

USER MANUAL

MODEL 2003 RS-232/RS-485 Keyboard Adapter



PATTON
Electronics Co.



*An ISO-9001
Certified Company*

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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 2003 components to be free from defects, and will--at our option--repair or replace the product should it fail within one year from the first date of shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse, or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall **Patton Electronics** be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings, and incidental or consequential damages arising from the use of or inability to use this product. **Patton Electronics** specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

1.1 RADIO AND TV INTERFERENCE

The Models 2003 generates and uses radio frequency energy, and if not installed and used properly--that is, in strict accordance with the manufacturer's instructions--may cause interference to radio and television reception. The Model 2003 has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the Model 2003 does cause interference to radio or television reception, which can be determined by disconnecting the RS-232 or TTL interface, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

1.2 CE NOTICE

The CE symbol on your Patton Electronics equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

2.0 GENERAL INFORMATION

1.3 SERVICE

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Support: **(301) 975-1007**; <http://www.patton.com>; or, **support@patton.com**.

NOTE: Packages received without an RMA number will not be accepted.

Patton Electronics' technical staff is also available to answer any questions that might arise concerning the installation or use of your Model 2003. Technical Support hours: **8AM to 5PM EST, Monday through Friday**.

Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. If any questions or problems arise during installation or use of this product, please do not hesitate to contact Patton Electronics Technical Support at (301)-975-1007.

2.1 FEATURES

- Tap into a PC keyboard port—with RS-232 or RS-485—while retaining use of the existing keyboard !
- Both RS-232 and RS-485 interfaces included in the same unit
- Multidrop up to 54 addressable Model 2003 adapters in RS-485 environments
- Supports data rates of 1200, 2400, 4800 and 9600 bps
- Monitor Mode facilitates keyboard activity monitoring
- Translates ASCII, Hex, Binary, Key Scan Codes and DOS Scan Codes
- No AC power required—draws all necessary operating power from interfaces

2.2 DESCRIPTION

The **Patton Model 2003** RS-232 or RS-485 to keyboard adapter lets you tap into a PC keyboard port with an RS-232 or RS-485 serial interface, while retaining use of the keyboard. Supporting data rates up to 9600 bps, the Patton Model 2003 has a myriad of applications: simulate keystrokes for software testing, use one RS-485 host to simultaneously control the testing of up to 54 (RS-485) target systems, monitor keyboard activity (Monitor Mode), “add” an RS-232 or RS-485 port to a PC, or connect a keyboard to an RS-232 or RS-485 port.

The Patton Model 2003 is equipped with one DB-25 (female) port for RS-232 or RS-485 device connection, plus two DIN-5 ports for input/output connection of an AT keyboard. No AC power or batteries are required for operation.

3.0 CONFIGURATION

2.0 APPLICATIONS

Model 2003 allows you to connect an RS-232 or RS485 computer port to another computer's keyboard port while still using the keyboard. Typical applications are for:

- **Software Testing** With the help of a Model 2003, you can develop a sequence of keystrokes and send them to the keyboard port of a computer running the software that you want to test. You can do this without having to add any software or ports to the computer system you are testing.
- **Multi-System testing** Using the multi-drop capability of the Model 2003 keyboard port adapter allows centrally controlled testing of up to 58 systems simultaneously. Only the Model 2003 port adapter allows such flexibility.
- **Remote Access** The Model 2003 keyboard port adapter allows remote access to a system where the software does not provide any other method.
- **Monitoring Keyboard Sessions** The Model 2003 can be used to monitor keyboard sessions. This can be helpful to develop regression test data or to detect keystrokes that are causing problems with target software. Attach a Keyboard to your Computer's RS-232 Port - You can use the Model 2003 to send and receive from a Keyboard attached to an RS-232 port.

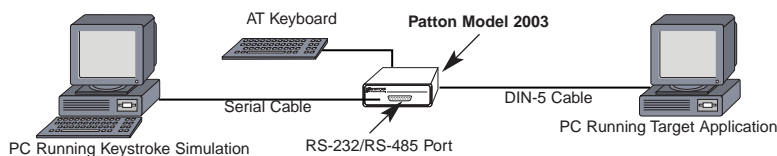


Figure 1. Software testing using a PC program to simulate keystrokes:

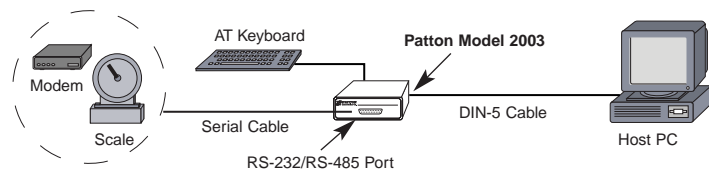


Figure 2. Creating an "extra" RS-232 or RS-485 port for a remote input device

The Model 2003 is easy to install and is ruggedly designed for excellent reliability. The following instructions will help you to properly configure the Model 2003.

