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Application Note: 115

How to determine if the serial relay boards will operate with a specific software or operating system.

INTRODUCTION

The family of serial controlled relay boards manufactured by Pencom Design, Inc. were designed to operate on a PC using the Windows operating system. Since these boards respond to the standard 7 bit ASCII commands they should be able to operate with just about any software and hardware that is capable of writing to a com port. This includes terminals and pocket type computers or other devices that have a standard serial port, and many different types of software, such as Basic, 'C', Java, Perl, etc.. The only requirement is that the software you intend to utilize needs to be able to concatenate the ASCII commands, and send a carriage return when transmitting the data out the serial port.

This document will explain how to test if your operating system or software can be used to operate our relays boards in your application before purchase.

TEST REQUIREMENTS

To test whether your software will operate, requires that either your test computer has two serial ports, or your test computer is connected to a IBM compatible PC utilizing Windows and the built-in HyperTerminal communications software. See Figure 1 for an example. You may also substitute another terminal communications program if you prefer.

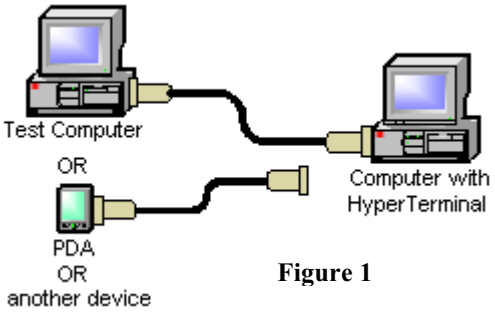

Figure 1

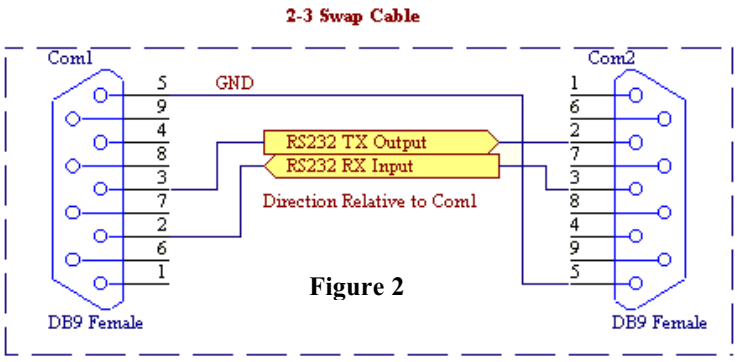

Figure 2

From PC Com1 to PC Com2
Or from one PC to a Com port on a second computer

You will also need a 2-3 swap cable to connect the 2 communication ports together. This cable can be easily built using Figure 2 as an example or contact Pencom for a standard IBM compatible PC type 2-3 swap cable that uses a modular cable and adapters.

If you are connecting two serial ports on the same computer you will need a multitasking operating system (Windows, Unix, Linux, etc.) that will allow your program & the terminal program to operate at the same time. Otherwise you will need to use a second computer and connect the com ports together.

As an example we will use our Relay Test Software and Windows HyperTerminal in two separate windows as shown in Figure 3 on the following page.

Make sure HyperTerminal is set to direct connection to com2 and the port setting is 9600 Baud 8-N-1 as shown at the bottom of terminal window. Emulation should be set to ANSI.

Verify the Relay Test Program (RTP) is set to Com1 as shown. Click on a switch to activate a relay and the command will be displayed in HyperTerminal as shown. If nothing is displayed in the terminal

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window, check the wiring connections, and verify the port settings are correct.

Now close the RTP and start your own software in your language of choice. Send the same command out the serial port on Com1 and verify that the data is the identical. When sending multiple commands one right after another, allow a slight delay between commands (10-20 milliseconds) to allow the serial routine to complete on the relay boards.

Note: When sending the command that is displayed in the terminal window "AH 5" this data will stay on this line (not jump down to the second line) when another switch or command is sent. If the data jumps to the next line you may be sending a <LF> line feed instead of a <CR> carriage return at the end of the command.

If the data jumps down to the next line when using our RTP software, HyperTerminal is incorrectly set up to add a line feed to receiving data, the can be changed in File>Propertys>Settings>ASCII Setup window. Deselect the box labeled "Append line feeds to incoming line ends"

When using two computers the procedure is the same, but if your computer transmitting the board commands is using an operating system other than windows, our RTP software will not operate.

