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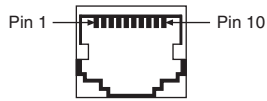
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**PXI-8431-4**

# Serial Quick Reference Guide

## 10-Position Modular Jack



| Pin | 232              | 422/485     |
|-----|------------------|-------------|
| 1   | No Connect       | No Connect  |
| 2   | RI <sup>1</sup>  | TXD-        |
| 3   | CTS              | TXD+        |
| 4   | RTS              | RTS- (HSO-) |
| 5   | DSR <sup>1</sup> | CTS- (HSI-) |
| 6   | GND              | RXD-        |
| 7   | DTR <sup>1</sup> | RXD+        |
| 8   | TXD              | RTS+ (HSO+) |
| 9   | RXD              | CTS+ (HSI+) |
| 10  | DCD <sup>1</sup> | GND         |

<sup>1</sup> These signals are "No Connect" on the PCI-232I and PXI-8422 ports.

## DB-9 Male

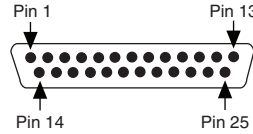


| Pin | 232 DTE          | 232 DCE | 422/485     |
|-----|------------------|---------|-------------|
| 1   | DCD <sup>2</sup> | DCD     | GND         |
| 2   | RXD              | TXD     | CTS+ (HSI+) |
| 3   | TXD              | RXD     | RTS+ (HSO+) |
| 4   | DTR <sup>2</sup> | DSR     | RXD+        |
| 5   | GND              | GND     | RXD-        |
| 6   | DSR <sup>2</sup> | DTR     | CTS- (HSI-) |
| 7   | RTS              | CTS     | RTS- (HSO-) |
| 8   | CTS              | RTS     | TXD+        |
| 9   | RI <sup>2</sup>  | RI      | TXD-        |

**Note:** DCE mode supported on USB-232/2 and USB-232/4 only.

<sup>2</sup> These signals are "No Connect" on the PCI-232I and PXI-8422 ports and ports 9-16 on legacy 16-port boards.

## DB-25 Male

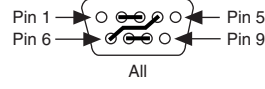
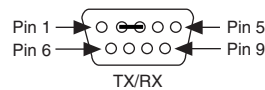


| Pin | 232              | 422/485     |
|-----|------------------|-------------|
| 2   | TXD              | RTS+ (HSO+) |
| 3   | RXD              | CTS+ (HSI+) |
| 4   | RTS              | RTS- (HSO-) |
| 5   | CTS              | TXD+        |
| 6   | DSR <sup>3</sup> | CTS- (HSI-) |
| 7   | GND              | RXD-        |
| 8   | DCD <sup>3</sup> | GND         |
| 20  | DTR <sup>3</sup> | RXD+        |
| 22  | RI <sup>3</sup>  | TXD-        |

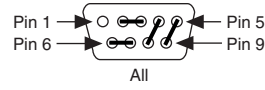
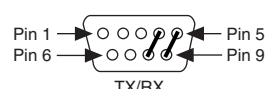
Pins not listed in this table are "No Connect."

<sup>3</sup> These signals are "No Connect" on the PCI-232I and PXI-8422 ports.

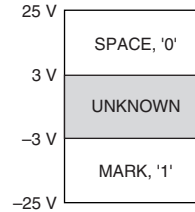
## RS-232 Loopback



## RS-485/422 Loopback



## RS-232 Signals



## RS-485/422 Signals

If '-' < '+'  
then MARK, '1'

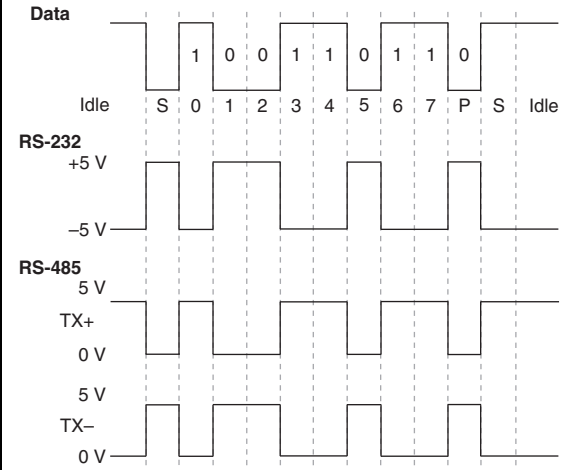
If '-' > '+'  
then SPACE, '0'

