**
 - This field displays information about the device selected including serial number and IP parameters. You may use this field to identify the RCM Series unit if multiple Mini-Circuits devices are connected at once.
- **Search:**
 - This button searches the network for connected devices. You may need to click it multiple times to refresh results before the IP address of your hardware appears in the IP List field.
- **Select:**
 - Once you’ve selected the IP address of your RCM Series hardware, click the “Select” button. The IP search window will close, and the selected IP address will now appear in the Connection window.
- **Cancel:**
 - Clicking “Cancel” closes the IP search window.

- 2) Once the device IP address appears in the connection menu, enter your password in the password field (leave this blank if you haven't set a password). Select which protocol (HTTP or Telnet) you wish to use to communicate with the device, and click "Start" to start open the GUI main control.

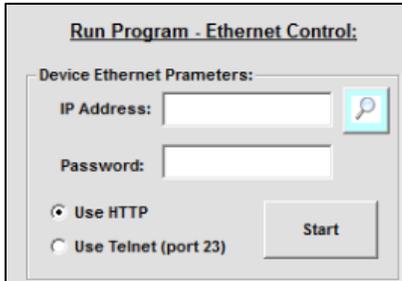


Figure 12: Control type window – Ethernet Control

7.3.2 (a). Firewall Access:

If your computer firewall is enabled, you may receive an alert message saying that Windows Firewall has blocked some features of the program. If this occurs, choose the networks you want to allow the GUI program to communicate with, and click "Allow Access."



Figure 13: Firewall Alert Message

7.3.3. Demo Mode

Selecting Demo Mode allows the user to explore the GUI program features for demonstration without actually connecting to the equipment. To explore the GUI in demo mode, select the "RCM Series" radio button and choose one of the demo configurations from the drop menu. Click "Start Demo" to open the GUI main control.

