User Guide

USB & RS232 to SPI Converters

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Chapter 1 – General Information

1.1 *Scope of the User Guide*

This User Guide provides general introduction, installation instructions and operating information for Mini-Circuits USB&RS232to SPI converters.

1.2 *Warranty*

See Mini-Circuits website http://www.minicircuits.com/support/ordering.html for Warranty information.

1.3 *Definitions*

Note: A note advises on important information you may need to insure proper operation of the equipment. There is no risk to either the equipment or the user.

CAUTION **A caution advises about a condition or procedure which can cause damage to the equipment (No danger to users).**

WARNING **A warning alerts to a possible risk to the user and steps to avoid it. Do Not proceed until you are sure you understand the warning.**

1.4 *General safety precautions*

There are no general Safety precautions for using Mini-Circuits USB&RS232 to SPI converters

1.5 *Introduction*

Mini-Circuits has developed two USB and RS232 to SPI bi-directional converters, as shown in ***Figure 1.3*** which allow the user to transmit SPI commands and read data from SPI devices using either USB or RS232 control. These models are plug & play devices which require no Driver for either RS232 or USB interface. With the supplied GUI software, or most common lab test software you can control them remotely to read or transmit SPI data. The models are light, compact and can be powered from the USB bus or an external power supply increasing system flexibility.

Figure 1.3: Mini-CircuitsRS232/USB-SPI

1.6 *Service and Calibration*

The USB&RS232 to SPI converter models do not require any periodic service or calibration. The only user service possible for the models is external cleaning of the case and connectors as needed. Do not use any detergents or spray cleaning solutions to clean the converter. To clean the connectors use an alcohol solution, and to clean the case a soft, damp cloth.

1.7 *Contact Information*

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Brooklyn, NY11235
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Sales / Customer Service Fax: 1-718-934-7092
sales@minicircuits.com
For regional offices and tech support see http://www.minicircuits.com/contact/offices.html

1.8 *Technical description*

1.8.1 Features of Mini-Circuits USB & RS232 to SPI Converters

- Bi directional SPI communication.
- Both USB and RS232 control options
- Control SPI RF switches such as SPI-SP10T-63
- Easy installation and operation
- 330kbit/sec SPI transmission rate
- Plug & Play devices, no driver installation required.
- ActiveX com object and .Net class library for use with other software: C++, C#, CVI®, Delphi®, LabVIEW®8 or newer, MATLAB®7 or newer, Python, Agilent VEE®, Visual Basic®, Visual Studio®6 or newer, and more
- User friendly Graphical User Interface for any Windows® 32 or 64 bit computer. Command line support for Linux® computers.

1.8.2 Intended Applications

Mini-Circuits digital converters are intended for indoor use in:
- Lab and test equipment setups for both manual and automated measurements.
- Control systems

The models can be used by anyone familiar with the basics of electronic measurements or electronic control systems.

1.8.3 Conformity

Mini-Circuits series of RS232 & USB to SPI converters conform to all requirements for the following international standards**:**

RoHS – The models comply with EU directive for Restriction of Hazardous Substances for 6 substances.

USB 2.0 – The models meet the specifications of the Universal Serial Bus Ver. 2.0 communication standard as described by USB-IF.

USB HID – The models meet the requirements for Universal Serial Bus Human Interface Devices according to USB-IF's Device Class Definition for Human Interface Devices firmware rev. 1.11

RS232 – The models meet all requirements for RS232 standard.

SPI – The models meet all requirements for transmitting and receiving data in SPI protocol as the master unit.

1.8.4 Supported Software Environments

Mini-Circuits USB & RS232 to SPI converters have been tested in the following operating systems:

32 bit systems: Windows 10, Windows 8, Windows 7, Windows Vista, Windows XP, Windows 98

64 bit systems: Windows 8, Windows 7, Windows Vista, Linux

The converters will work with almost any software environment that supports ActiveX or .Net including: C++, C#, CVI®, Delphi®, LabVIEW®8 or newer, MATLAB®7 or newer, Python, Agilent VEE®, Visual Basic®, AutoIT, Visual Studio®6 or newer, and more

1.8.5 Model Selection Guide

RS232/USB-SPI-N has a standard RJ45 SPI connector.
RS232/USB-SPI has a special Digital Snap Fit (DSF) connector for compatibility with Mini-Circuits'ZX76 attenuator series.

For detailed model performance, data and graphs, outline drawing, ordering information and environmental specifications click on the model P/N.

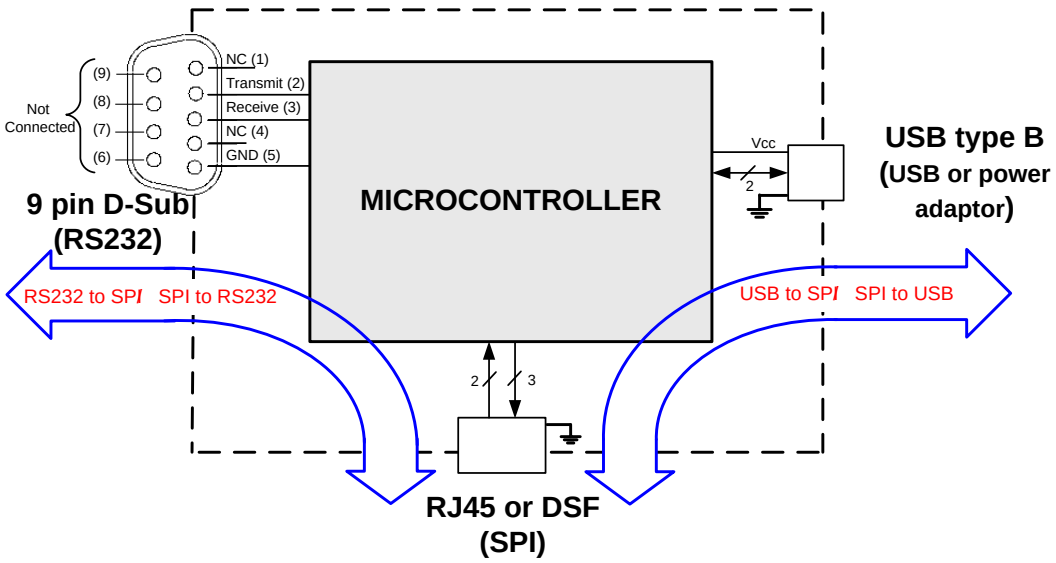

Figure 1.8.5 *Converter Functional Block Diagram*

1.8.6 Included Accessories and Options

All models are supplied with the following Accessories:

- 2.7 ft (0.8m) USB cable (Type A to Type B)
- 6 ft (1.8M) RS232 cable (9 Pin D-Sub Male-Female)
- AC/DC power adapter suitable for a wide selection of wall sockets
- One SPI cable (several types available, see below)

The following additional accessories are also available:

- 6.9 ft (2m) USB cable (Type A to Type B)
- 11 ft (3.3m) USB cable (Type A to Type B)
- SPI cable : 5 ft (1.5m) RJ45(M) – RJ45(M) (for RS232/USB-SPI-N)
- SPI cable : 5 ft (1.5m) DSF(M) – DSF(M) (for RS232/USB-SPI)
- SPI cable : 5 ft (1.5m) DSF(M) – Pigtail (for RS232/USB-SPI)

Chapter 2 – Installation and setup

System requirements for the RS232 & USB to SPI converters are a computer (Pentium II or better) with support for either USB HID or RS232. When using the supplied power adaptor, an appropriate AC mains power source of 110-220$V_{AC}$is required. To run the GUI program a Windows operating system is required.
If the converter is used to control RF switches such as SPI-SP10T-63 a separate power supply for the switches will also be needed.