3.1 CONFIGURATION SWITCHES

The Model 2003 has eight DIP switches that you may use to set the port address and the bit rate. These externally accessible switches located on the front of the Model 2003 as shown in Figure 3, below.

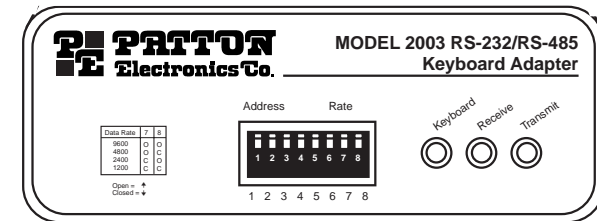


Figure 3. Model 2003 Front Panel Switches

Figure 4 shows the orientation of the DIP Switches with respect to Open and Closed positions.

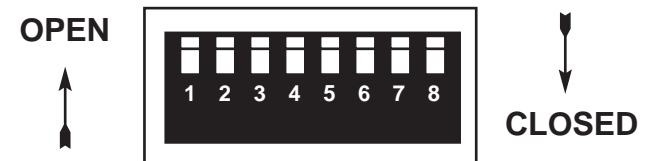


Figure 4. Close-up of DIP Switches Showing Open and Closed Positions

3.1.1 Address Configuration Switches (S1 through S6)

Switches S1-S6 allow you to set an address for the Model 2003. You must set an address for each Model 2003 configured in a multidrop topology. To set a 2003 address, choose an address from the left-most column of Table 1. Then configure Switches S1-S6 according to the the OPEN or CLOSED settings in the same row.

Table 1. Model 2003 Address Settings						
ADDRESS	SWITCH SETTINGS					
	1	2	3	4	5	6
None	Open	Open	Open	Open	Open	Open
1	Closed	Open	Open	Open	Open	Open
2	Open	Closed	Open	Open	Open	Open
3	Closed	Closed	Open	Open	Open	Open
4	Open	Open	Closed	Open	Open	Open
5	Closed	Open	Closed	Open	Open	Open
6	Open	Closed	Closed	Open	Open	Open
7	Closed	Closed	Closed	Open	Open	Open
8	Open	Open	Open	Closed	Open	Open
9	Closed	Open	Open	Closed	Open	Open
10	Open	Closed	Open	Closed	Open	Open
11	Closed	Closed	Open	Closed	Open	Open
12	Open	Open	Closed	Closed	Open	Open
13	Closed	Open	Closed	Closed	Open	Open
14	Open	Closed	Closed	Closed	Open	Open
15	Closed	Closed	Closed	Closed	Open	Open
16	Open	Open	Open	Open	Closed	Open
17	Closed	Open	Open	Open	Closed	Open
18	Open	Closed	Open	Open	Closed	Open
19	Closed	Closed	Open	Open	Closed	Open
20	Open	Open	Closed	Open	Closed	Open
21	Closed	Open	Closed	Open	Closed	Open
22	Open	Closed	Closed	Open	Closed	Open
23	Closed	Closed	Closed	Open	Closed	Open
24	Open	Open	Open	Closed	Closed	Open
25	Closed	Open	Open	Closed	Closed	Open
26	Open	Closed	Open	Closed	Closed	Open
27	Closed	Closed	Open	Closed	Closed	Open
28	Open	Open	Closed	Closed	Closed	Open
29	Closed	Open	Closed	Closed	Closed	Open

Table 1. Model 2003 Address Settings (continued)						
ADDRESS	SWITCH SETTINGS					
	1	2	3	4	5	6
30	Open	Closed	Closed	Closed	Closed	Open
31	Closed	Closed	Closed	Closed	Closed	Open
32	Open	Open	Open	Open	Open	Closed
33	Closed	Open	Open	Open	Open	Closed
34	Open	Closed	Open	Open	Open	Closed
35	Closed	Closed	Open	Open	Open	Closed
36	Open	Open	Closed	Open	Open	Closed
37	Closed	Open	Closed	Open	Open	Closed
38	Open	Closed	Closed	Open	Open	Closed
39	Closed	Closed	Closed	Open	Open	Closed
40	Open	Open	Open	Closed	Open	Closed
41	Closed	Open	Open	Closed	Open	Closed
42	Open	Closed	Open	Closed	Open	Closed
43	Closed	Closed	Open	Closed	Open	Closed
44	Open	Open	Closed	Closed	Open	Closed
45	Closed	Open	Closed	Closed	Open	Closed
46	Open	Closed	Closed	Closed	Open	Closed
47	Closed	Closed	Closed	Closed	Open	Closed
48	Open	Open	Open	Open	Closed	Closed
49	Closed	Open	Open	Open	Closed	Closed
50	Open	Closed	Open	Open	Closed	Closed
51	Closed	Closed	Open	Open	Closed	Closed
52	Open	Open	Closed	Open	Closed	Closed
53	Closed	Open	Closed	Open	Closed	Closed
54	Open	Closed	Closed	Open	Closed	Closed
55	Closed	Closed	Closed	Open	Closed	Closed
56	Open	Open	Open	Closed	Closed	Closed
57	Closed	Open	Open	Closed	Closed	Closed
58	Open	Closed	Open	Closed	Closed	Closed
*59	Closed	Closed	Open	Closed	Closed	Closed

*Special Setting 59: Puts Model 2003 in immediate mode with address of zero (no address).