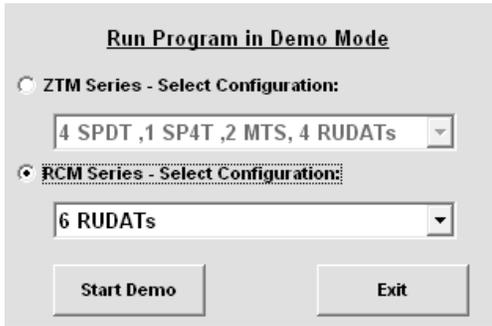


Figure 14: Connection menu – Demo Mode

7.4. Using the GUI Controls

7.4.1. The Main Control Window

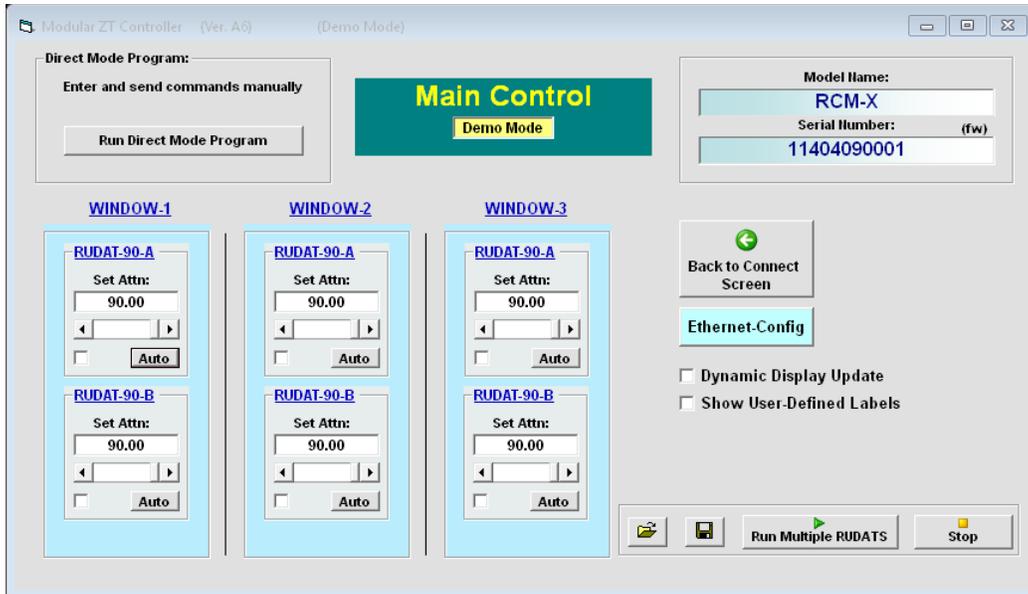


Figure 15: Example GUI main control window for RCM-100-6

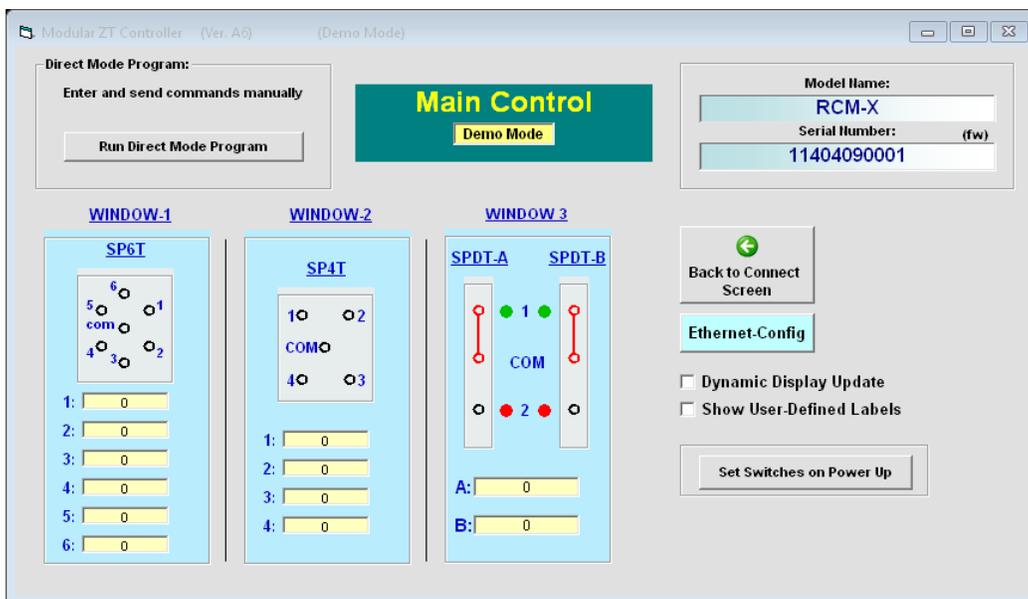


Figure 16: Example GUI main control window for RCM-200 Series

7.4.2. Common Control Features

- **Model Name:**
 - This field displays the device model name.
- **Serial Number:**
 - This field displays the 11 digit serial number of the device in use.
- **(fw):**
 - Firmware update. Clicking this button displays current firmware version and allows firmware update when available. See section 8.5 for more information.
- **Back to Connect Screen:**
 - This button returns to the Connection Window, so you can switch between USB, Ethernet, and Demo mode as desired.
- **Run Direct Mode Program:**
 - This button opens the Direct Mode Control window to enter and send specific commands directly to the RCM hardware. See section 8.4.3 for more information about these functions.
- **Show User Defined Labels:**
 - Selecting this checkbox expands the Main Control window, displaying a form with 6 labels. Using this form, you may name each component in the system based on its corresponding function in your test setup. The GUI will then display the assigned name of each component.

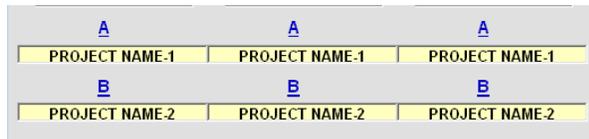


Figure 17: User Titles option allows you to assign a name to each component

- **Ethernet Config:**
 - Opens the Ethernet Configuration Window to manage IP settings. The unit must be connected via USB to open Ethernet configuration control. See section 8.4.4 for more information about these options.

