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A Serial Relay Interface

RS232Relay

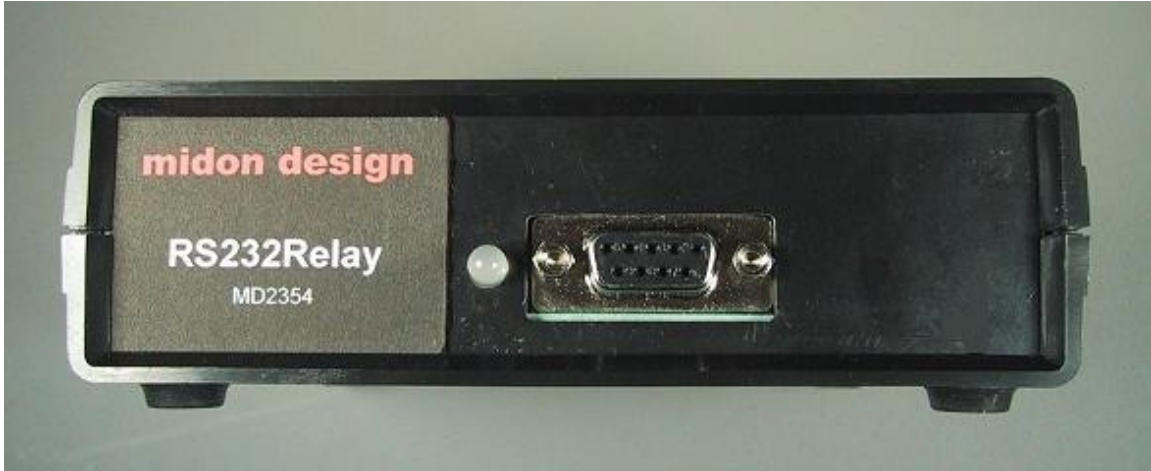


Figure 1 RS232Relay

RS232Relay User Guide Version 1.05
October 17, 2009

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2. Introduction

Thank you for your purchase of the RS232Relay. The following instructions will assist you in configuring and operating the product.

RS232Relay provides an easy to use interconnection between your Personal Computer (PC) and switched devices. The relays used on RS232Relay can be connected to almost any load to perform “real-world” functions.

RS232Relay has the following features:

- 4 dry contact relay outputs, each with a Form C contact, that is, a normally open and a normally closed contact, each capable of handling 100 Volts DC at up to 1.25 Amperes, or 120 Volts AC at 0.5 Amperes.
- Capable of Momentary, Pulsed or steady-state operation of the relays
 - Momentary operation is useable from 1 second to 99 minutes
- On board LED's to show the state of the relays.
- Interfaces directly to your PC via a spare RS232 serial port, or via any RS232 to USB converter
- Power input of 12 Volts AC or DC at 350 mA.

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3. Installation

To complete this project, you will need to connect a 12 to 16 Volt (AC or DC) transformer to connector J1 (see Figure 2 for the location of J1). The transformer needs to supply at least 350mA. The polarity of the connection to J1 is not important. **Do not power up at this time.**

Connect a standard serial cable (straight-through) between J2 and your PC. Review Table 1 for which pins are used.



Figure 2 Location of Connectors

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Table 1 RS232 Cable Connections

Pin Number	Pin Name	Definition
1		Not used
2	TXD	Data from RS232Relay to your PC
3	RXD	Data from your PC to RS232Relay
4		
5	GND	Ground
6		
7		
8		
9	PWR	Not used unless JP1 is installed. Provides +12V referenced to pin 5 for external devices

IMPORTANT:

Due to a Version C PCB error, the labels for J3, 4, 5 and 6 are incorrect. **NO** and **C** are swapped on the PCB labels. Figure 3 shows how they should be connected (J6 shown, but applies to all relay terminals). The **NC** contact is correct on all connectors.