3.1.2 Bit Rate Switches (S7 and S8)

Set Switches S7 and S8 together to determine the bit rate (in bits per second) of the Model 2003.

<u>S7</u>	<u>S8</u>	<u>Bit Rate</u>
Open	Open	9600 bps
Closed	Open	4800 bps
Open	Closed	2400 bps
Closed	Closed	1200 bps

3.2 CONFIGURATION STRAPS

In addition to the configuration switches described above, the Model 2003 also has two internal straps: One that set the RS-232 or RS-485 Operation; and, one that determines whether the keyboard connection passes through the 2003, or connects between devices in parallel. In order to configure these straps, you must open the Model 2003 case.

NOTE: Before opening the case, determine whether the default settings are correct for your application (see Sections 3.2.3 and 3.2.4)

3.2.1 Opening the Case

To open the Model 2003 insert a large flat head screwdriver into an open slot on either side of the case, as in Figure 5.



Figure 5. Using a Large Flat Blade Screwdriver to Open the Plastic Case

Twist the screwdriver head slightly and the top half of the case will separate from the lower half, as in Figure 6, below.

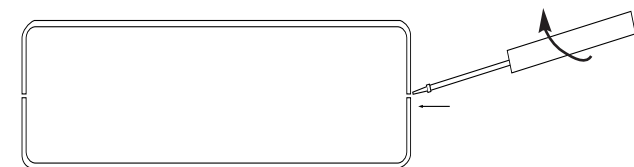


Figure 6. Using a the Screwdriver to Open the Plastic Case

To close the case, fit the 2 halves together snugly and snap them back in place.

3.2.2 Jumpers K1 and K2

The internal jumpers mounted on the Model 2003's PC board (labeled K1 - K2) are used to configure the RS-232/RS-485 operation and keyboard operation. Figure 7 (below) shows the location of the Model 2003's jumpers on the internal PC board.

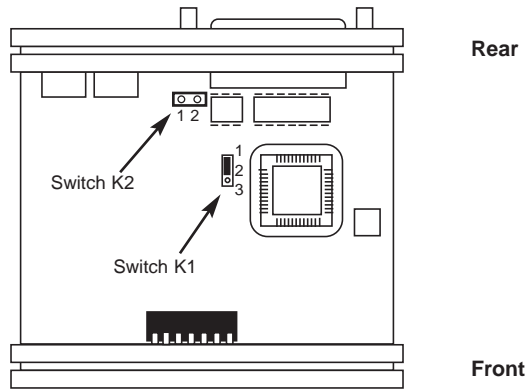


Figure 7. Jumpers K1 and K2 on the top of Model 2003 pc board

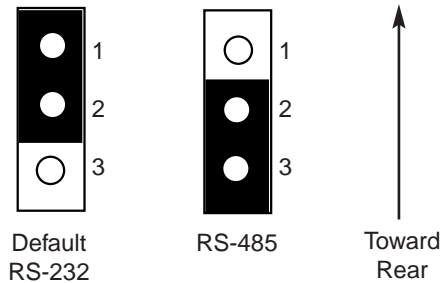


Figure 8. Possible strap positions for jumper K1

Jumper K1: RS-232 or RS-485 Interface

This setting determines whether the the DB-25 operates according to the RS-232 standard or the RS-485 standard.

K1	Setting
1 & 2	RS-232 Operation (<i>default position</i>)
2 & 3	RS-485 Operation

Jumper K2: Power via DB-25 Pin 9

Normally, the Model 2003 operates on +5V supplied by the 6 pin computer's Mini-DIN keyboard interface. You may also supply operating voltage to pin 9 on the DB-25 connector if you don't connect the computer's Mini-DIN keyboard interface. However, most computers already supply voltage on pin 9. **DO NOT** connect this jumper unless you are not connecting the computer keyboard port AND the RS-232 device does not supply power.

K2	Setting
Strap On	Connects +5V from the RS-232 device to pin 9 of the DB-25 connector
Strap Off	Disconnects pin 9 on the DB-25 connector (<i>default position</i>)

WARNING!! +5V is normally provided by the PC. DO NOT connect to another +5V source if the PC provides power. This can result in damage to the RS-232 device and to connecting equipment.

4.0 INSTALLATION

The Model 2003 is typically installed by connecting the DB-25 port to a computer or terminal, the keyboard port to a keyboard, and the computer port to a computer's keyboard port. This section describes connection procedures.

There are three data ports on the rear panel of the Model 2003 -- an RS-232/RS-485 female DB-25 port, a Keyboard port, and a computer port (see Figure 9, below).