2.1 *Software Setup*

If you have had any problems installing the software, we're here to help.
Try following these complete step-by-step instructions. If you still experience problems, give us a call at Mini-Circuits Worldwide Technical support. It's (718) 934-4500 or e-mail apps@minicircuits.com for North America or go to minicircuits.com/contact/worldwide_tech_support.html for other regional numbers and addresses.

2.1.1 ***First*** save all work in progress and close any other programs that may be running.

2.1.2 ***Next,*** insert the *Mini-Circuits* CD into the CD-ROM drive, or download the full CD software from minicircuits.com. If installing from files downloaded from the web - unzip the downloaded files to a temporary folder on your desktop or C: drive, then open the file folder you created and double-click the "Install" icon.

2.1.3 ***If installation from the CD does not start automatically, run install.exe*** from the <CD drive> root directory.

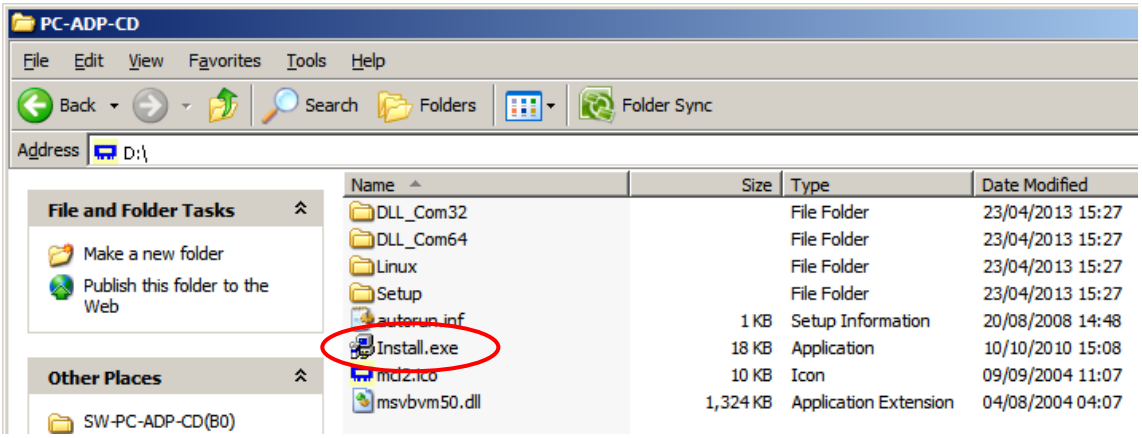

Figure 2.1.3 *CD file listing window*

2.2 *Installation*

2.2.1 ***The installer window*** should now appear. Click the “Install Now” button.

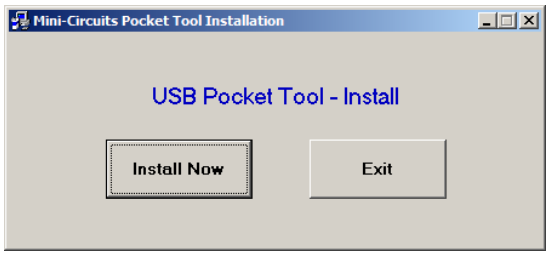

Figure 2.2.1 *Installation window*

2.2.2 ***The license agreement*** should now appear. To proceed, click “I Agree” and the “Continue” button.

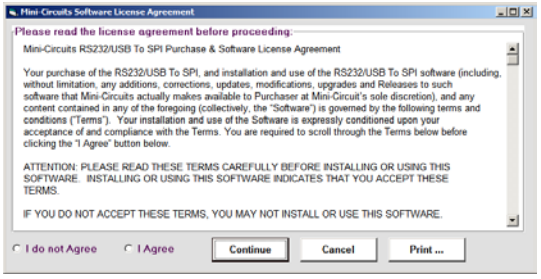

Figure 2.2.2 *License agreement*

2.2.3 ***The installation program will launch***. Click the “OK” button to continue.

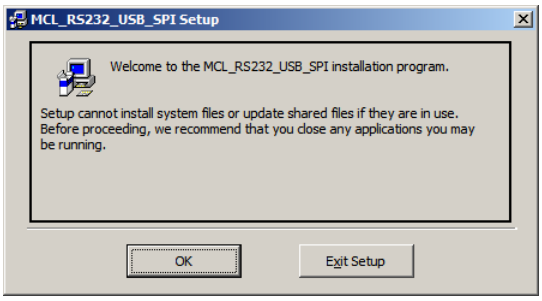

Figure 2.2.3 *Installation Program window*

2.2.4 ***The destination directory window*** will appear. At this point it's a good idea to take a second and confirm the full destination address for the software. In most cases, the default will be your computer's hard drive (C:)\Program Files\Mini-Circuits RS232_USB to SPI\.Change it if you prefer, then click the large button at the top to continue.

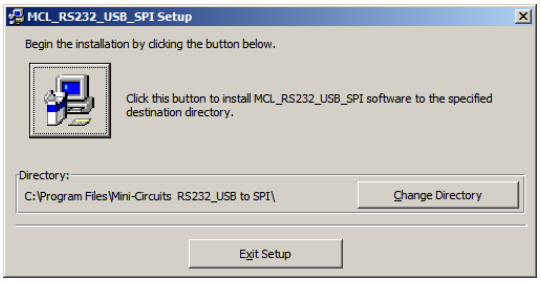

Figure 2.2.4: *Destination Directory window*

2.2.5 ***The Program Group window*** will appear. This window allows you to select the program group under which the link for the Switch controller program in the Start Menu will be created. Click on "Continue" to proceed.

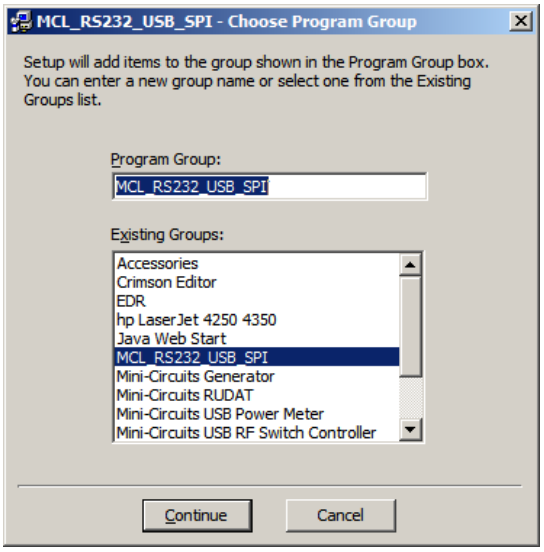

Figure 2.2.5: *Program Group Window*

2.2.6 ***In a second or two, your installation will be complete.*** Click "OK" to close the installer.