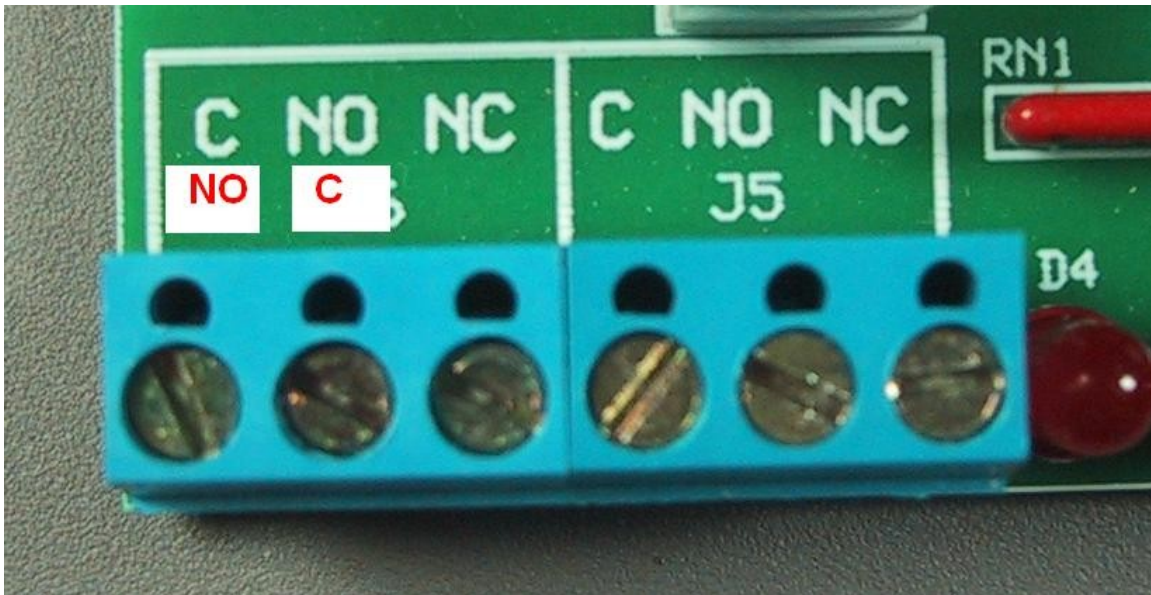


Figure 3 Corrected Relay Contacts

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4. Configuring RS232Relay

Using Hyperterm, or any other terminal emulation program, configure the connected serial port to 9600 BPS, No parity, 8 bits, 1 start bit and NO hardware handshaking. Ensure that the port chosen matches the connected serial port.

Now, apply power to RS232Relay. The default start-up sequence will look like this:

```
RS232Relay v1.04 2009-09-01
www.MidonDesign.com
Serial # 2632C0000001436ECB2D

Debug = Off
Momentary Relay Action = Off
Relay Powerup Restore = Off
Relay #01= Off
Relay #02= Off
Relay #03= Off
Relay #04= Off
Clones: None Set
```

The following commands will establish the parameters you need to control your relays.

4.1. MOM

Use the **MOM** command to determine if you want your relays to turn off a pre-determined amount of time after turning on. The **RLT** command sets that time interval, which can be anywhere from 1 second to 99 minutes. Setting **MOM** on will enable the timer functionality.

Note that if the Momentary function is enabled, you will not be able to process any further commands to any of the relays until after the first command has gone through the time period established by the **RLT** command. If you need to activate another relay in this period, use the **RTC** command to clear the timer and then proceed as normal.

4.2. RLT

Set the time delay with the **Relay Timer** command. Input any number from 0 to 99. The time delay is measured in seconds (if TYP=S) or minutes (if TYP=M).

RLT is not a valid command if **MOM** is set to off.

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Using a time of 0 will cause a near-instantaneous relay off whenever you turn a relay on.

4.3. TYP

Use the **TYP** command to determine the type of time interval desired by the **RLT** command. The options are S for Seconds and M for Minutes.

TYP is not a valid command if **MOM** is set to off.

4.4. SPR

Relay232 retains memory through a power failure, so if you want the relay states to revert to what they were prior to a power failure, enable this capability with the **Set Power Restore On** command (**SPR on**). This setting is defaulted to off.

4.5. CLO

The **CLO** command provided for those cases when you may need more than a SPDT (Single Pole Single Throw) contact closure for an external device. Cloning a relay makes two relays operate exactly as if they were one unit and thus gives you DPDT (Double Pole Double Throw) capabilities.

For example, if you want to use Relays 1 and 4 as a DPDT relay, use the command:

```
CLO1=4
```

Anytime you then set or clear relay 1, relay 4 will also set or clear. The same is true in reverse; operating Relay 4 will also operate Relay 1.