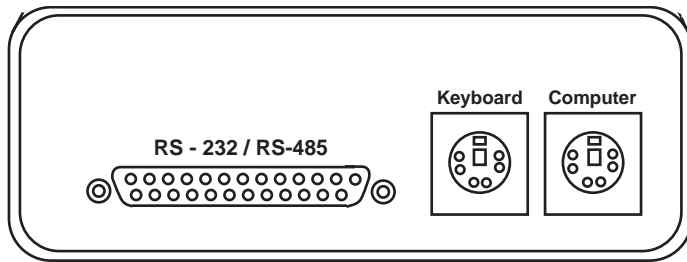


Figure 9. Connection ports on the rear panel of Model 2003

4.1 CONNECTING RS-232/RS-485 DEVICES

When the DB-25 port of the Model 2003 is configured as an RS-232 port, it looks like DCE (Data Circuit-Terminating Equipment). Therefore, the Model 2003 serial port will connect directly to a DTE (Data Termination Equipment) The following pinout diagram shows the signal directions of the pins on the interface.

Pin#	Description	Direction
1	Protective Ground	N/A
2	Transmit Data	RS-232 Input to 2003
3	Receive Data	RS-232 Output from 2003
4	Request to Send	RS-232 Input to 2003
5	Clear to Send	RS-232 Output to 2003
6	Data Set Ready	RS-232 Output to 2003
7	Signal Ground (common return)	
8	Carrier Detect	RS-232 Output from 2003
9	+5VDC	RS-232 Input
14	Transmit Data/Receive Data	RS-485 Input+/Output+
16	Transmit Data/Receive Data	RS-485 Input-/Output-
20	Data Terminal Ready	RS-232 Input to 2003

4.1.1 Connecting RS-232 Terminal Equipment

The diagrams below show pin connections between the Model 2003's serial port and a standard RS-232 serial interfaces. You may use these diagrams to construct your own cables, or you may purchase pre-made cables from Patton Electronics.

PC/XT™ to Model 2003 Pin-Outs

Serial DB-25 (DTE) Pin No.	Model 2003 DB-25 (DCE) Pin No.
1 (FG)	1
2 (TD)	2
3 (RD)	3
4 (RTS)	4
5(CTS)	5
6 (DSR)	6
7 (SG)	7
8 (CD)	8
20(DRT)	20

PC/AT™ to Model 2003 Pin-Outs

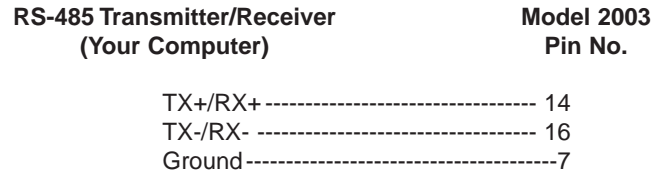
Serial DB-9 (DTE) Pin No.	Model 2003 DB-25 (DCE) Pin No.
1 (CD)	8 (CD)
2 (RD)	3 (RD)
3 (TD)	2 (TD)
4 (DTR)	20 (DTR)
5 (SG)	7 (SG)
6 (DSR)	6 (DSR)
7 (RTS)	4 (RTS)
8 (CTS)	5 (CTS)
9 (n/c)	

5.0 OPERATION

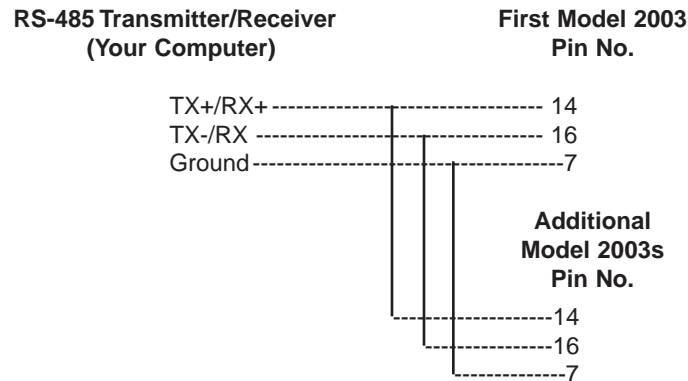
4.1.2 Connecting RS-485 Terminal Equipment

The diagrams below show pin connections between the Model 2003's RS-485 half-duplex serial interface and a typical RS-485 serial interfaces. You may use these diagrams to construct your own cables, or you may purchase pre-made cables from Patton Electronics.

Point-To-Point Connection



Multi-Point Connection



4.2 CONNECTING THE COMPUTER/KEYBOARD PORTS

To connect the computer and keyboard's ports, follow these steps:

1. Connect the keyboard's 6-Pin Mini-DIN connector to the keyboard port on the Model 2003.
2. Connect the enclosed 6-Pin Mini-DIN cable between the port labeled "Computer" on the Model 2003 to the Target PC's Keyboard DIN port.