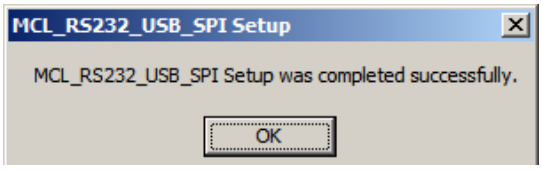

Figure 2.2.6: *Installation complete*

2.3 *Digital Converter physical Setup*

2.3.1 ***To use USB control, connect*** the converter as follows:

-Connect USB cable between converter unit USB port and computer USB port.
-Note the Indicator lights up.
-Connect SPI cable from Converter SPI port (Either RJ45 or DSF according to converter model) to your SPI device.

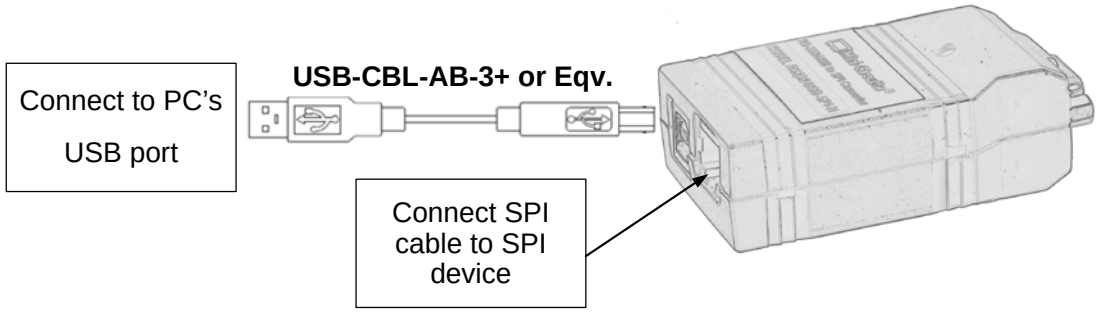

Figure 2.3.1: *RS232/USB-SPI-N USB setup*

2.3.2 ***To use RS232 control, connect*** the converter as follows:

-Connect D-Sub9 cable between converter unit D-Sub port and computer serial port.
-Connect USB cable between supplied power adaptor and converter USB port.
-Connect the provided power adaptor to a suitable mains power supply
-Note the Indicator lights up.
-Connect SPI cable from converter SPI port (Either RJ45 or DSF according to converter model) to your SPI device.

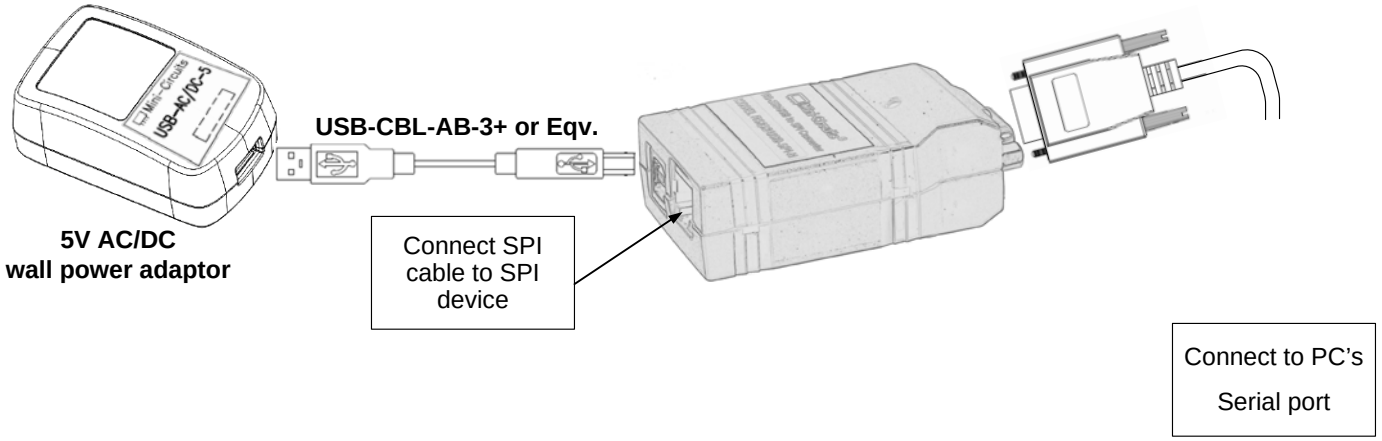

Figure 2.3.2: *RS232/USB-SPI-NRS232 setup*

Note: To insure proper operation set the converter's SPI mode to match the mode required by your external SPI device.

Chapter 3 – Use model as an SPI Converter

The converter models are supplied along with API programming objects (DLL files) to allow them to be easily controlled by most common lab test software (see programming manual for details) and with a Windows GUI program to transmit or receive data manually.

3.1 *Starting the GUI program*

3.1.1 *To start the program go to the Windows Start menu* and select All Programs>MCL_RS232_USB_SPI(default), or go to the other destination address you selected during installation(section **2.2.5**). The "MCL_RS232_USB_SPI" icon should be waiting there for you. Click on it and get started!

3.1.2 *At the start up screen select* USB or RS232 control, and for RS232 control the COM port where the unit is connected, then start the program in either converter mode for direct control of the SPI data sent and received, or SPI-SP10T-63 switch controller to control up to 50 SPI-SP10T-63 switches in series. For more detail on using the converter as a switch controller, see Chapter 4.

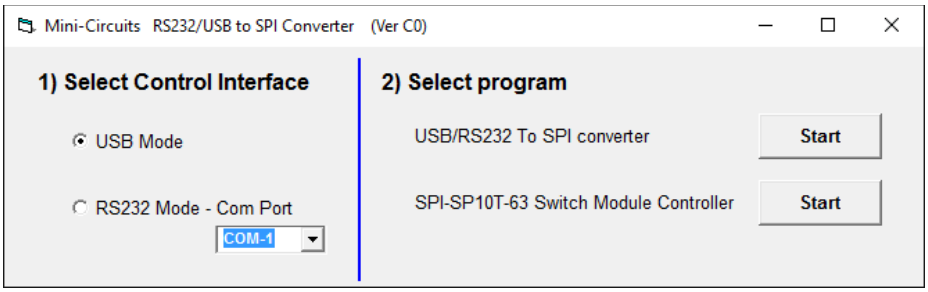

Figure 3.1.1: *Start up screen*

3.1.3 *When Selecting USB control, If multiple convertor units are connected to* the computer, the unit selection screen will appear, showing the list of serial numbers of all connected units. Select the unit you wish to start with and click OK, or click Cancel to exit the program. The program can handle up to 24 convertor units connected simultaneously.

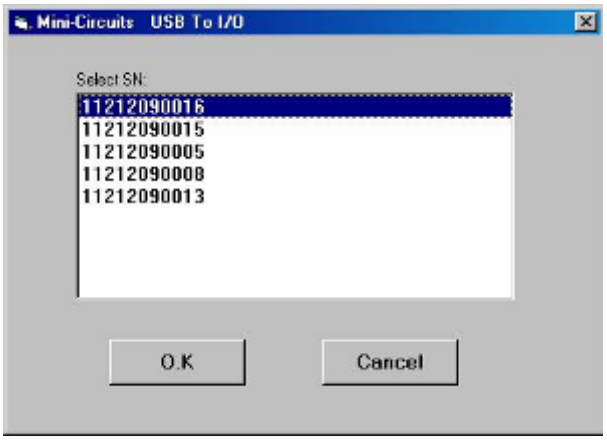

Figure 3.1.3: *Unit selection screen*

3.1.4 *Mini-Circuits RS232/USB to SPI Converter software* will start the unit you selected in either convertor or switch controller mode.