RS232Relay ships with clones disabled. If you want to clear any clones you have set, reset them all with the following command:

```
CLO0
```

4.6. DEB

Midon Design strives to ensure the highest quality of our software and hardware. However, there are times when problems do occur. The **DEB** command is used to enable diagnostics so that Midon Design can trouble-shoot any problems you may encounter. Normally the debug function is off, but if you have problems,

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set debug on and send us any outputs from RS232Relay. This will speed up assisting you. **DEB** parameters are On or Off.

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5. Using RS232Relay

Other useful commands are available to interact with RS232Relay.

5.1. RLx

You control the relays directly from your PC using the **RLx** commands. The syntax is:

```
RLx {on|off}
```

Where x can be "A", "1", "2", "3" or "4"

RLA will turn on or off all the relays.

In Momentary mode, you cannot issue further **RLx** commands when a timer sequence is in process. Use the **RTC** command to cancel the relay timer if you need to do additional operations on the relays.

5.2. RLS

The **Relay Status** command will display the current relay states.

5.3. PLx

Use the **PLx** command to pulse any relay for approximately one second. This can be used independently of the relay timer. The syntax is:

```
PLx
```

Where x can be "1", "2", "3" or "4"

The **PLx** command will return the selected relay to the state that it was in before the command.

5.4. DIS

The **DIS** commands displays your system status, including all settings and the current state of the relays.

The output will look something like this with MOM off:

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```
RS232Relay v1.04 2009-09-01  
www.MidonDesign.com  
Serial # 2632C0000001436ECB2D
```

```
Debug = Off  
Momentary Relay Action = Off  
Relay Powerup Restore = Off  
Relay #01= Off  
Relay #02= Off  
Relay #03= Off  
Relay #04= Off  
Clones: None Set
```

With momentary mode set to on, the output will look like this:

```
RS232Relay v1.04 2009-09-01  
www.MidonDesign.com  
Serial # 2632C0000001436ECB2D
```

```
Debug = Off  
Momentary Relay Action = On  
Relay Timer = 01 Seconds  
Relay Powerup Restore = Off  
Relay #01= Off  
Relay #02= Off  
Relay #03= Off  
Relay #04= Off  
Clones: None Set
```

5.5. RTC

The **Relay Timer Cancel** command will stop the timer when Momentary operation is active. This may be useful if you need to change a relay when one has already been set in momentary mode. This command is not valid if Momentary mode is not enabled.

5.6. HLP

The **HLP** command displays a simple list of all available commands, like this:

```
>hlp  
CLO  
DEB  
DIS  
HLP  
MEM  
MOM  
PL1  
PL2  
PL3
```

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PL4
RLA
RL1
RL2
RL3
RL4
RLS
RLT
RTC
SER
SPR
TYP
VER
ZZZ

5.7. MEM

The **MEM**ory command is available if you want to inspect any of the memory in the RS232Relay program or data store. It can also be used, under direction of our technicians, to modify data when trouble-shooting. **USE THIS COMMAND WITH GREAT CAUTION.**

5.8. VER

The **VER**sion command outputs the software version and serial number of RS232Relay. A related command is **SER**, which will display just the serial number.

5.9. ZZZ

The **ZZZ** command will do a reset of RS232Relay, similar to power cycling the unit but without the need to remove power. You should not normally need to use this command.

5.10. Input Timeout

To avoid problems with erroneous characters, or noise on the serial input, there is an input timeout for any commands. If more than 10 seconds elapse without a valid input after a command has been started, the operation will abort with the following error message:

```
? Input Timeout
```

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6. RS232Relay Command Summary

Table 2 RS232Relay Command List

Command	Description	Syntax
CLO	Clone a relay to another	CLOx=y Where x = 1 to 4, y = 1 to 4 and the equal sign is provided by the unit
DEB	Enable or disable debug outputs. Use only when directed to by Midon Design	DEB<on off>
DIS	Display all settings of RS232Relay	DIS
HLP	Display a list of available commands	HLP
MEM	Display and change specific memory locations. Use only when directed to by Midon Design	MEM <start location><cr>
MOM	Set or disable Momentary relay function	MOM <on off>
PLx	Pulses any relay or all relays from current state to the opposite state	PLx Where x = 1 to 4
RLT	Set the timer duration for the relay wait period	RLT xx Where x = 00 to 99 minutes (or seconds) of wait period
RLx	Actuate a specific relay	RLx <on off> Where x = 1 to 4 or A for All
RLS	Display the Relay states	RLS
RTC	Relay Timer Cancel – stop the timer when in momentary mode	RTC
SER	Display the serial number	SER
SPR	Enable or disable power on restore of relay states	SPR <on off>

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Command	Description	Syntax
TYP	Set the type of time interval desired by the relay timer	TYP <SJM> Where S = Seconds or M = Minutes
VER	Displays the current version of the software loaded	VER
ZZZ	Resets RS232Relay	ZZZ

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7. Software Change History

Table 3 RS232Relay Software History

Version	Date	Major Changes from Previous Loads
1.04	2009/09/01	<ul style="list-style-type: none">• Final production version of software

7.1. Upgrading RS232Relay Software

Midon Design strives to continue to add value to the RS232Relay product and, as a result, we may release new features to the RS232Relay software from time to time. Upgrading RS232Relay is easy. Software updates can be ordered from our web pages. Upon receipt of your new chip containing the upgraded software, return the original chip to Midon Design and cite the order number. If we receive the device back within 30 days of the upgrade order, we will credit your PayPal account with half the price of the upgrade, less shipping costs. Alternatively, you can apply that credit towards a future purchase from Midon Design.

7.2. Upgrade Instructions

1. **Remove power from RS232Relay!**
2. Make sure that you are grounded, or adequately static free.
3. Using a small screw-driver, or similar tool, gently remove U3, the 68HC908KX8 micro-controller, by inserting the screw-driver between the micro-controller and the DIP socket that it is inserted to. The location of U3 is shown in Figure 3.
4. Insert the new micro-controller into the socket. Care should be taken to observe the correct polarity. The end of the micro-controller with a small notch, or a dot in the left corner, should be positioned to be close to resistor R1 as per Figure 3.
5. Make sure that all micro-controller pins are seated in the socket. Check for any pins that may have bent inwards.
6. Restore power to RS232Relay.
7. Enjoy your new features.

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The following figure shows the location for installing the new processor, U3.



Figure 4 RS232Relay Top View

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8. Trouble-Shooting Problems with RS232Relay

The most common problems associated with using RS232Relay are listed in the following table. If these instructions do not result in better results with your RS232Relay, please feel free to contact Midon Design at support@midondesign.com. We would be more than happy to assist you.