7.4.3. Attenuator Control Features

- **Attenuator Displays:**
 - The attenuator displays show the current attenuation level of each RUDAT-series programmable attenuator in the system in the “Set Attn:” field. Attenuation levels may be adjusted by typing the desired attenuation value directly into the “Set Attn:” field, by dragging the slider, or by clicking the the arrows at either end of the slider bar. **Note that attenuation values must be entered in multiples of 0.25 dB.**

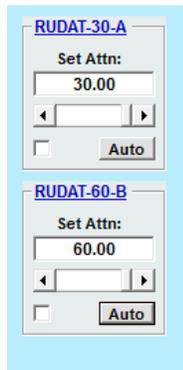


Figure 18: Attenuator display

- **Auto:**
 - Clicking the **Auto** button on any Attenuator Display opens the Attenuator Sequencing Menu for that attenuator. See section 8.4.2 for details on attenuator sequencing.
- **Run Multiple Checkbox:**
 - The checkbox located adjacent to the “Auto” button on the Attenuator Display allows multiple RUDATs to run specified attenuation sequences simultaneously.



Clicking the Run Multiple RUDATs button will start the specified attenuation sequences for all “checked” RUDATs simultaneously.



: Clicking the “Stop” button stops all attenuator sweep or hop sequences.

7.4.4. Attenuator Sequencing

Clicking the **Auto** button on any Attenuator Display opens the attenuator sequencing menu for that attenuator:

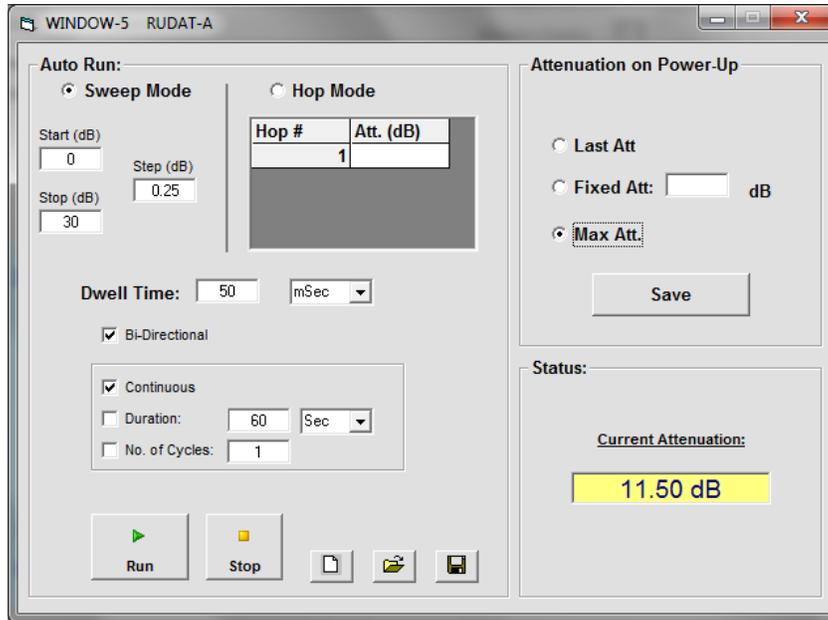


Figure 19: Attenuator sequencing menu

The attenuator sequencing menu displays controls for attenuation sweeping and hopping as well as other useful functions for automating various attenuation patterns for the selected attenuator.

Sweep Mode: Selecting the “Sweep Mode” radio button allows you to set up attenuation sweeps over any attenuation range within the specified range of the selected RUDAT. The settings for Sweep Mode are as below, with all attenuation values having a precision of 0.25 dB:

Start (dB): The starting attenuation value for the sweep.

Stop (dB): The ending attenuation value for the sweep.

Step (dB): Sets the step size for the sweep.

Dwell Time: Sets the time interval over which attenuation will remain at each step in the sweep. You can set dwell times as short as 5 ms although this is limited by the communication delays between computer and attenuator.

Bi-Directional: Checking this box will run the attenuation sweep from “Start” value to “Stop” value and then in reverse back to “Start” value.

Hop Mode: Selecting the “Hop Mode” radio button allows you to enter a list of discrete attenuation levels in any order and run that attenuation pattern. Valid attenuation values must be within the attenuation range of the selected RUDAT and be in denominations of 0.25 dB. Pressing the “Enter” key after each entry in the hop sequence creates a new empty row for the next entry in the sequence. The settings for hop mode are:

Hop #: Denotes the order of an attenuation value in the hop sequence. For example, the attenuation value in the row with Hop # of “3” will be third in the hop sequence.

Att. (dB): The given attenuation value at each step in the sequence. Values are entered by the user and must be in denominations of 0.25 dB.

Dwell Time: Sets the time interval over which attenuation will remain at each step in the sweep. User can set dwell times as short as 1 ms.