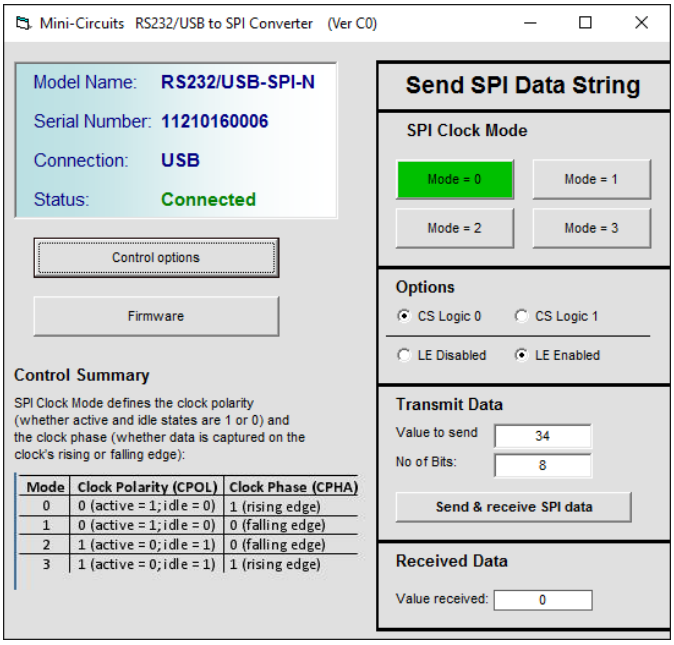

Figure 3.1.4a: *Convertor Initial screen, USB control*

3.1.5 ***If no unit is connected*** via USB when USB control is selected the demo mode alert will appear, click OK and the program will open with no S/N shown and status "DISCONNECTED" listed.

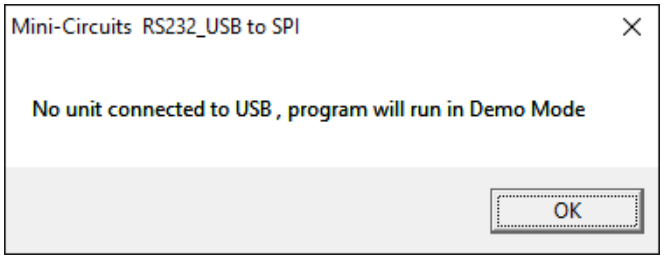

Figure 3.1.4: *Demo mode alert*

3.2 *Convertor mode functions*

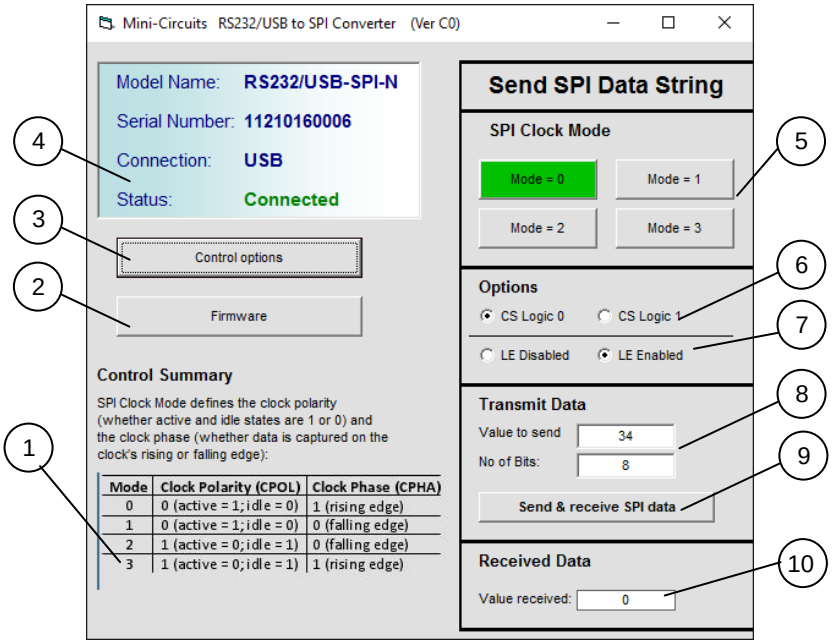

Figure 3.1.4: *Convertor Mode*

#	Name	Descriptions
1	Control Summary	Summary of SPI clock modes showing Clock polarity and phase in each mode.
2	Firmware	Opens the Firmware information and upgrade window (available only in USB control)
3	Control Options	Returns to startup screen as shown in 3.1.2
4	Convertor details	Shows details of current convertor connected and control method
5	SPI clock mode	Select which clock mode setting to use. Selected mode will be in green.
6	CS options	Select if CS control will be active at logic high or logic low. If CS logic 0 is selected the converter will hold CS at logic high until it's ready to select the SPI slave model, then drop it to '0' to signify CS active.
7	LE options	Select if LE is enabled, if LE is disabled no LE signal will be sent.
8	Transmit Data	Specify number of bits to send (max 16 bits) and the value in decimal to send.
9	Send and receive data	Send the specified data and read back the same number of bits from the SPI device.
10	Received data	Decimal value of data received from SPI device

Note: Check the specification of your external SPI device to determine how the converter should be set.

3.2.1 *SPI Modes:*

- Mode 0: Clock defaults to logic low '0' when not sending clock signal (at the end of each transmission clock will drop to 0) and data is synchronized with the rising edge of the clock signal.
- Mode 1: Clock defaults to logic low '0' when not sending clock signal (at the end of each transmission clock will drop to '0') and data is synchronized with the falling edge of the clock signal.
- Mode 2: Clock defaults to logic high '1' when not sending clock signal (at the end of each transmission clock will rise to '1') and data is synchronized with the rising edge of the clock signal.
- Mode 3: Clock defaults to logic high '1' when not sending clock signal (at the end of each transmission clock will rise to '1') and data is synchronized with the falling edge of the clock signal.

3.2.2 ***With the correct communication options specified,*** typing the decimal value of the binary word to send in the "Data value to send" field and clicking on "Send and Receive SPI" will transmit the data entered to the SPI device and display the response in the "Data value received" field. If the value to be sent is greater than possible in the number of bits specified an incorrect value may be sent.

3.2.3 ***The converter models can also*** be controlled automatically via USB using most common lab test software, or your own custom programs, with the provided DLL files; or via RS232 using sending the relevant ASCII codes. For more information on this see Mini-Circuits Programming Handbook on our website at
http://www.minicircuits.com/softwaredownload/Prog_Manual-8-USB_RS232_SPI.pdf

3.3 *Application examples*

3.3.1 ***Controlling a Synthesizer***

. Connecting the RS232/USB to SPI converter via either USB or RS232 to a computer allows synthesizers using 3 wire serial communication (SPI) to be controlled directly using the Load Enable, Clock and Data out pins of the convertor (See **Fig. 3.2.1**). This configuration allows controlling SPI devices (synthesizer, PLL, digital step attenuators, etc…) via USB or RS232 interfaces.