5.1 COMMAND/DATA ENTRY

The Model 2003's main job is to accept data from the RS-232 or RS-485 port and send it through to another computer's keyboard port. However you may also enter configuration commands to the Model 2003. You may send data or commands in the following forms:

1. ASCII;
2. ASCII control codes;
3. DOS scan codes;
4. Keyboard scan codes;
5. ASCII Hexadecimal.

Commands are instructions to the Model 2003 to do something other than just pass data through to the computer. All commands begin with a ~ (tilde, hex 7E) character followed by a command character and in some cases, some data.

```
: ~C<ENTER>    {Sets Model 2003 to Character Mode}
: DIR^M<ENTER> {Sends DOS a directory command}
```

5.1.1 Command Entry Rules

Commands have some restrictions based upon the Model 2003 operating Model (See Section 5.2 for Operating Modes). These rules are listed below:

Rule #1. You may string commands together in one command line, and separate commands with spaces. This will occur before you press <ENTER/CR>.

Rule #2. Each command line must end with an <ENTER/CR>. The Model 2003 will not begin command execution until it receives a carriage-return character.

Rule #3. If you turn on line turn around (~L Command) or set an address on the Model 2003 if the Model 2003 is addressed, a line can have a maximum length of 46 characters and should end with an <ENTER> (CR, hex 0D).

Rule #4. In the case when immediate turn around is set, data and commands are interpreted as received, and buffered up to 30 characters.

Rule #5. If you get more than 30 characters ahead of the computer, the additional characters will be tossed.

Rule #6. Characters are not echoed when the Model 2003 is addressed.

Rule #7. If line turn around is set or if the Model 2003 is addressed, a colon is sent back acknowledging the data sent.

Rule #8. After receiving an addressed message, a colon is sent back immediately.

Rule #9. If not addressed but line turn around is set, a colon is sent back after the data has been processed, signaling that another command can be sent.

5.2 OPERATING MODES

Four operating mode commands set the way Model 2003 interprets incoming data. Once set, the Model 2003 operating mode stays the same until you change it or until a power failure occurs.

~C Character Mode - is the default mode of operation. When this mode is set, any ASCII character except ~ (tilde, hex 7E), ^ (caret, hex 5E), and CR (return, hex 0D) is converted to the scan codes for that character. Each ASCII character will be sent to the keyboard with the corresponding make and release codes. Allow enough time for the codes to be sent through to the computer, as an ASCII code can require up to 10 keyboard codes to execute. (*default operating mode*)

Control codes may be sent by a combination of a ^ (caret, hex 5E), and the corresponding letter. For example, a control C (Hex 03) is ^C.

~H Hex ASCII Mode - Data is interpreted as hexadecimal encoded ASCII. For example, to send the computer the character 'A', you would need to send its hexadecimal ASCII value (Hex 41) as two ASCII digits, 4 and 1.

~S Scan Code Mode - In this mode, data is translated to the corresponding keyboard scan codes. For an ASCII transfer, each pair of ASCII encoded characters is interpreted as a DOS scan code. For a binary transfer, each 8 bit character is interpreted as a DOS scan code. DOS assigns each key a DOS scan code. Note that all DOS scan codes are sent complete with make and break sequences.

~K Key Code Mode - In this mode, codes are sent directly to the computer without interpretation. For an ASCII transfer, each pair ASCII encoded characters is interpreted as a keyboard code. For a binary transfer, each 8 bit character is interpreted as a keyboard code. Care should be taken in using keyboard scan codes, as the computer can be left in a very confused state if the scan code sequence is not properly completed.

5.3 DATA TRANSFER COMMANDS

~A ASCII Transfer - Default setting. If ASCII transfer is set, all data is interpreted as ASCII.

~B Binary Transfer - In scan code (~S) or key code (~K) modes. Data is sent as 8 bit binary

5.4 KEYBOARD COMMANDS

~Dnn Set/Clear Keyboard LEDs - Use this command to turn on or off local keyboard LED indicators. The nn field is an ASCII hex encoded binary field, where:

b0 = Scroll Lock

b1 = Num Lock

b2 = Caps Lock

Examples: **~D01** Scroll Lock on, Caps & Num Lock off
 ~D04 Caps Lock on, Scroll & Num Lock off
 ~D00 Turns off all LEDs

~Xnn Send Data to Keyboard - Use this command to send the ASCII hex encoded byte nn to the keyboard. This command requires technical knowledge of the keyboards.

5.5 TURN AROUND COMMANDS

~I Immediate Turn Around - Data is interpreted 'on-the-fly'. Special address switch setting of 59 makes this default for non-addressed mode. Note that in this mode <ENTER/CR> (Hex 0D) is not a special character, and passed on to the computer.

~L Line Turn Around - Set Model 2003 to a line oriented basis, each line ending with an <ENTER/CR> (Hex 0D).

~Pnn Set Turn Around Delay (nn milliseconds) - This sets the delay that the Model 2003 waits before sending data in response to a command. The default setting in non-addressed mode is 0, and in addressed mode the default setting is 3 milliseconds. (NOTE: You must send two digits, i.e. for 7 milliseconds, send **~P07**)

5.6 KEYBOARD MONITOR COMMANDS

~M Monitor ON - Turns keyboard monitor on

~N Monitor OFF - Turns keyboard monitor off

5.7 OTHER COMMANDS

~T Test Model 2003 - This command to the Model 2003 causes it to undergo tests to validate the keyboard and computer interface. You will see the keyboard LED's cycle, testing the keyboard interface. You should see on the PC screen:

TEST:7 (With the number cycling from 0-7)

The serial port displays:

Test: <ENTER> to stop

The test runs until <ENTER> is received.