Bi-Directional: Checking this box will run the attenuation hop sequence from starting point to end point and then in reverse back to the starting point.

Auto Run Settings: You can specify the interval over which the RUDAT will automatically run a sweep or hop sequence in one of three ways:

Continuous: The attenuator will repeat the sweep or hop until the user sends the “Stop” command.

Duration: The attenuator will repeat the sweep or hop for a set length of time specified by the user.

No. of Cycles: The attenuator will complete a specified number of full sweeps or hop sequences.

Attenuation on Power Up: This group of controls specifies the attenuation level for each RUDAT when the RCM unit is turned on. The user can specify the power-up attenuation level for each RUDAT in one of three ways.

Last Att: The attenuator will restore the last attenuation setting from the previous session when turned on.

Note: It is important that the GUI is safely closed before powering off the system in order for this feature to operate correctly

Fixed Att.: The attenuator will provide a fixed, user-defined attenuation level every time the system is turned on.

Max Att: The attenuator will be set its maximum attenuation value when the system is turned on.

Clicking the  button will activate your chosen settings for attenuation on power up every time the system is turned on.

Status: This field displays the current attenuation level setting of the selected attenuator.

Save and Recall Test Profiles: The software allows you to save the settings for specific attenuation patterns as a configuration file and recall them for repeated use. If the same settings are used often and repeatedly for a given test, this function avoids having to restore settings individually, saving time. The menu buttons to save and recall test profiles are:



: Clicking the “Save Test Profile” button allows the user to save a specified attenuation sequence to his or her computer. A browse window will appear prompting the user to select a directory location to save the test profile and assign a desired file name.



: Clicking the “Recall” button allows the user to load all settings from a saved test profile. A browse window will appear, allowing the user to find and select the desired saved test profile.

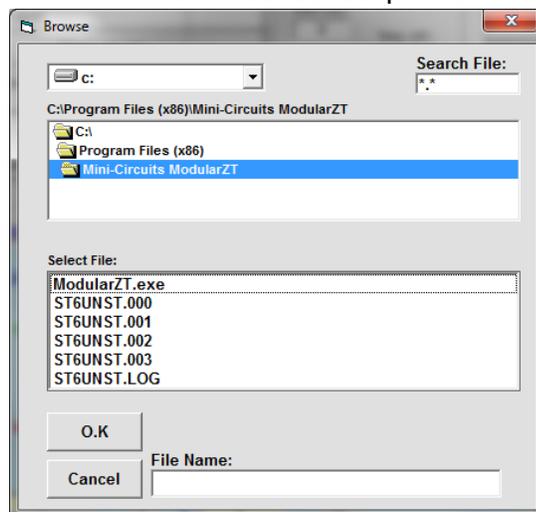
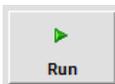


Figure 20: Test profile browse window



: Clicking the “Reset to Default Values” button returns all settings to their default values and clears all entries in the Hop grid.



: Clicking the “Run” button runs the specified sweep or hop for the selected attenuator.



: Clicking the “Stop” button stops the sweep or hop sequence.

7.4.5. Switch Control Features

- **Switch Displays:**
 - The switch displays show a visual representation of each switch with the active path highlighted red
 - The switch state is changed by clicking the port that the common port should be connected to
 - The yellow cells at the bottom of the display indicate the switch counts, with a separate count for each port of the switch (ie: the number of times that the common port has been connected to it)

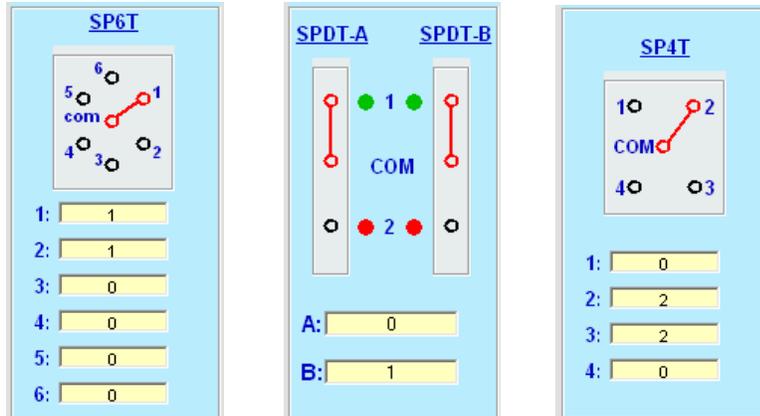


Figure 21: Switch control displays for SP4T switch, pair of SPDT switches and SP6T switch

