

Operating Temperature & Humidity:

0° to 50° centigrade, 90% Relative (If used outdoors, this device must be installed in a waterproof enclosure).

Parts Listing

These items are included with the units:

Model: S8-RLY-IO-EXT

- 1 - With enclosure
- 1 - AC to 9VDC Wall Transformer adapter



Model: S8-RLY-IO-INT

- 1 - No enclosure
- 1 - With internal power transformer 120VAC 50/60 Hz with terminal block connection.

All Models Require: Order the ‘-S’ versions to include the adapter & cable

- 1 – Custom wired RS232 9 pin Dsub to Modular Cable Adapter (Part number: ADP-MOD)



- 1 – RJ-11 Modular telephone cable (reverse wired) Part Number MC4-7.

Note: The 4-conductor modular cable and modular adapter is not supplied since these relay boards can be used in a single board application or a multi-board application. Only one adapter is needed in both of these configurations.

Setup Instructions

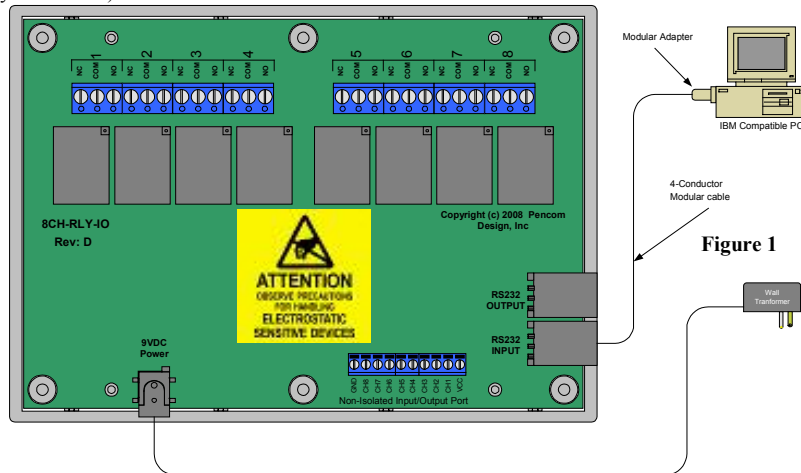
Important: make sure you use the proper modular cables (reverse wired) when connecting the relay boards together.

Board configuration:

Connect the computer, RS232 Modular cable adapter, Modular cables, relay board, and wall transformer as shown in Figure 1. Make sure the cable from the PC is plugged into the RS232 input jack. If your using a board with the internal on-board transformer, this is connected directly to 120VAC with a 3-contact terminal block, instead of the external wall transformer as shown in Figure 1.

Download, install, and run the relay test software on your windows personal computer. Select the correct COM port in the software that’s connected to the relay board.

Plug in the wall transformer or apply power to board (on-board transformer). Make sure the board address in the software is set to “A”. This is the factory default and is normally used in a single board configuration. Click ON one of the relays in the software program and there should be an audible click from the relay selected, and the LED will illuminate (if available on your version).

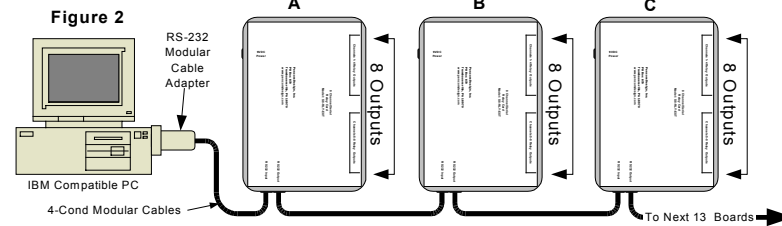


Multiple board configuration:

Connect the boards as specified above. Use the second modular cable and connect the output of the first board to the input of the second board, and each additional board if connected. Each 8-channel relay board has a four position DIP switch. When used in multiple board applications,

the DIP switches are used to uniquely identify each board. Since all the boards are connected to the same serial RS-232 channel, the host computer needs to communicate with each board, without talking to the other boards on the same channel. The board address codes are listed in table 1. Every board must be set to a different address to operate correctly.

The board address code range is between A and P, these letter address codes will be used as part of the command codes when sending serial data from the host to the relay board. The DIP switch is brown in color and located near the RS232 output connector.