Table 4 Common RS232Relay Problems and Resolutions

Problem	Possible Causes
I cannot display RS232Relay output on my PC	Ensure that you are connected with the proper settings (9600 bps, no parity) and that you are using a straight-through, not a null-modem, serial cable
I cannot see what I type on Hyperterm	This is normal for Hyperterm versions that come pre-packaged with some versions of Windows. Upgrade to a commercial version of Hyperterm or use different terminal emulator software. Some versions will allow you to set the "echo local characters" functionality. Review your software's help instructions to determine if it has that capability.
Relays turn off (or on) by themselves	You have enabled Momentary mode. If this is not desired, disable Momentary mode with the <code>MOM Off</code> command.

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9. Error Messages

Table 5 RS232Relay Error Messages

Message	Description
? Entry error	You have made a syntax error in entering a command or a parameter
? Input Timeout	A parameter was not received within 10 seconds of starting a command
? Wait until timer expired	You are in Momentary mode and tried to change a relay before the timer expired. Use the RTC command to cancel the timer and try again, or wait for the timer to expire.
? Command not valid Momentary Relay Action = Off	You are trying to use a relay timer command while MOM is off. Enable MOM.
? EEPROM Error	An error occurred while trying to write to the EEPROM on board. Try your command again. If this error persists, it may indicate a faulty EEPROM. Contact Midon Design if this occurs.

Table 6 Reset Type Messages

Reset Type (hex)	Cause of Reset
02	Low voltage – the power supply fell below spec
04	Monitor Mode reset entry – should never be seen
08	Illegal Address – something in the software caused access to an illegal address. Contact Midon Design
10	Illegal Op Code reset – something in the code happened. If this was not the result of a ZZZ command, contact Midon Design
20	Watchdog timeout. The software was busied out with something. If this occurs too frequently, contact Midon Design
40	User reset – you issued a ZZZ command
80	Power on reset – a normal entry

Binary combinations of the types above are possible and normal. For example, a power up reset will usually result in a type 82 message (Power on reset plus low voltage reset) and a ZZZ reset will result in a type 50 message.

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10. RS232Relay Schematic

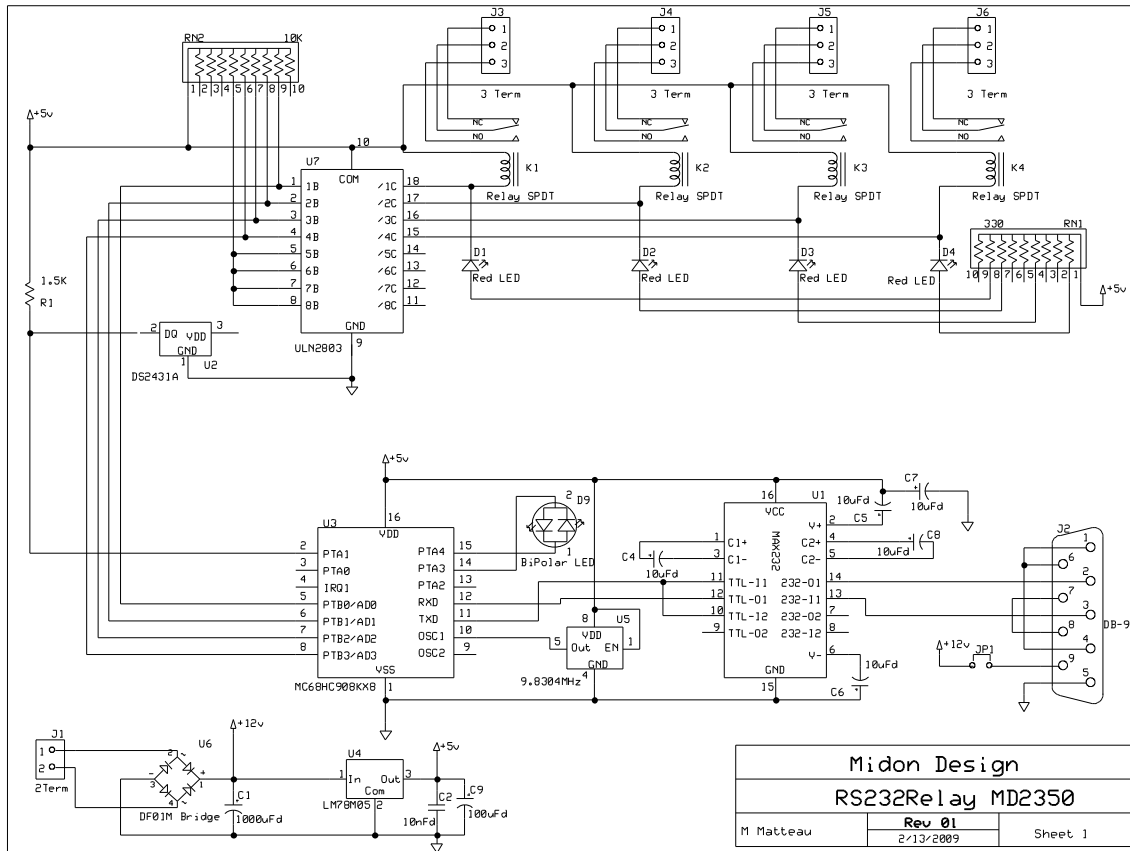


Figure 5 RS232Relay Schematic

Table 7 Bill of Material

Quantity	Designation	Description	Midon Part Number
1	C1	1000uF capacitor	MES1002
1	C2	10nF capacitor	MES0111
5	C4-8	10uF capacitor	MES0121
1	C9	100uF capacitor	MES0124
4	D1-4	Red LED	MES0201
1	D9	Bi-Polar LED	MES1062
1	J1	2 Terminal Screw Connector	MES1089
1	J2	DB-9 RS232 connector	MES1088
4	J3-6	3 Terminal Screw Connector	MES1090
1	JP1	Jumper Header	MES1100
4	K1-4	Relay SPDT	MES1291
1	R1	1.5K Ohm 1/4 Watt resistor	MES0062
1	RN1	330 SIP Resistor	MES1295
1	RN2	10K SIP Resistor	MES1103

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1	U1	MAX232 Serial converter	MES1051
1	U2	DS2431A 1-Wire EEPROM	MES1342
1	U3	MC68HC908KX8 Programmed Microcontroller	MD2353
1	U4	LM78M05 Voltage Regulator	MES1274
1	U5	9.8304MHz Oscillator	MES1272
1	U6	DF01M Full-Wave Bridge	MES1087
1	U7	ULN2803 Relay Driver	MES1289

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