- **Switch Power-Up Settings:**
 - The switch power-up settings are accessed by clicking the "Set Switches on Power Up button"

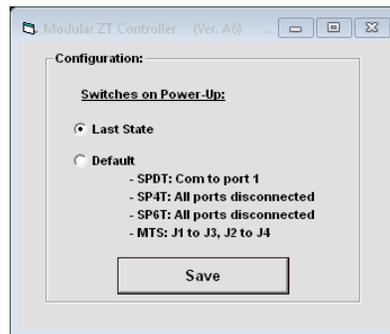


Figure 22: Switch power-up options

- The options for power up are:
 - **Last State:** The system powers-up with the switches in the same state as they were when last powered off
 Note: It is important that the GUI is safely closed before powering off the system in order for this feature to operate correctly
 - **Default:**
 - SPDT: Com to port 1
 - SP4T / SP6T: All ports disconnected
 - Transfer switch: J1 to J3, J2 to J4

7.4.6. Direct Mode

Clicking the “Run Direct Mode Program” button at the top of the GUI main screen opens the direct mode screen:

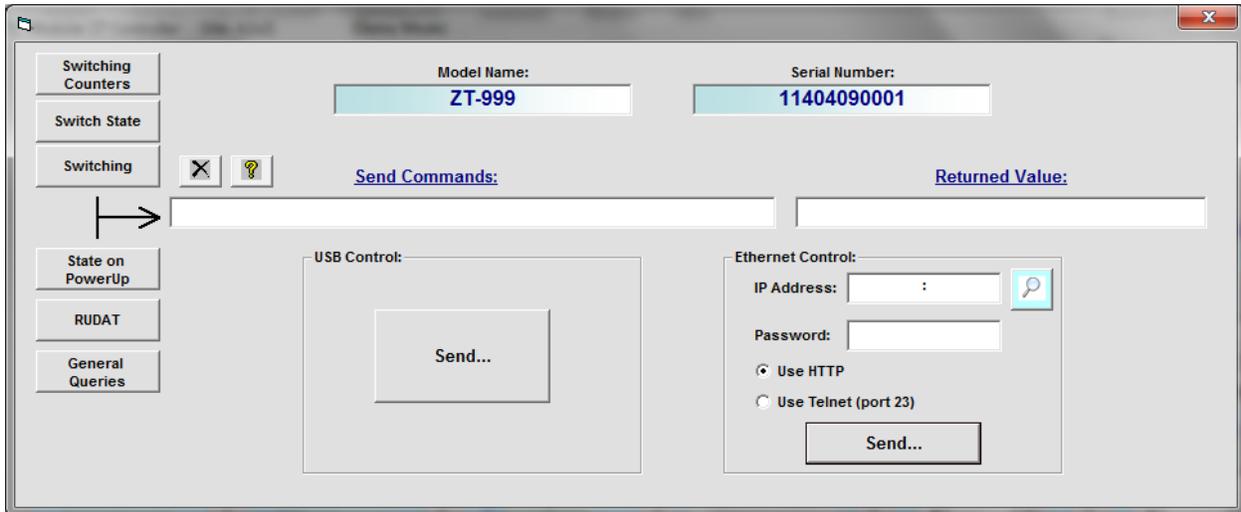


Figure 23: Direct mode screen

Direct mode allows the user to send commands directly to the RCM unit. Multiple legal commands may be sent simultaneously by separating them with a semicolon (;) or an ampersand (&). After sending a command, the GUI returns a value of “1” if successful, or an error code if unsuccessful.

Model Name: This field displays the RCM unit model name when connected.

Serial Number: This field displays the RCM unit 11-digit serial number when connected.

Send Commands: This field displays the list of commands sent to the RCM unit separated by a semicolon (;) or an ampersand (&).

Returned Value: This field displays the returned values of each command once commands are sent to the RCM unit.

IP Address: If connected to the RCM unit by Ethernet, the device IP address should be entered in this field. Refer to the instructions in section section 8.3.2.