Dip Switch Setting				Board Address
1	2	3	4	Address
OFF	OFF	OFF	OFF	A
OFF	OFF	OFF	ON	B
OFF	OFF	ON	OFF	C
OFF	OFF	ON	ON	D
OFF	ON	OFF	OFF	E
OFF	ON	OFF	ON	F
OFF	ON	ON	OFF	G
OFF	ON	ON	ON	H
ON	OFF	OFF	OFF	I
ON	OFF	OFF	ON	J
ON	OFF	ON	OFF	K
ON	OFF	ON	ON	L
ON	ON	OFF	OFF	M
ON	ON	OFF	ON	N
ON	ON	ON	OFF	O
ON	ON	ON	ON	P

Table 1

Connecting Relay Outputs

Remove the six case screws from the back of the relay board (depending on model). Lift off the top cover and the inside will resemble Figure 3.

At the top of the board you will see a row of 3-contact terminal blocks marked with NC, COM, NO these are the relay outputs. Relay numbers are marked next to each terminal block. Warning do not touch any other components on the board since static electricity from your fingers may damage these devices.

Strip the insulation back on your wire approx. ¼ inch. Wire the hot (or positive if DC) side of the power to the COM pin, and the output to the device under control using the NO (normally open) or NC

(normally closed) pins depending on your application. Insert the stripped wire into the side of the terminal block and tighten the screw to clamp the wire in place. The terminal blocks are designed for 14-22 AWG wire size. Do not exceed the 10 amp current rating of the relays. Most applications will use the normally open contacts.

Re-assembly: align the wires with the slot in the case making sure the wires are not crimped by the case. Make sure there is no bare wire extending from the case. Re-assemble with the six screws removed earlier.

8 Channel I/O Port

The I/O port is on the 10 position terminal block. **Warning** these connections are for 5VDC logic only, do not exceed this voltage or damage to the board will result. They are current limited to approx. 12ma. The I/O ports are typically used for dry contacts (switch inputs) or controlling an external device with a 5V input. Use the RTP software on the PC for setup.

Modular Cable Wiring

When routing modular cables, do not place them next to power cables as this will induce noise on the lines and could cause RS232 communication problems. **Important** use only reversed wired modular, **NOT** network /printer/data cables, these are straight wired which may damage the boards.

When you hold the modular connectors together on both ends of the wire with the gold pins facing you, the same color wires are on opposite sides of the connector (the color doesn't matter only the position).

Software

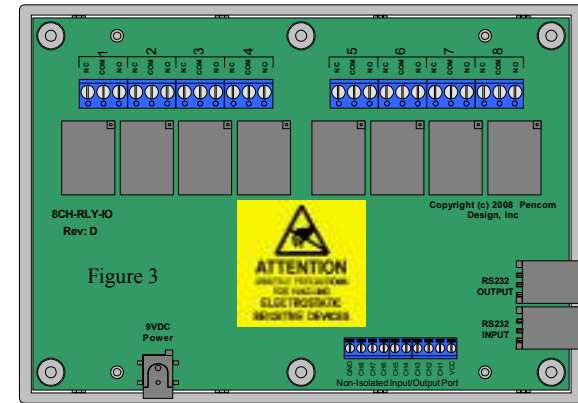
These relay boards can be used with almost any software language that is able to use the PC RS232 serial port. The relay board recognizes standard ASCII characters that are

transmitted from the host computer. Commands are case sensitive.

The commands are transmitted in the following format in one string from left to right:

All the board commands and values explained below may be tested using the relay testing software available for download from our website.

Download app note #156 for additional information on board commands.



Command Structure: “AHI<cr>” (without the quotes) as shown below

“<Board Identification><Board Command><Relay Number or Data><Carriage return>”

Board Identification	Board Commands	Relay Number or Data
This is the letter code shown as the board address in Table 1.	H = Relay HIGH (ON) L = Relay LOW (OFF) R = Read relay status W = Write data latch M = Momentary Delay T = Toggle relay I or a = read port 1 input O or A = Write port1 output	(H or L) = Relay number 1 – 8 or 0 = all relays on selected board (R) = receive a number 0 – 255 (W) = send a number 0 – 255 (O or a) = send a number 0 – 255 (I or a) = receive a number 0 – 255

Board identification:

The board address is the first part of the command sent to the relay board(s) it ranges from A to P as shown in table 1. If your only using one board connected to the PC this command will always stay the same (factory default = A). If your using multiple boards, this part of the command will change depending on which board you want to address. The board address must be sent with any command. Note that all commands are case sensitive.

Example: Dip switch setting = ON-OFF-ON-ON or (1011 in binary) = board address “L”, you would replace the ‘A’ with an ‘L’ to address this board.

Board Commands:

The board command is the second part of the serial data sent to the relay board(s) These commands work in conjunction with the third part of the serial data that will be explained in the following section.

H = Relay High (ON) – Sending an “H” will direct the board to turn ON the relay (making a connection between the NO & COM contacts on the board).

L = Relay High (OFF) – Sending an “L” will direct the board to turn OFF the relay (breaking the connection between the NO & COM contacts on the board).