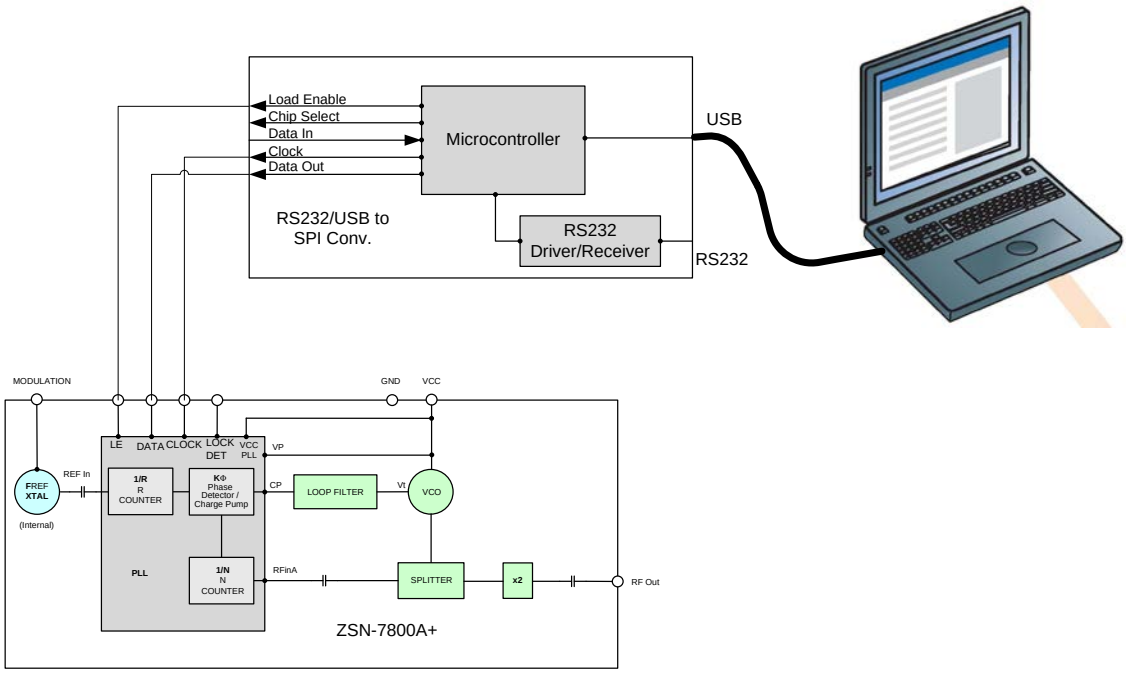

Figure 3.3.1: *Synthesizer ZSN-7800A+ controlled via USB.*

3.3.2 ***Reading data from an Analog-Digital converter (ADC).***

To demonstrate the convertor's bi-directional capability, a simple experiment can be set-up where the RS232/USB-SPI converter is used as an interface between a PC (using the USB port in this case) and an ADC (analog to digital converter) mounted on a test board. The ADC has an SPI interface that allows certain properties to be configured before the digital output is read. The RS232/USB-SPI converter operates at 330kb/sec with 1 to 16 data bits (as specified by the user) being sent and received per SPI word.

With configuration of the test board and ADC's external circuitry, the application can be that of a voltmeter:

- The ADC takes an analogue voltage input and provides a digital output over SPI
- The RS232/USB-SPI converts between the test board's SPI interface and the computer's USB interface
- Mini-Circuits' supporting software interprets the information and allows the original analogue voltage to be displayed
- The communication needs to be bi-directional in order to configure the ADC with the appropriate settings

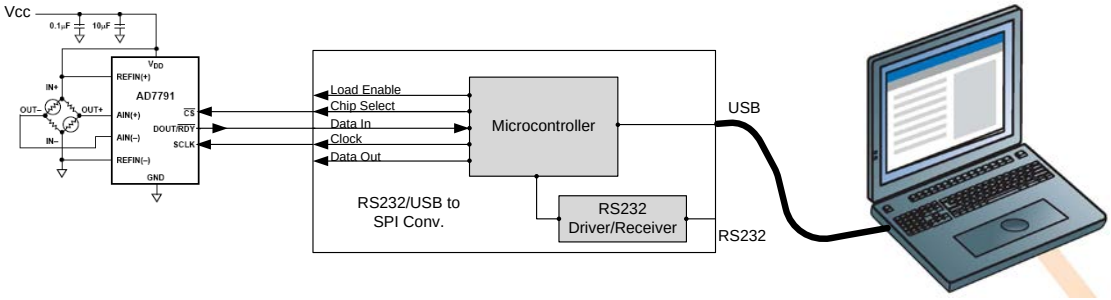

Figure 3.3.2: *Reading data from ADC as a voltmeter via USB.*

3.3.3 ***A demonstration of this application uses*** Analog Devices' AD7791 ADC, mounted on a test board. The analog input of the ADC is routed to an SMA connector for the voltage measurement input port, with the ADC's control connections being exposed through a serial connector. A suitable control cable was created to interface with the test board's serial port and the "digital snap-fit" SPI connector of the RS232/USB-SPI converter.

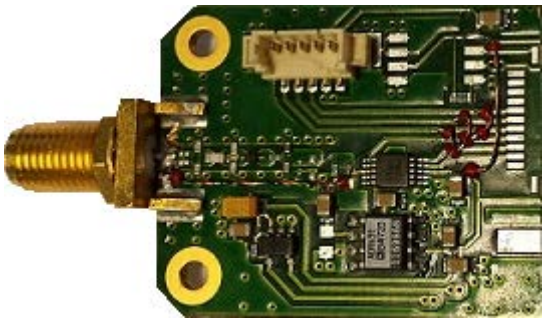

Figure 3.3.3: *Test board for ADC as a voltmeter*

The test board also includes the required external circuitry to set up AD7791 for this application, including provision of an external reference voltage. Configuration of AD7791 is beyond the scope of this document so please see the Analog Devices website (www.analog.com) for further details.

For devices or systems under test that use an RJ45 connector for the SPI interface, Mini-Circuits offers RS232/USB-SPI-N. The functionality and software control is identical to RS232/USB-SPI except that the digital snap fit connector is replaced with RJ45 for the SPI interface.

3.3.4 *To implement this application with the provided GUI:*

- Enter in the 'No. of bits' field 8 and in the 'Data value to send' field 16, then hit send to set the ADC to configuring the mode register(Neither Chip Select nor LE is needed)
- Change the value in 'Data value to send' field to 4, then hit send to set the ADC's "Unipolar Buffered" property in the mode register.
- Change the value in 'Data value to send' field to 36, then hit send to start configuring the filter register of the ADC
- Change the value in 'Data value to send' field to 7, then hit send to set the ADC's noise filter.
- Change the value in 'Data value to send' field to 0 and the number of bits to 16, then hit send, and record the value received as Data1.
- Change the number of bits to 8, then hit send, and record the value received as Data2.
- The voltage measured will be (Data1*2^8+Data2)/(Ref voltage*2^24). Ref voltage in our example was 2.5V

Chapter 4 – Use as an SPI-SP10T-63 Switch Controller

The converter models are supplied along with API programming objects (DLL files) to allow them to be easily controlled by most common lab test software (see programming manual for details) and with a Windows GUI program to transmit or receive data manually.