Password: If a password has been set for connection over a network, enter password here.

Use HTTP/Use Telnet (Port 23): Allows user to toggle between HTTP and Telnet protocols for Ethernet communication with the RCM unit.

Send: Clicking “Send” executes the commands listed in the “Send Commands” field. Be sure to click the “Send” button corresponding to the connection type (USB or Ethernet) you are using. Commands listed in the “Send Commands” field will not be implemented until the “Send” button has been clicked.

Command Lists: The buttons on the left of the direct mode control screen open dropdowns that display all the SCPI commands for communicating with the RCM unit. The commands are sorted into the following groups:

RUDAT: Contains queries that return the maximum attenuation level of a specified attenuator, the current attenuation level of a specified attenuator, and commands to set the attenuation level of any attenuator in the system.

General Queries: Contains a list of queries including readings of the internal temperature sensors, and user-defined labels for each hardware window in the system.

Switching: Contains the commands to set switch states

Switch State: Contains the queries to check switch states

Switching Counters: Contains the queries to check the switch count for any switch port



: Clears the “Send Commands” field.



: Opens the ReadMe file for the GUI software.

7.4.7. Ethernet Configuration:

NOTE: You must be connected to the RCM unit via USB to access Ethernet configuration controls.

Clicking “Ethernet Config” from the GUI Main Control opens the Ethernet configuration screen:

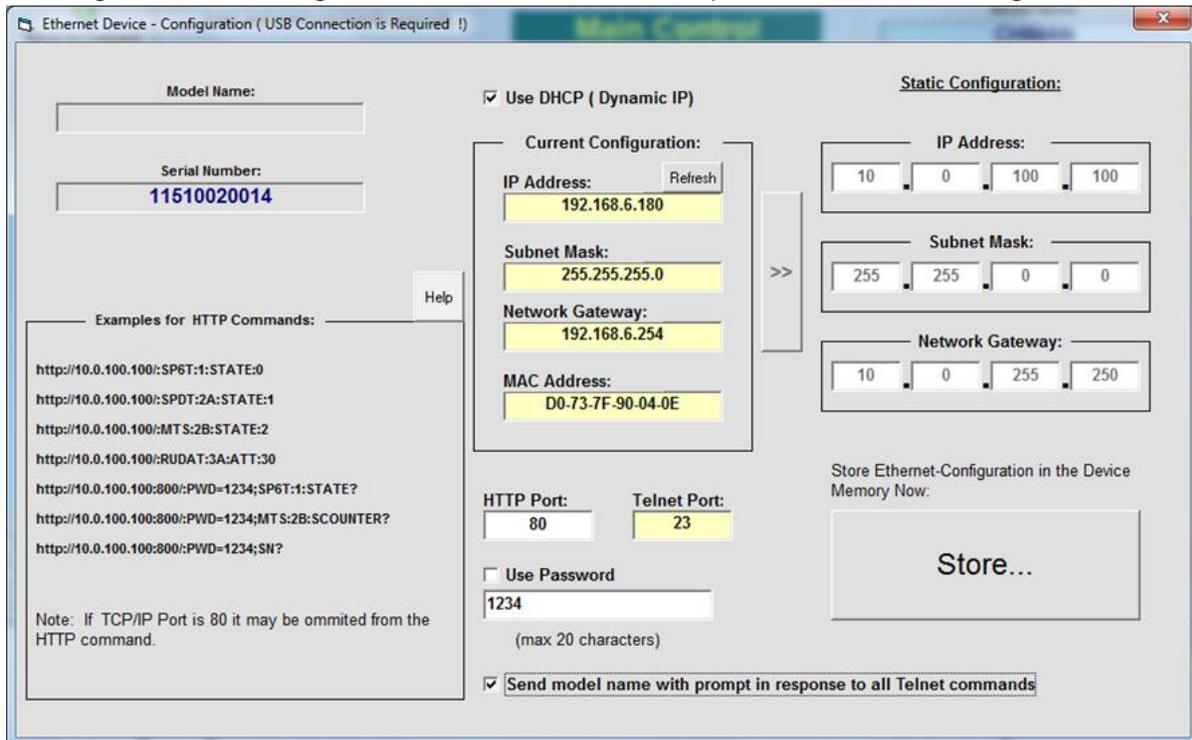


Figure 24: Ethernet configuration screen

The Ethernet configuration screen enables the user to control the following IP settings:

Use DHCP (Dynamic IP) - Checking this box enables Dynamic Host Control Protocol, which will cause the RCM unit to derive the IP address, network gateway, and subnet mask settings automatically from the server to which it is connected. Unchecking this box disables the automatic mode so that the IP parameters can be set manually.