~? Request Status - The format of the response is:

AA-EEDDMBTV where

AA is the address setting

- is a dash character, Hex 2D

EE is a error status:

00-No Errors 01-Parity Error

02-Framing Error 03-Parity and Framing

DD LED status (bit field -0=OFF, 1=ON

b0-Scroll lock b1=Num Lock b2=Caps

Lock

M Mode setting (~C, ~H, ~K, or ~S)

B Binary or ASCII Transfer Setting (~A or ~B)

T Turn Around Setting (~I or ~L)

V Monitor Setting (~M or ~N)

5.8 MULTIDROP OPERATION

If the DIP switch address setting is not zero, Model 2003 looks for an address select prefix to any buffer received. The address must be the first byte of the transmission and the high bit set. Address 1 is hex 81, Address 2 is hex 82, etc. If you send a command to address 80, all Model 2003s will read the command.

When sending data to the Model 2003 in multi-drop mode, the Model 2003 will return a single byte colon character when it receives the message. This does not mean that you can send another buffer can be sent but rather that the Model 2003 received the message and the host can go on to talk to other devices. If a proper delay cannot be assured, you should poll the device until it responds before sending another buffer.

5.9 LED INDICATORS

The Model 2003 features three front panel LEDs that monitor data activity on the keyboard and RS-232/RS-485 ports. Figure 10 shows the front panel location of each LED. Following Figure 10 is a description of each LEDs function.

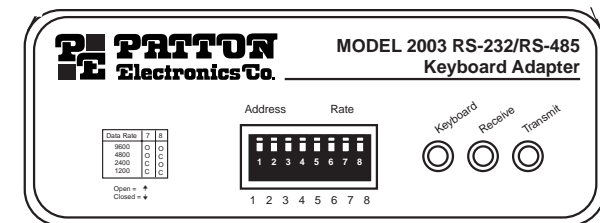


Figure 3. Model 2003 Front Panel Switches

Keyboard

Turns solid yellow when the keyboard is sending to the Computer. Blinks whenever the Model 2003 is processing a command from the RS-232/485 port. If Model 2003 is set with an address, the LED blinks yellow when it receives its address.

Receive

Blinks red when Model 2003 receives data or commands on the RS-232/RS-485 port.

Transmit

Blinks green when Model 2003 transmits data through the RS-232/RS-485 port.

APPENDIX A

**PATTON ELECTRONICS MODEL 2003
SPECIFICATIONS**

Transmission Format:	Asynchronous, half duplex
Data Rates:	1200, 2400, 4800 and 9600 bps
Serial Interface:	RS-232 or RS-485 (jumper selectable)
Connectors:	RS-232 and RS-485 (DB-25F) Two Mini-DIN 6 pin Connectors: (1) to keyboard (2) to computer
LED Indicators:	Keyboard, Receive, and Transmit
Codes Accepted:	Character, HEX ASCII, Scan Code, and Key Code
Multiple Drops:	Supports 58 addressable units in an RS-485 multipoint environment
Data Turnaround Modes:	Line Oriented or Immediate
Power Supply:	Interface Powered, obtains operating power from data and control signals
Temperature Range:	32 to 122°F (0 to 50° C)
Dimensions:	1.58"H x 4.16"W x 3.75"D (10.6 x 4.1 x 8.8 cm)

APPENDIX B

**PATTON ELECTRONICS MODEL 2003
SCAN CODES**

AT SCAN CODE	2003 SC CODE	KEY	KEYBOARD SCAN CODES
01	01	ESC	76 F0 76
02	02	1/!	16 F0 1E
03	03	2/@	1E F0 1E
04	04	3/#	26 F0 26
05	05	4/\$	25 F0 25
06	06	5/%	2E F0 2E
07	07	6/^	36 F0 36
08	08	7/&	3D F0 3D
09	09	8/*	3E F0 3E
10	10	9/(46 F0 46
11	11	0/)	45 F0 45
12	12	-/_	4E F0 4E
13	13	=/+	55 F0 55
14	14	Backspace	66 F0 66
15	15	Tab	0D F0 0D
16	16	Q	15 F0 15
17	17	W	1D F0 1D
18	18	E	24 F0 24
19	19	R	2D F0 2D
20	20	T	2C F0 2C
21	21	Y	35 F0 35
22	22	U	3C F0 3C
23	23	I	43 F0 43
24	24	O	44 F0 44
25	25	P	4D F0 4D
26	26	[{/	54 F0 54
27	27]}	5B F0 5B
28	28	Enter	5A F0 5A
28	A0	KeypadEnter	E0 5A E0 F0 5A
29	29	LefCtrl	14 F0 14
29	A1	RightCtrl	E0 14 E0 F0 14
29+69	A2	PAUSE	E1 14 77 E1 F0 14 F0 77
30	30	A	1C F0 1C
31	31	S	1B F0 1B
32	32	D	23 F0 23
33	33	F	2B F0 2B