W = Write data latch – Sending an “W” will write directly to the port latch. This latch is 8 bits wide and corresponds to the number of relays on the board. This command allows you to turn multiple relays ON or OFF on the same board at the same time.

R = Read relay status – This code is a bit different than the three commands above. When this command is sent to the board – the board will respond back to the PC with a number which corresponds to the status of the relays on the board.

M = Momentary Command – This command will briefly activate or deactivate a single relay or all relays. The initial state of the relay will determine whether the relay toggles ON – OFF – ON or OFF – ON – OFF. The momentary delay default is 30 milliseconds, but may be changed from 10-50 milliseconds in the setup.

T = Toggle command - The toggle command will reverse the relay from it’s current position. The initial state of the relay will determine whether the relay toggles ON or OFF.

I or a = Input command – Read the inputs on 8 channel I/O port #1

O or A = Output command – Set the outputs on 8 channel I/O port #1

Relay numbers on board								Decimal	
8	7	6	5	4	3	2	1	Equivalent	
0	1	0	1	0	0	1	0	82	(relays 2,5,7 ON)
1	0	1	0	1	0	1	0	170	(relays 2,4,6,8 ON)
0	0	0	0	0	0	0	0	0	(All relays OFF)
1	1	1	1	1	1	1	1	255	(All relays ON)

Relay Number or Data:

The relay number or data command is the third part of the serial data sent to the relay board(s) this data is numerical. The data that is sent or received will relate directly to the board commands that were explained in the previous section.

If board command is “H” or “L”:

Send a number from 1 to 8 which represents the relay number on the board and will turn ON or OFF the individual relay specified. You may also send a zero which will turn ON or OFF ALL relays on this board.

If board command is “W”:

Send a number from 0 to 255. When this number is converted into binary it represents the relay numbers on the board. This command allows you to turn multiple relays ON or OFF at the same time with one command. Binary data is one’s and zero’s which represents ON and OFF on the relay board (ON = 1 & OFF = 0). See the example in the table above.

Example:

If you wish to turn ON relay 2, 5 & 7 and leave all the others OFF you would send decimal number 82. This will turn ON the proper relays and turn all the rest OFF. Conversion from binary to decimal can easily be accomplished using the scientific calculator built into windows. Select the ‘bin’ check box in the calculator program and enter the binary number from left to right. Click the ‘Dec’ check box and the number will be converted to binary.

If board command is “R”:

Send any number from 0 to 255 (it doesn’t matter it will be ignored). The relay board will immediately respond with decimal number from 0 to 255 representing which relays are active in the same method as explained above.

If the board command is “M”:

Send a number from 1 to 8 which represents the relay number available on the board, and it will momentarily active (or deactivate) the individual relay specified. You may also send a zero which will momentarily active (or deactivate) ALL relays on this board. The initial state of the relay will determine whether it is turned ON or OFF.

If the board command is “T”:

Send a number from 1 to 8 which represents the relay number available on the board, it will reverse the relay from it’s current position on the individual relay. Sending a zero which will toggle ALL relays on this board.

If the board command is “I” or “a”:

Used to read I/O port #1, transmit a zero as the data, and the unit will read the status and reply with a return value of 0-255. Valid data values to send are 0 to 255 decimal, values greater than zero is a mask function and is explained below.

If the board command is “O” or “A”:

Used to write to I/O port #1 when channels are setup as outputs. Valid data values are 0-255. I/O ports are set to inputs at the factory and must be changed in the setup program to use as output ports.

Input Mask:

To read only one or multiple pins you may send a value between 1 & 255, this is a mask that will restrict which of the port pins you wish to read. Example: to read channel 1 you would send a mask of 1 (00000001 in binary) to read this pin only. If this pin is active it will reply with a 1, if this pin is a zero it will respond with a zero. If you want to read channel 8 send a value of 128 (10000000 in binary). If this pin is active it will reply with a 128, if this pin is a zero it will respond with a zero.

If you want to read both channels 7 & 8 you will send a mask of 192 (11000000 in binary). If both pins are zero it will return a zero if pin 8 is active and pin 7 is zero it will return a 128 (10000000 in binary). If pin 7 is one and pin 8 is zero it will return a 64 (01000000 in binary) If both pins are active it will return a 192 (11000000 in binary) showing both pins are active.

Reading the output port status:

To read the status of the output port, follow the procedure for reading the inputs above using the lower case command that matches your output port. The mask may be used to isolate only the status of the output pins you want to read.

To setup the inputs and other features on the board use the Relay Test Program Version 1.04 and newer. Download app note #158 for additional information on the I/O port.