IP Address: this (Internet Protocol) address allows other devices (such as computers) to communicate with the RCM unit over an Ethernet Network.

Subnet Mask: this parameter tells the RCM unit which part of its address it can share with other devices in the same network.

Network Gateway: This parameter represents the address of the network server.

MAC Address: This address is constant and cannot be changed. It identifies the RCM unit’s physical address for the network server.

HTTP port: This parameter represents a port for communicating with the RCM unit using HTTP protocol. The default value for this port is 80.

Telnet port: This parameter represents a port for communicating with the RCM unit using Telnet protocol. The default value for this port is 23.

Telnet prompt: By default, the RCM unit will prompt for each Telnet command with a new line character when communicating programmatically or through a Telnet client. Check the “Send model name with prompt in response to all Telnet commands” option in order to see a complete prompt based on the model name (for example “RCM-100>”). This feature requires firmware C0 or later.

Use Password: Checking this box implements a password requirement to connect to the RCM unit via Ethernet. Enter your desired password in the field below, and record it for your own reference.

NOTE: IF YOU LOSE YOUR PASSWORD, YOU CAN RECOVER IT BY CONNECTING TO THE RCM UNIT BY USB AND OPENING THE ETHERNET CONFIGURATION WINDOW.

7.5. Updating Firmware

All products are shipped with the latest available firmware and an update is usually not required. Mini-Circuits occasionally makes firmware update files available as a courtesy to add additional features or correct known issues. Please contact testsolutions@minicircuits.com for details.

 Caution: interruption of firmware upgrade process (due to USB disconnection, or power failure) may render the unit unresponsive.

NOTE: The firmware information and upgrade option are only available via the USB connection.

- 1) To check your firmware version and update firmware when new versions are available, click the “(fw)” icon above the Serial Number field of the GUI Main Control.

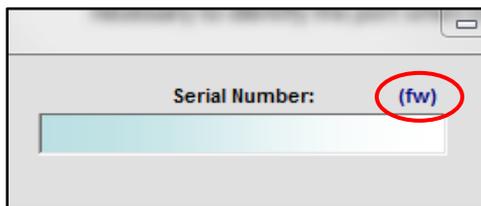


Figure 25: Firmware update Icon

- 2) The firmware info window will appear, displaying the current version of firmware:

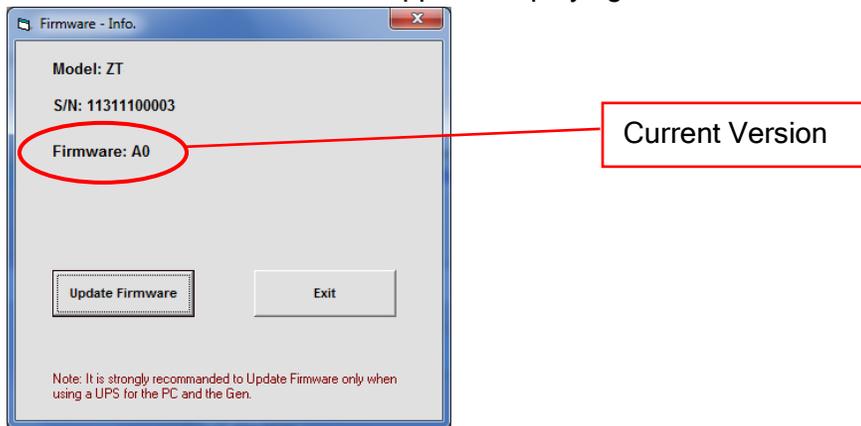


Figure 26: Firmware info window

- 3) Once you've downloaded the latest firmware version provided by Mini-Circuits, you can begin updating by clicking "Update Firmware" in the firmware info window.