RS-422 Voltage:  $\pm 7$  V

RS-485 Voltage:  
-7 V to +12 V

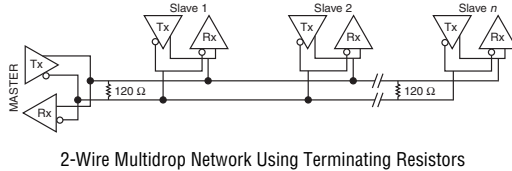
## UART Data Frame Example

0xD9—8 Data Bits, Odd Parity, 1 Stop Bit

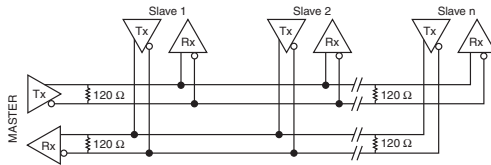


Voltagess are for illustration only. Actual voltage levels may vary.

## RS-485 Topologies



2-Wire Multidrop Network Using Terminating Resistors



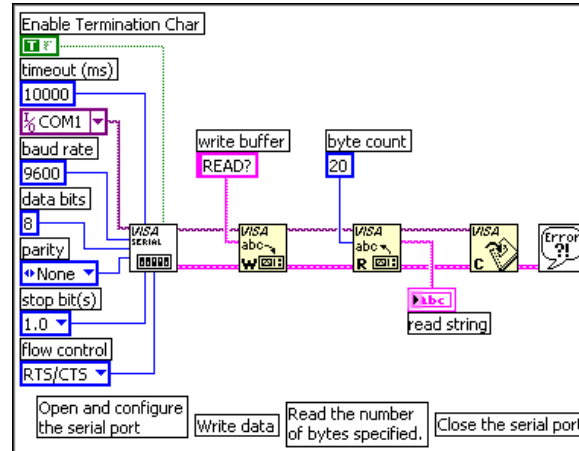
4-Wire Full-Duplex Multidrop Network Using Terminating Resistors

The driver directly supports 4-wire full-duplex operation on peer-to-peer RS-485 networks. Multidrop RS-485 networks require additional software development.

## RS-485 Transceiver Control

| Enable | 4-Wire | 2-Wire   |             |      |
|--------|--------|----------|-------------|------|
|        |        | DTR/Echo | DTR/No Echo | Auto |
| TX     | ON     | DTR      | DTR         | TX   |
| RX     | ON     | ON       | DTR         | TX   |

## LabVIEW Programming Example



For more information about LabVIEW, refer to [ni.com/labview](http://ni.com/labview).

## NI-Serial Features

### Hardware

- Flexible baud rates up to 3 Mb/s
- High-performance DMA engine
- Isolation up to 2000 V
- RS-485 transceiver control

### Software

- Deterministic control with LabVIEW Real-Time
- Over 3000 instrument drivers online
- Powerful development tools

For more information about NI Serial products, refer to [ni.com/serial](http://ni.com/serial).