Mini-Circuits' SPI-SP10T-63 SP10T switches are controlled via a simple SPI interface with a novel design allowing up to 50 switches to be "daisy-chained" into a Master / Slave configuration. The key advantage of this approach is that all switches (slave units) take their instructions via the single SPI Master unit, so only one control interface is needed for the full chain of up to 50 switches.

4.1 *Starting the GUI program*

4.1.1 *To start the program go to the Windows Start menu* and select All Programs>MCL_RS232_USB_SPI(default), or go to the other destination address you selected during installation(section **2.2.5**). The "MCL_RS232_USB_SPI" icon should be waiting there for you. Click on it and get started!

4.1.2 *At the start up screen select* USB or RS232 control, and for RS232 control the COM port where the unit is connected, then start the program in either converter mode for direct control of the SPI data sent and received, or SPI-SP10T-63 switch controller to control up to 50 SPI-SP10T-63 switches in series. For more detail on using the model as an SPI converter, see Chapter 3.

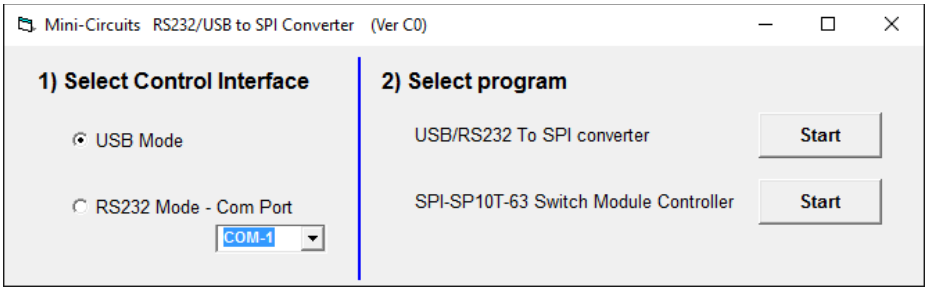

Figure 3.1.1: *Start up screen*

Note: Power to the SPI-SP10T-63 is not provided by the RS232/USB-SPI converter and needs to be provided separately.

4.1.3 ***When Selecting USB control, If multiple convertor units are connected to*** the computer, the unit selection screen will appear, showing the list of serial numbers of all connected units. Select the unit you wish to start with and click OK, or click Cancel to exit the program. The program can handle up to 24 convertor units connected simultaneously.

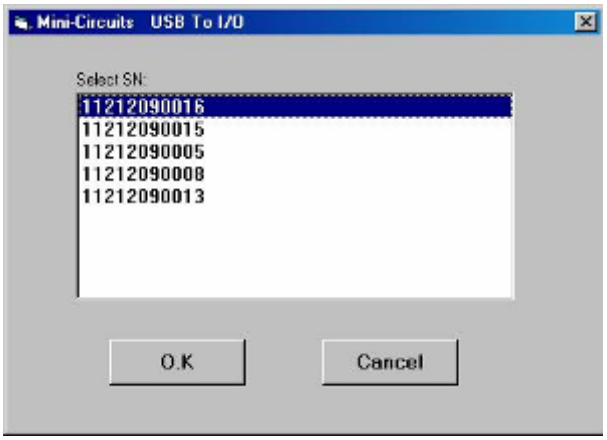

Figure 3.1.3: *Unit selection screen*

4.1.4 ***Mini-Circuits RS232/USB to SPI Converter software*** will start the unit you selected in either convertor or switch controller mode.

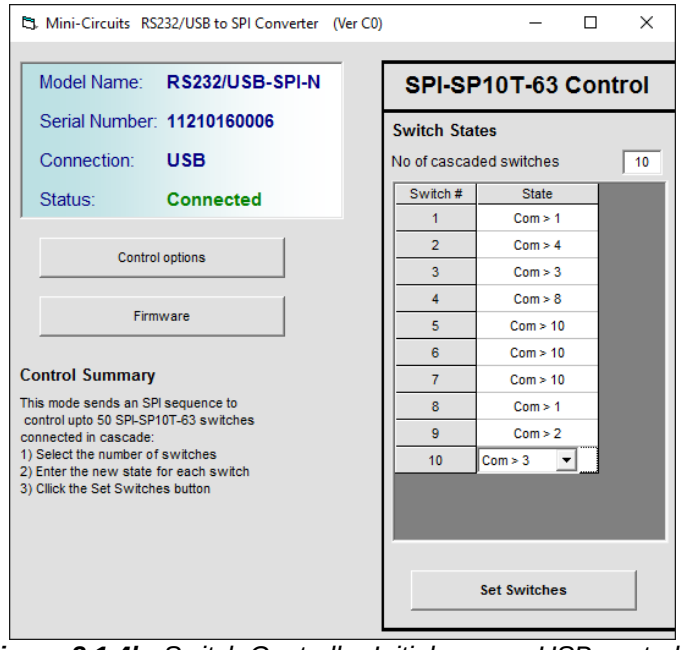

Figure 3.1.4b: *Switch Controller Initial screen, USB control*

4.1.5 ***If no unit is connected*** via USB when USB control is selected the demo mode alert will appear, click OK and the program will open with no S/N shown and status "DISCONNECTED" listed.