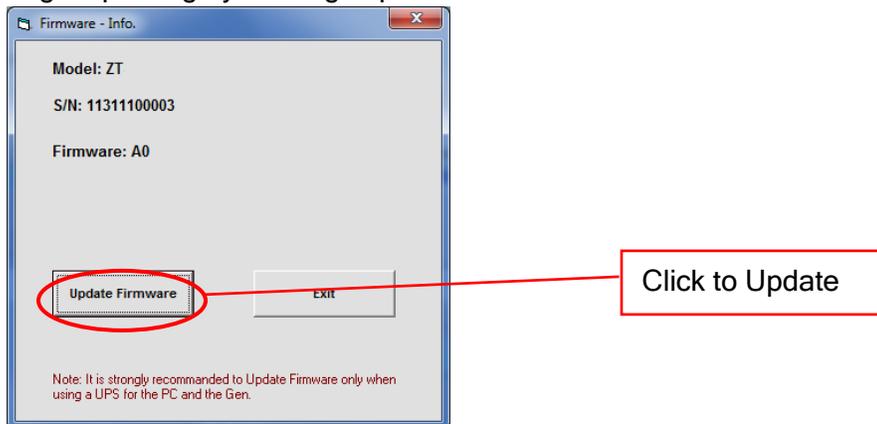


Figure 29: Click "Update Firmware" to initiate the update process.

- 4) The firmware brows menu will appear. Select the firmware file from the location where you saved it earlier in (3). Then click "O.K."

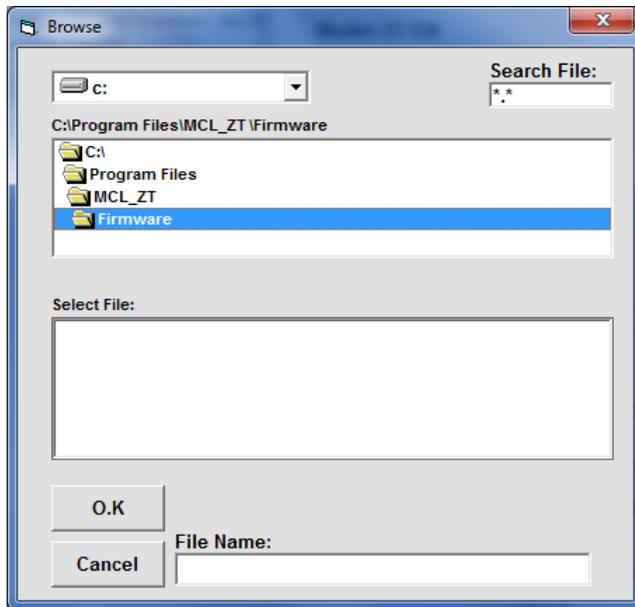


Figure 270: Firmware browse menu

- 5) A status indicator will appear on screen and advise when the update is complete. The RCM unit will then automatically restart for the new firmware to take effect.

7.6. Programming Support

In addition to the supplied GUI program, you may also create your own control interface for Mini-Circuits RCM Series test equipment. Mini-Circuits offers support for a variety of operating systems, programming environments, and third party applications including (but not limited to):

- Visual Basic®
- Visual C#®
- Visual C++®
- Delphi®
- Borland C++®
- CVI®
- LabVIEW®
- MATLAB®
- Python®
- Agilent VEE®

A complete list of SCPI commands and other information about programming your RCM unit is included in the [programming manual](#) available for download from the Mini-Circuits website. This manual includes detailed instructions and program examples for Windows® and Linux® environments.

Periodically, Mini-Circuits may update the GUI, DLLs, firmware, and supporting documentation for this equipment to ensure the best experience for our users. For this reason, it's a good idea to check the Mini-Circuits website frequently for updates.

You can find a complete package of the latest software downloads, programming manuals, project examples, and application notes on our website at:

https://www.minicircuits.com/softwaredownload/ztm_rcm.html

8. RETURN MATERIAL AUTHORIZATION (RMA) PROCEDURE

If you have received this unit by mistake or wish to return it for evaluation, please contact Test Solutions support using the information on page 4. You may also contact our Sales Department at +1 718 934-4500 / sales@minicircuits.com or your local Mini-Circuits sales representative. They will review your RMA request, and per Mini-Circuits RMA policy, issue an identification number to ensure proper handling. **All returns must be accompanied by appropriate Mini-Circuits identification and documentation to ensure proper handling.**