

## NELLCOR N400 RS232 COMMUNICATION

### RS232 Parameters:

- 1200, 2400, 9600, 19200 baud
- 8 data bits
- 1 stop bit
- no parity

### Pinouts:

Pin	Signal
1	not used
2	RXD
3	TXD
4	not used
5	GND
6	not used
7	not used
8	CTS
9	not used

- Pin 8 (CTS) may be used to control data transmission. When held "high", data transmission takes place. When "low" data transmission is suspended temporarily.
- Loss of data may occur if pin 8 is held "low" for longer than four seconds.

### DIP Switch Settings:

#### Output Format

Format	Description	Switch Settings		
		6	7	8
Conversation	Request for parameter	DOWN	DOWN	UP
Beat-to-Beat	Outputs heart rate and saturation once per beat	DOWN	UP	DOWN

#### Baud Rate

Baud Rate	Switch Settings	
	3	4
1200	UP	UP
2400	DOWN	UP
9600	UP	DOWN
19200	DOWN	DOWN

## Communications Formats:

### Conversation Format

In this mode, the output is a single parameter, sent by request only. For example, the computer requests the current pulse rate by sending an "R." The interface responds with:

**<STX>Rnnn <CR><LF>**

where (nnn is the pulse rate). Other request codes are listed below:

R = Pulse Rate (nnn)

S = Saturation % (nnn)

P = Signal Quality (nnn)

O = Low Saturation Alarm Limit (nnn)

A = Alarm Status in ASCII-coded decimal:

Bit 0 = not used (default = 0)

Bit 1 = not used (default = 0)

Bit 2 = Low Sat Limit (1 = alarm active, 0 = no alarm)

Bit 3 = not used (default = 0)

For example, ASCII 004 = binary 0100 = low sat alarm limit active.

M = Monitor Status in ASCII-coded decimal

Bit 0 = Pulse Search Status      1 = Locked              0 = Search

Bit 1 = Sensor Status            1 = Attached            0 = Off or invalid sensor

Bit 2 = Audio Alarm Status      1 = Enabled            0 = Disabled

Bit 3 = ECG Signal Status       1 = Not in Use        0 = In Use

Bit 4 = Response Time          1 = Mode 2            0 = Mode 1

Bit 5 = Sensor Contact          1 = sensor in contact 0 = sensor lifted

Bit 6 = not applicable (default = 1)

Bit 7 = Monitor Communication 1 = Lost                0 = Intact

For example, if the monitor status byte is ASCII 015, (binary 00001111), this means that the monitor is locked on pulse, sensor attached, audio alarms enabled, and ECG signals are being received on the analog port.

T = Time (hhmmss)

V = Version (Number Nellcor N-400 V 4.n.n.nn [4.n.n.nn])

n = ASCII character, normally a number

<STX> = 02 hex

<CR> = 0D hex

<LF> = 0A hex

### Beat-to-Beat Format

This mode transmits saturation and pulse rate data once per beat in the following format:

**RnnnSnnn<space><CR><LF>**

<space> = 20H

<CR> = 0D hex

<LF> = 0A hex