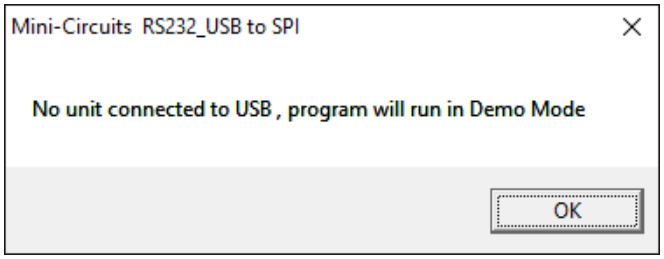

Figure 3.1.4: *Demo mode alert*

4.2 *Switch controller mode functions*

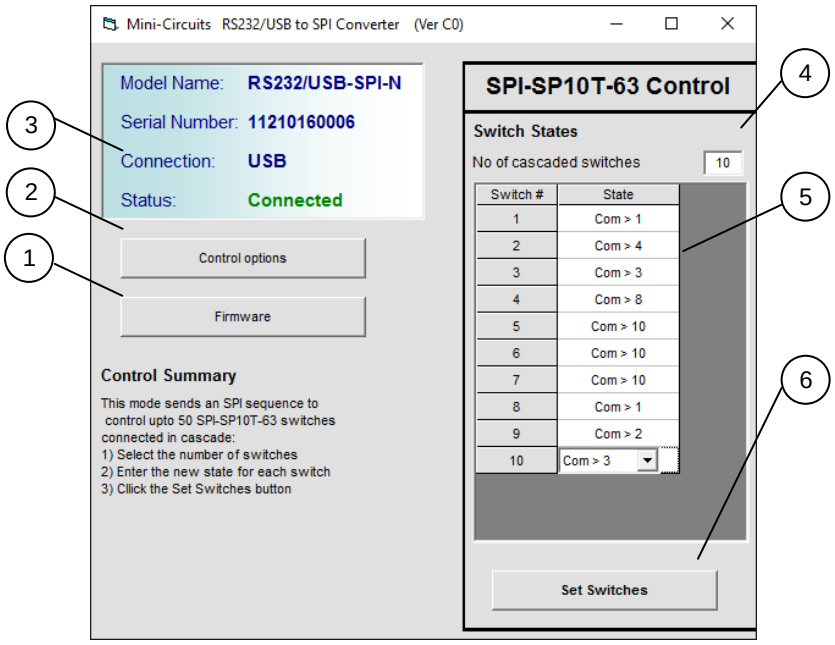

Figure 3.1.4: *Convertor Mode*

#	Name	Descriptions
1	Firmware	Opens the Firmware information and upgrade window (available only in USB control)
2	Control Options	Returns to startup screen as shown in 3.1.2
3	Convertor details	Shows details of current convertor connected and control method
4	No. of switches	Specify number of SPI-SP10T-63 switches are connected in series
5	Switch states	Specify the desired state of each switch in the series with Switch 1 being the one connected directly to the convertor.
6	Set Switches	Set all the switches to the state specified.

4.2.1 ***The switch controller cannot provide*** power to the SPI-SP10T-63 switches; therefore the first switch in the series should be connected to the converter using CBL-5FT-MMD-P+ or equivalent cable which allows connecting an external power supply. Up to 50 switches can be connected in series.

4.2.2 ***The switch controller can also*** be controlled automatically via USB using most common lab test software, or your own custom programs, with the provided DLL files; or via RS232 using sending the relevant ASCII codes. For more information on this see Mini-Circuits Programming Handbook on our website at
http://www.minicircuits.com/softwaredownload/Prog_Manual-8-USB_RS232_SPI.pdf

4.3 *Cascaded SPI-SP10T-63 switch setup and control*

SPI (Serial Peripheral Interface) is a simple data-link standard that is widely used for short distance communication with micro-controllers. Since SPI interfaces are not included with typical PCs, Mini-Circuits' RS232/USB-SPI converter can act as a convenient and cost-effective converter, providing a USB or RS232 interface to a cascaded chain of SPI-SP10T-63 switches.

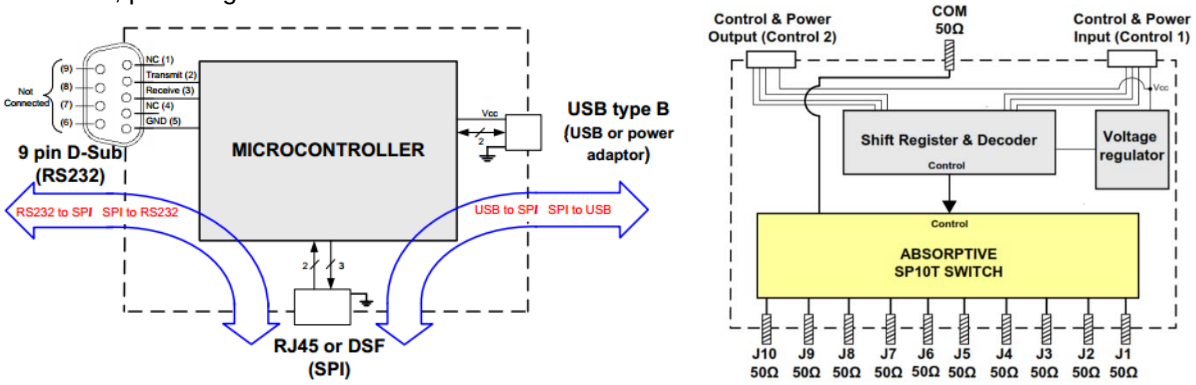

Figure 4.3: *Functional Diagram for the RS232/USB-SPI (left) and SPI-SP10T-63 (right)*

4.3.1 *Connecting cascaded SPI-SP10T-63 switches*

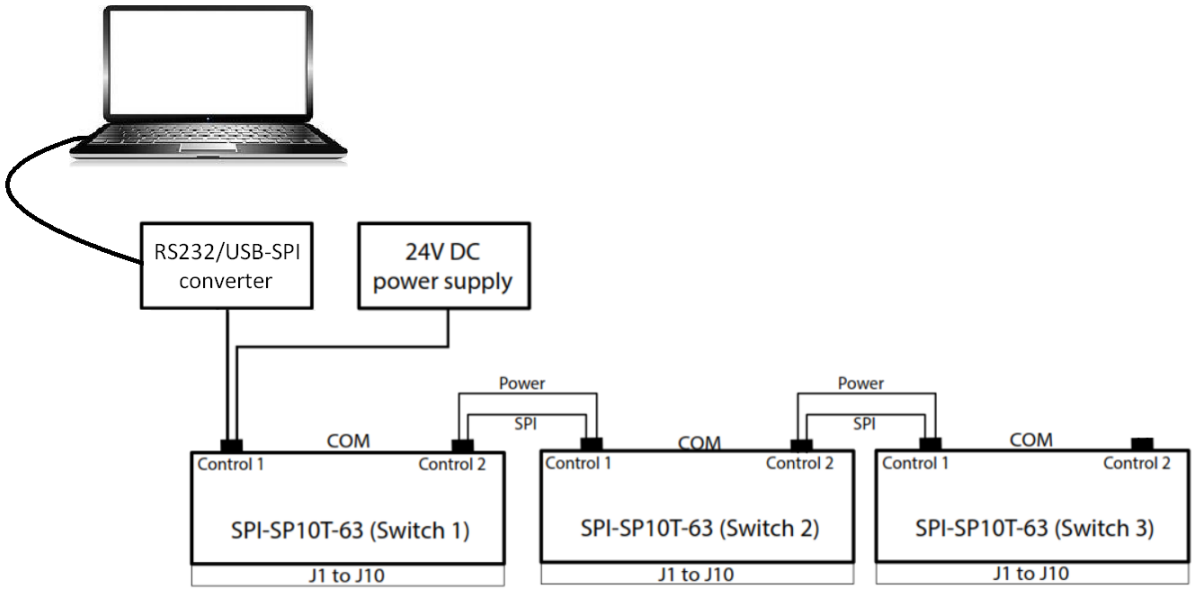

Figure 4.3: *Cascaded SPI-SP10T-63 Switches, Controlled via the RS232/USB-SPI Converter*

SPI-SP10T-63 switches can be cascaded from each other by connecting the "Control 2" port of one switch with the "Control 1" port of the next switch in the chain using the supplied SPI control cable. Control 2 of the last switch in the chain is left unconnected. A 24V DC supply will also need to be connected to at least one of the switches in the chain at either the Control 1 or Control 2 ports (the DC voltage is passed between switches via the SPI cables).

The first switch in the chain assumes the role of Master, with all other units as Slaves. Control 1 of the Master unit should be connected into the SPI port of the RS232/USB-SPI converter using another SPI cable. The USB connection of the converter can then be connected directly into the USB port of the controlling PC to complete the control set-up.