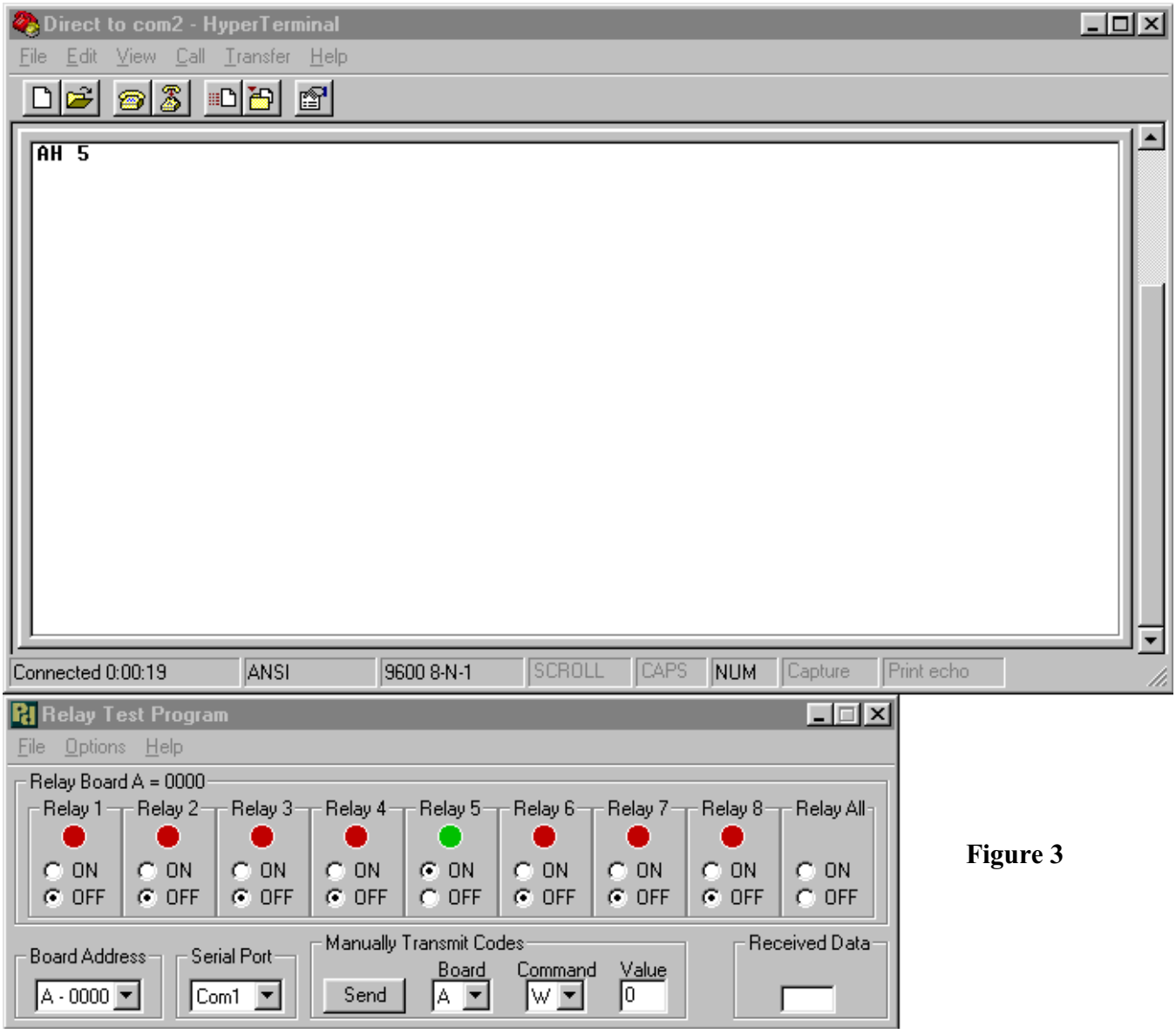

Figure 3

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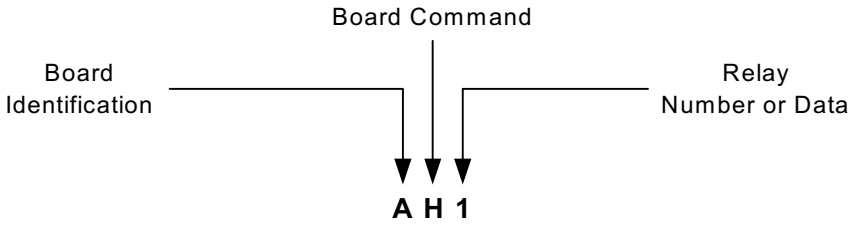
ASCII COMMAND STRUCTURE

All the relay board versions recognize standard 7 Bit ASCII characters that are transmitted from the host computer. The commands are transmitted in the following format in one string front left to right:

ALL commands must be in uppercase.

If you are using the Windows operating system, all the board commands and values explained below may be tested using the relay test software available for download from our website.

Board identification:



Board Identification
This is the letter code shown as the board address in Table 1 for the 8 channel boards.

The 1 & 2 channel boards are preset in software to address 'A' and cannot be changed.

Board Commands
H = Relay HIGH (ON)
L = Relay LOW (OFF)
R = Read relay status
W = Write data latch

Relay Number or Data
(H or L) = Relay number 1 – 8
or 0 = all relays on selected board
(R) = receive a number 0 – 255
(W) = write a number 0 - 255

The board address is the first part of the command sent to the relay card(s) it ranges from A to P as shown in table 1. If your only using one card or the 1 & 2 channel versions 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 must be in uppercase.

Example: Dip switch setting = ON-OFF-ON-ON or (1011 in binary) = board address "L", you would replace the 'A' with a 'L' to address this board.

Dip Switch Setting				Board
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

Board Commands:
The board command is the second part of the serial data sent to the relay card(s) These commands work in conjunction with the third part of the serial data that will be explained in the following section. There are four different board commands as explained below:

H = Relay High (ON) – Sending an "H" will direct the card 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 card to turn OFF the relay (breaking the connection between the NO & COM contacts on the board).

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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. This will be explained in more detail below:

Relay Number or Data:

The relay number or data command is the third part of the serial data sent to the relay card(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 available 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"**: (for the 8 channel board)

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 card (ON = 1 & OFF = 0). See the example below.

Relay numbers on board								Decimal	Relays Active
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)

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 card will immediately respond with decimal number from 0 to 255 representing which relays are active in the same method as explained above.

Note: If you are using the 1 or 2 channel relay boards these units will only respond with a number representing to the maximum relays available on the board.

- 1 channel relay board maximum valid number returned is 1
- 2 channel relay board maximum valid number returned is 3

If you need any additional information contact support@pencomdesign.com

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