Visual Basic Example

This example transmits data out to the relay board using the MSComm function to turn ON Relay #3 on board address set to “B”.

MSComm1.Output = "B" & "H" & "3" & Chr\$(13)

1. “B” = Board address
2. “H” = Board Command (relay = high)
3. “3” = Relay Number as a string (quotes required), if using it in an equation use str(3).
4. Chr\$(13) = carriage return, this must be sent after each command string.
5. The ampersand “&” operator is used to force string concatenation of the expressions.

Setup the Mscomm properties as follows:

DTREnable = False InBufferSize = 1024 Rthreshold = 1
 EOFEnable = False InputLength = 0 RTSEnable = False
 NullDiscard = True InputMode = 1 Sthreshold = 1
 HandShaking = 0 OutBufferSize = 512 Settings 9600,8,n,1

The following code receives the data from the relay board on the “R” (Read command).

```
Private Sub MSComm1_OnComm()
    'Receive data on the serial port
    Select Case MSComm1.CommEvent
        Case comEvReceive
            Dim buffer As Variant
            Dim Data As String
            buffer = MSComm1.Input
            ShowData (StrConv(buffer, vbUnicode))
    End Select
End Sub
```

```
Private Static Sub ShowData(Data As String)
    'Eliminate carriage returns.
    Do
        i = InStr(Data, Chr$(13))
        If i Then
            Data = Left$(Data, i - 1) & Mid$(Data, i + 1)
        End If
    Loop While i
    'Display data in a text box
    TxtData.Text = Data
End Sub
```

There are numerous software languages that can utilize the PC for serial communications. Information is readily available on the internet and in books explaining how to output to the serial ports, in other languages. We are only showing you one example using the popular graphical language Visual Basic. It’s an easy language to learn and has many powerful features.

Additional information is available online at www.pencomdesign.com/support

Printed in USA

8 Channel RS232 Relay Board W-IO



Model: S8-RLY-IO-EXT (Shown)

Model: S8-RLY-IO-INT

Model: S8-RLY-IO-INT-2

Introduction

Thank you for buying our 8 Channel RS232 controlled Relay Board.

The goal of Pencom Design is to provide top quality equipment at low cost. All of our products are designed, built and tested in-house to meet our high quality standards.

Features

Low cost universal 8 channel serial relay board with heavy duty 10 Amp 240VAC/28VDC SPDT relays, with 8 channel 5V logic (TTL) input/output Port, controlled through one of the PC RS232 serial ports.

The serial relay board is designed for single board operation or multiple board operation on the same serial port. Up to 16 boards may be connected in a daisy chain configuration, with up to 128 - 10 Amp relays and 128 input/output combinations under PC control.

Easy hook up using standard modular telephone cable, for connecting PC to single board and for multiple board configurations. A 9-pin serial to modular cable adapter is required to connect to the PC (Part number: ADP-MOD), available separately, or order the –S version.

Almost any software language that is able to write to the PC serial port and concatenate the string can communicate with this relay board – NO special drivers needed. Simple ASCII commands to control the relays. 4800-38400 (9600 default) baud, 8 bits, no parity, 1 stop bit. Each relay will latch ON or OFF depending on what command is sent and will maintain this position until power is removed or changed again in software.

Two different board design versions are available:

- Circuit board mounted in an enclosure with an external wall transformer.
- Circuit board without an enclosure with internal on-board mounted transformer – for installation in a customers enclosure.

A windows based, relay testing software is available to verify operation, and program the optional features on the relay boards before writing your own software program. See our website to download the software or order on disk.

Applications

- Industrial control applications
- Automatic test equipment (ATE)
- Lighting control equipment
- Process control systems
- Power switching applications

Specifications

Dimensions:

With light gray Enclosure: 6.89” Wide X 4.88” High X 1.52” Deep
 Circuit Board (no enclosure): 6.73” Wide X 4.66” High X 1.412” Deep

Connections:

- 1 RJ-12 Modular phone jack for RS232 input to relay board from PC.
- 1 RJ-12 Modular phone jack for RS232 output to next relay board (daisy chain)
- 8 3 contact Terminal blocks for output connections for 14-22 AWG wire
- 1 10 contact terminal block for 8 channel I/O for 16-26 AWG wire.
- 1 Power Jack for DC wall transformer (external transformer version)
- 1 115VAC or (230VAC) 3-pin Terminal Block (internal transformer version)

Power Requirements:

9 Volts DC @ 1.2 amp wall transformer (Model: S8-RLY-IO-EXT)
 115 VAC (230VAC) 50/60 HZ internal transformer (Model: -INT & -INT-2)

Transmission distance:

PC to relay board & board to board in multiple board configurations:
 Standard RS232 specifications 50 feet, minimum.