4.3.2 *Controlling the cascaded switches using the RS232/USB-SPI GUI*

Mini-Circuits provides a simple software GUI (Graphical User Interface) with the RS232/USB-SPI converter which includes a control screen for cascaded SPI-SP10T-63 switches. The process is as below:

1. Launch the GUI, selecting "SPI-SP10T-63 Switch Module Controller" mode
2. Enter the number of cascaded switches to control
3. Enter the states to be set for each switch
4. Click "Set Switches" to send the command via the converter and set all the switches

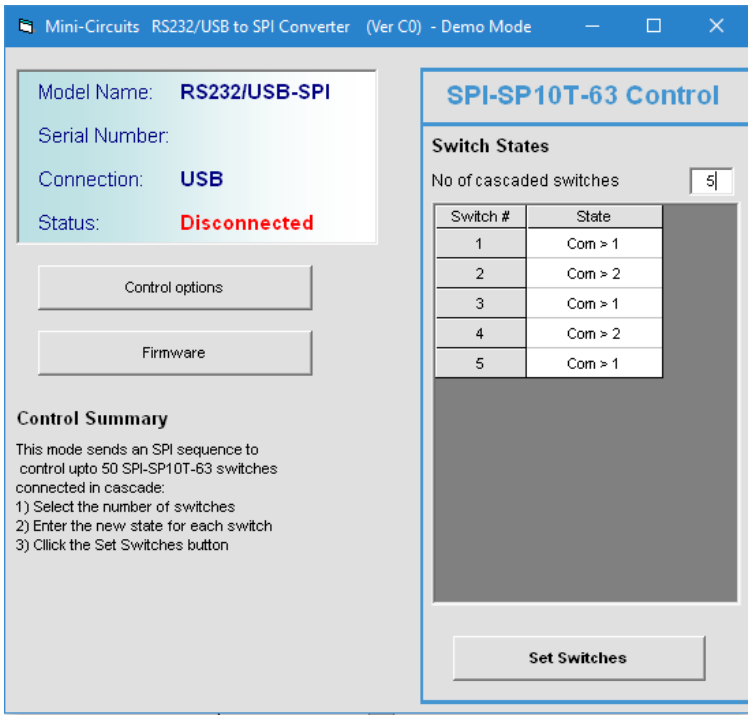

Figure 4.3: *Cascaded SPI-SP10T-63 Switches, Controlled via the RS232/USB-SPI Converter*

4.3.3 *Writing a Custom Program to Control the Cascaded Switches*

The switches take a 4-bit data string to determine which switch state is to be set, as shown in figure 4.3.3.

Switch State	Bit Logic				Decimal Value
	A0	A1	A2	A3	
Com <-> J1	1	0	1	0	10
Com <-> J2	1	0	1	1	11
Com <-> J3	1	0	0	1	9
Com <-> J4	1	0	0	0	8
Com <-> J5	1	1	0	0	12
Com <-> J6	0	1	0	0	4
Com <-> J7	0	0	1	0	2
Com <-> J8	0	0	1	1	3
Com <-> J9	0	0	0	1	1
Com <-> J10	0	0	0	0	0

Figure 4.3.3a: *Table of data inputs for each SPI-SP10T-63 Switch State*

Whilst the LE (Latch Enable) connection is held low (logic 0) the data bits can be loaded into the switches' internal shift registers without affecting the switch states. The cascaded switches pass the data along the chain as a shift register so the data for the furthest switch from the Master (switch 3 in the example of figure 4.3.1) should be sent first and the data for the Master (switch 1 in the example of figure 4.3.1) should be sent last.

Once the data has been loaded into the shift register for all switches in the cascaded chain, toggling the LE connection high (logic 1) and then low will set all the switch states.

Full details of the SPI timing sequence for control of the SPI-SP10T-63 switches can be found on the product datasheet.

An example timing sequence to set 3 cascaded switches is shown in figure **4.3.3b**.

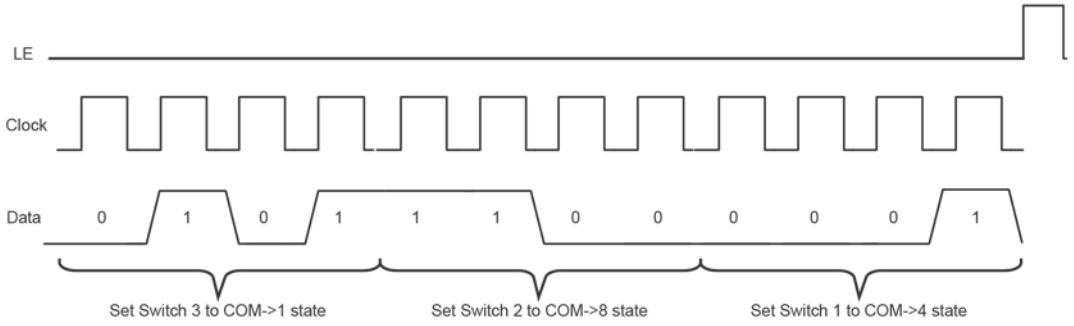

Figure 4.3.3b: *Example timing Sequence setting Switch 1(COM<->1), Switch 2(COM<->8) and Switch 3(COM<->4)*

4.3.4 *Using the RS232/USB-SPI Converter's API*

Mini-Circuits provides an API (Application Programming Interface) DLL to allow control of the RS232/USB-SPI converter from a wide range of programming environments. The API is supplied in two forms, an ActiveX COM object and a .NET class library. Each of these files is a library that provides all the necessary functions to send and read data from the converter via the USB connection.

The steps to create a control program using either of the DLL files are summarized below:

1. Reference the DLL
    a. A reference needs to be added to the DLL file within the programming environment and assigned to a new "object". The object represents the converter functionality and can be referred to throughout the program.
2. Connect to the RS232/USB-SPI converter
    a. The DLL's Connect function is used to connect the software object to the correct converter device. If multiple converters are connected by USB then the serial number should be provided in order to specify the correct hardware.
3. Send SPI data
    a. The DLLs' Send_SPI data function can be used to send the data to the switches' shift registers for the required switch states
4. Set LE connection
    a. The DLL's Set_LE function can be used to control the LE connection to the cascaded switches
5. Disconnect the converter
    a. The DLL's Disconnect function should be called as the last stage in a control program to close the connection

For detailed explanation of programming with the RS232/USB to SPI converter please refer to the Programming Manual on the Mini-Circuits website.

4.3.5 *DLL Control Logic Example*

The simplest approach to send the SPI data sequence of figure **4.3.3b** for controlling 3 cascaded switches is to send a series of Send_SPI commands, 1 per switch, then send the commands to toggle the LE connection:

```
                    // Send data value 10 (4 bits) to set switch 3 (Com<->1)
My_USB_SPI.Send_SPI(4, 10)
                    // Send data value 12 (4 bits) to set switch 2 (Com<->5)
My_USB_SPI.Send_SPI(4, 12)
                    // Send data value 1 (4 bits) to set switch 1 (Com<->9)
My_USB_SPI.Send_SPI(4, 1)
                    // Toggle LE to logic high
My_USB_SPI.Send_LE(1)
                    // Toggle LE to logic low
My_USB_SPI.Send_LE(0)
```