APPENDIX B

PATTON ELECTRONICS MODEL 2003
SCAN CODES (continued)

AT SCAN CODE	2003 SC CODE	KEY	KEYBOARD SCAN CODES
33	33	F	2B F0 2B
34	34	G	34 F0 34
35	35	H	33 F0 33
36	36	J	3B F0 3B
37	37	K	42 F0 42
38	38	L	4B F0 4B
39	39	;/	4C F0 4C
40	40	'"	52 F0 52
41	41	~/	0E F0 0E
42	42	LeftShift	12 F0 12
43	43	\	5D 50 5D
44	44	Z	1A F0 1A
45	45	Z	22 F0 22
46	46	C	21 F0 21
47	47	V	2A F0 2A
48	48	B	32 F0 32
49	49	N	31 F0 31
50	50	M	3A F0 3A
51	51	,/<	41 F0 41
52	52	,/>	49 F0 49
53	53	//?	4A F0 4A
53	93	/	E0 4A E0 F0 4A
54	54	RightShift	59 F0 59
55	55	*	7C F0 7C
55	A4	PRT SCRN	E0 12 E0 7C E0 F0 7C E0 F0 12
56	A5	RightAlt	11 F0 11
57	57	Space	E0 11 E0 F0 11
58	58	Caps Lock	29 F0 29
59	59	F1	58 F0 58
60	60	F2	05 F0 05
61	61	F3	06 F0 06
62	62	F4	0C F0 0C
63	63	F5	03 F0 03
64	64	F6	0B F0 0B
65	65	F7	83 F0 83
66	66	F8	0A F0 0A

APPENDIX B

PATTON ELECTRONICS MODEL 2003
SCAN CODES (continued)

AT SCAN CODE	2003 SC CODE	KEY	KEYBOARD SCAN CODES
67	67	F9	01 F0 01
68	68	F10	09 F0 09
69	69	NUM LOCK	77 F0 77
70	70	SCROLL LOCK	7E F0 7E
71	71	HOME	E0 6C E0 F0 6C
71	A6	Keypad Home/7	C6 F0 6C
72	72	Up Arrow	E0 12 E0 75 E0 F0 75 E0 F0 12
72	A7	KeypadUpArrow/8	75 F0 75
73	73	Page Up	E0 7D E0 F0 7D
73	A8	Keypad PageUp/9	7D F0 7D
74	74	-	7B F0 7B
75	75	LeftArrow	E0 12 E0 6B E0 F0 6B E0 F0 12
75	A9	KeypadLeftArrow/4	6B F0 6B
76	76	05	73 F0 73
77	77	RightArrow	E0 12 E0 74 E0 F0 74 E0 F0 12
77	B0	KeypadRt.Arrow/6	74 F0 74
78	78	+	79 F0 79
79	79	End	E0 12 E0 69 E0 F0 69 E0 F0 12
79	B1	End/1	69 F0 69
80	80	Down Arrow	E0 12 E0 72 E0 F0 72 E0 F0 12
80	B2	KeypadDnArrow/2	72 F0 72
81	81	Page Down	E0 12 E0 7A E0 F0 7A E0 F0 12
81	B3	Keypad PageDown/3	7A F0 7A
82	82	Insert	E0 70 E0 F0 70
82	B4	Ins/0	70 F0 70
83	83	Delete	E0 12 E0 71 E0 F0 72 E0 F0 12
83	B5	KeypadDel/.	71 F0 71
84		Undefined	
85		Undefined	
86		Undefined	
87	87	F11	78 F0 78
88	88	F12	07 F0 07
89		Undefined	
90	90	Left Window	E0 5B E0 F0 5B
91	91	Right Window	E0 5C E0 F0 5C
92	92	Menu	E0 5D E0 F0 5D