## ASCII Table

| Dec | Hex  | Char  | Dec | Hex  | Char | Dec | Hex  | Char | Dec | Hex  | Char  |
|-----|------|-------|-----|------|------|-----|------|------|-----|------|-------|
| 0   | 0x00 | (nul) | 32  | 0x20 | (sp) | 64  | 0x40 | @    | 96  | 0x60 | '     |
| 1   | 0x01 | (soh) | 33  | 0x21 | !    | 65  | 0x41 | A    | 97  | 0x61 | a     |
| 2   | 0x02 | (stx) | 34  | 0x22 | "    | 66  | 0x42 | B    | 98  | 0x62 | b     |
| 3   | 0x03 | (etx) | 35  | 0x23 | #    | 67  | 0x43 | C    | 99  | 0x63 | c     |
| 4   | 0x04 | (eot) | 36  | 0x24 | \$   | 68  | 0x44 | D    | 100 | 0x64 | d     |
| 5   | 0x05 | (enq) | 37  | 0x25 | %    | 69  | 0x45 | E    | 101 | 0x65 | e     |
| 6   | 0x06 | (ack) | 38  | 0x26 | &    | 70  | 0x46 | F    | 102 | 0x66 | f     |
| 7   | 0x07 | (bel) | 39  | 0x27 | '    | 71  | 0x47 | G    | 103 | 0x67 | g     |
| 8   | 0x08 | (bs)  | 40  | 0x28 | (    | 72  | 0x48 | H    | 104 | 0x68 | h     |
| 9   | 0x09 | (tab) | 41  | 0x29 | )    | 73  | 0x49 | I    | 105 | 0x69 | i     |
| 10  | 0x0A | (lf)  | 42  | 0x2A | *    | 74  | 0x4A | J    | 106 | 0x6A | j     |
| 11  | 0x0B | (vt)  | 43  | 0x2B | +    | 75  | 0x4B | K    | 107 | 0x6B | k     |
| 12  | 0x0C | (ff)  | 44  | 0x2C | ,    | 76  | 0x4C | L    | 108 | 0x6C | l     |
| 13  | 0x0D | (cr)  | 45  | 0x2D | -    | 77  | 0x4D | M    | 109 | 0x6D | m     |
| 14  | 0x0E | (so)  | 46  | 0x2E | .    | 78  | 0x4E | N    | 110 | 0x6E | n     |
| 15  | 0x0F | (si)  | 47  | 0x2F | /    | 79  | 0x4F | O    | 111 | 0x6F | o     |
| 16  | 0x10 | (dle) | 48  | 0x30 | 0    | 80  | 0x50 | P    | 112 | 0x70 | p     |
| 17  | 0x11 | (dc1) | 49  | 0x31 | 1    | 81  | 0x51 | Q    | 113 | 0x71 | q     |
| 18  | 0x12 | (dc2) | 50  | 0x32 | 2    | 82  | 0x52 | R    | 114 | 0x72 | r     |
| 19  | 0x13 | (dc3) | 51  | 0x33 | 3    | 83  | 0x53 | S    | 115 | 0x73 | s     |
| 20  | 0x14 | (dc4) | 52  | 0x34 | 4    | 84  | 0x54 | T    | 116 | 0x74 | t     |
| 21  | 0x15 | (nak) | 53  | 0x35 | 5    | 85  | 0x55 | U    | 117 | 0x75 | u     |
| 22  | 0x16 | (syn) | 54  | 0x36 | 6    | 86  | 0x56 | V    | 118 | 0x76 | v     |
| 23  | 0x17 | (etb) | 55  | 0x37 | 7    | 87  | 0x57 | W    | 119 | 0x77 | w     |
| 24  | 0x18 | (can) | 56  | 0x38 | 8    | 88  | 0x58 | X    | 120 | 0x78 | x     |
| 25  | 0x19 | (em)  | 57  | 0x39 | 9    | 89  | 0x59 | Y    | 121 | 0x79 | y     |
| 26  | 0x1A | (sub) | 58  | 0x3A | :    | 90  | 0x5A | Z    | 122 | 0x7A | z     |
| 27  | 0x1B | (esc) | 59  | 0x3B | ;    | 91  | 0x5B | [    | 123 | 0x7B | {     |
| 28  | 0x1C | (fs)  | 60  | 0x3C | <    | 92  | 0x5C | \    | 124 | 0x7C |       |
| 29  | 0x1D | (gs)  | 61  | 0x3D | =    | 93  | 0x5D | ]    | 125 | 0x7D | }     |
| 30  | 0x1E | (rs)  | 62  | 0x3E | >    | 94  | 0x5E | ^    | 126 | 0x7E | ~     |
| 31  | 0x1F | (us)  | 63  | 0x3F | ?    | 95  | 0x5F | _    | 127 | 0x7F | (del) |

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