APPENDIX C

PATTON ELECTRONICS MODEL 2003
ASCII SCANS CODES

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
NUL ^@	00	14 1E F0 1E F0 14
SOH ^A	01	14 1C F0 1C F0 14
STX ^B	02	14 32 F0 32 F0 14
ETX ^C	03	14 21 F0 21 F0 14
EOT ^D	04	14 23 F0 23 F0 14
ENQ ^E	05	14 24 F0 24 F0 14
ACK ^F	06	14 2B F0 2B F0 14
BEL ^G	07	14 34 F0 34 F0 14
BS ^H	08	66 F0 66
TAB ^I	09	0D F0 0D
LF ^J	0A	14 3B F0 3B F0 14
VT ^K	0B	14 42 F0 42 F0 14
FF ^L	0C	14 4B F0 4B F0 14
CR ^M	0D	3A F0 3A
SO ^N	0E	14 31 F0 31 F0 14
SI ^O	0F	14 44 F0 44 F0 14
DLE ^P	10	14 4D F0 4D F0 14
DC1 ^Q	11	14 15 F0 15 F0 14
DC2 ^R	12	14 2D F0 2D F0 14
DCE ^S	13	14 1B F0 1B F0 14
DC4 ^T	14	14 2C F0 2C F0 14
NAK ^U	15	14 3C F0 3C F0 14
SYN ^V	16	14 2A F0 2A F0 14
ETB ^W	17	14 1D F0 1D F0 14
EM ^X	18	14 22 F0 22 F0 14
SUB ^Y	19	14 35 F0 35 F0 14
SUB ^Z	1A	14 1A F0 1A F0 14
ESC ^[1B	76 F0 76
FS ^\	1C	14 5D F0 5D F0 14
GS ^]	1D	14 5B F0 5B F0 14
RS ^^	1E	14 12 36 F0 36 F0 12 F0 14
US ^_	1F	14 12 4E F0 4E F0 12 F0 14
Space	20	29 F0 29
!	21	12 16 F0 16 F0 12
"	22	12 52 F0 52 F0 12
#	23	12 26 F0 26 F0 12
\$	24	12 25 F0 25 F0 12

APPENDIX C

PATTON ELECTRONICS MODEL 2003
ASCII SCANS CODES (continued)

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
%	25	12 2E F0 2E F0 12
&	26	12 3D F0 3D F0 12
	27	52 F0 52
(28	12 46 F0 46 F0 12
)	29	12 45 F0 45 F0 12
*	2A	7C F0 7C
+	2B	79 F0 79
,	2C	41 F0 41
-	2D	7B F0 7B
.	2E	49 F0 49
/	2F	4A F0 4A
0	30	45 F0 45
1	31	16 F0 16
2	32	1E F0 1E
3	33	26 F0 26
4	34	25 F0 25
5	35	2E F0 2E
6	36	36 F0 36
7	37	3D F0 3D
8	38	3E F0 3E
9	39	46 F0 46
:	3A	12 4C F0 4C F0 12
;	3B	4C F0 4C
<	3C	12 41 F0 41 F0 12
=	3D	12 55 F0 55 F0 12
>	3E	12 49 F0 49 F0 12
?	3F	12 4A F0 4A F0 12
@	40	12 1E F0 1E F0 12
A	41	12 1C F0 1C F0 12
B	42	12 32 F0 32 F0 12
C	43	12 21 F0 21 F0 12
D	44	12 23 F0 23 F0 12
E	45	12 24 F0 24 F0 12
F	46	12 2B F0 2B F0 12
G	47	12 34 F0 34 F0 12
H	48	12 33 F0 33 F0 12
I	49	12 43 F0 43 F0 12

APPENDIX C

PATTON ELECTRONICS MODEL 2003
ASCII SCANS CODES (continued)

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
J	4A	12 3B F0 3B F0 12
K	4B	12 42 F0 42 F0 12
L	4C	12 4B F0 4B F0 12
M	4D	12 3A F0 3A F0 12
N	4E	12 31 F0 31 F0 12
O	4F	12 44 F0 44 F0 12
P	50	12 4D F0 4D F0 12
Q	51	12 15 F0 15 F0 12
R	52	12 2D F0 2D F0 12
S	53	12 1B F0 1B F0 12
T	54	12 2C F0 2C F0 12
U	55	12 3C F0 3C F0 12
V	56	12 2A F0 2A F0 12
W	57	12 1D F0 1D F0 12
X	58	12 22 F0 22 F0 12
Y	59	12 35 F0 35 F0 12
Z	5A	12 1A F0 1A 0 12
[5B	54 F0 54
\	5C	5D F0 5D
]	5D	5B F0 5B
^	5E	12 36 F0 36 F0 12
_	5F	12 4E F0 4E F0 12
`	60	0E F0 0E
a	61	1C F0 1C
b	62	32 F0 32
c	63	21 F0 21
d	64	23 F0 23
e	65	24 F0 24
f	66	2B F0 2B
g	67	34 F0 34
h	68	33 F0 33
i	69	43 F0 43
j	6A	3B F0 3B
k	6B	42 F0 42
l	6C	4B F0 4B
m	6D	3A F0 3A
n	6E	31 F0 31

APPENDIX C

PATTON ELECTRONICS MODEL 2003
ASCII SCANS CODES (continued)

ASCII CHAR.	ASCII HEX	KEYBOARD SCAN CODES
o	6F	44 F0 44
p	70	4D F0 4D
q	71	15 F0 15
r	72	2D F0 2D
s	73	1B F0 1B
t	74	2C F0 2C
u	75	3C F0 3C
v	76	2A F0 2A
w	77	1D F0 1D
x	78	22 F0 22
y	79	35 F0 35
z	7A	1A F0 1A
{	7B	12 54 F0 54 F0 12
	7C	12 5D F0 5D F0 12
}	7D	12 5B F0 5B F0 12
~	7E	12 0E F0 0E F0 12
Del	7F	71 F0 71