SM Series Bell-202, Bell-202T, V.23 Modems

Configuration and User’s Guide

Version 1.10
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Features

Power
- 5 VDC or 12 to 160 VDC, draws less than 500 mw
- Power cable can be removed/inserted with power on
- "Hot Card Swap" on rack mount configuration

Timings
- Carrier detect on delay: 2 to 30 msec.
- RTS/CTS delay: 0 to 254 msec. or constant CTS

Levels
- Transmit Gain: 0 to –31 dB, switch selectable, 1dB increments
- Receiver Gain: –35 or -45 dB, switch selectable

Isolation
- 1,500 VAC Telco
- 1,800 VAC Power Supply

LEDs
- LEDs for transmit (TD) and receive (RD) data, RTS, CTS, carrier detect (CD), and power

Connections
- Analog side via 4-wire RJ-11
- Digital side via DB-25 RS-232

Other
- 2-wire or 4-wire (2-wire with optional 156 msec. receiver squelch)
- Constant or switched carrier
- 900Hz soft carrier turn-off

Packaging

The modem dimension is based on a VME form-factor PC card (100 x 160mm) that can be mounted in an optional metal box (Model 5006), inserted into a VME-style rack (Model 5008), or mounted in a customer enclosure (Model 5006) with 4 4-40 screws. The metal box dimensions are 7.35 x 4.14 x 1.42” (187 x 105 x 36 mm) and include flanges with 4 mounting holes. For the rack mount version, power is provided through the backplane connector. For the Model 5006, power connection is via a 3-position terminal block.
Switch Settings
- Settings Apply to Both Rack Mount (5008) and Box Mount (5006) Modem
- **Bold Italics** indicates factory settings

<table>
<thead>
<tr>
<th>Switch</th>
<th>Usage</th>
<th>Notes</th>
<th>Position</th>
<th>Value if ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1</td>
<td>Transmit gain</td>
<td>• 0 to –31 dB&lt;br&gt;• Add values for all switches in the ON position and add 0 to sum of switch values if <strong>JP7</strong> is installed and add –16 if <strong>JP7</strong> is removed.</td>
<td>1</td>
<td>–1 dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>–2 dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>–4 dB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>–8 dB</td>
</tr>
<tr>
<td>JP7</td>
<td><strong>JP7 (See Jumper Settings)</strong></td>
<td><strong>Bold Italics</strong> indicates factory settings&lt;br&gt;• Add values for all switches in the ON position if <strong>JP7</strong> is installed and add –16 if <strong>JP7</strong> is removed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW3</td>
<td>CD On Delay</td>
<td>• Delay in setting RS-232 “CD” signal after carrier is detected, 2 to 30 milliseconds&lt;br&gt;• Add values for all switches in the ON position&lt;br&gt;• At least one switch must be ON</td>
<td>1</td>
<td>2 msec</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>4 msec</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>3</strong></td>
<td><strong>8 msec</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>16 msec</td>
</tr>
<tr>
<td>SW4</td>
<td>RTS/CTS</td>
<td>• Delay between requesting RTS and granting CTS, 0 to 254 milliseconds or constant&lt;br&gt;• If switch 1 is OFF, add values for all switches (2 to 8) in ON position.&lt;br&gt;• If all switches are OFF, CTS is constantly enabled</td>
<td>1</td>
<td>0 msec</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>2 msec</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>3</strong></td>
<td><strong>4 msec</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>8 msec</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>5</strong></td>
<td><strong>16 msec</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>32 msec</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>64 msec</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>128 msec</td>
</tr>
</tbody>
</table>
### Jumper Settings for Box Mount (5006) Modem (Rev E)

- **Bold Italics** indicates factory settings

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Usage</th>
<th>Notes</th>
<th>Jumper</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| JP1    | DTR/DSR | - Uses DTR as “clear-to-send” signal, instead of CTS  
- Uses DSR as “request-to-send” signal instead of RTS  
- Normal mode (RTS/CTS) has no jumpers installed | 1-2 | DTR  
3-4 | DSR |
| JP2    | Receiver gain | - Sets receiver gain to –35 or –45 dB  
- Exactly one jumper must be installed | 1-2 | -45 dB  
3-4 | -35 dB |
| JP3    | Receiver squelch | - For half duplex mode, adds 156 millisecond delay between end of transmitted message and enabling receiver  
- Receiver constantly enabled if not installed | 1-2 | 156 msec |
| JP4    | 2W/4W | - Selects 2-wire (half duplex) or 4-wire (full-duplex) operation  
- Exactly 2 jumpers must be installed | 1-2 | 2-wire  
3-4 | 4-wire  
5-6 | 4-wire  
7-8 |
| JP5    | Carrier | - Selects switched or constant carrier  
- Remove jumper for switched carrier | 1-2 | Removed |
| JP6    | 900Hz soft carrier turn-off | - Installed if 900Hz-carrier turn-off is not required.  
- Removed if 900Hz-carrier turn-off is required.  
- Note: Must be installed for V.23 CCITT operation | 1-2 | Installed |
| JP7    | Transmit level range selection | - If installed, SW1 settings interpreted as 0 to –15 dB  
- If removed, SW1 settings interpreted as –16 to –31 dB | 1-2 | Installed |
| JP8    | Power Supply | - If 1-3 and 2-4, input power must be regulated 5 VDC  
- If 3-5 and 4-6, input power can be 12 to 160 VDC | 1-3 | 5V  
2-4 | 12-160 V  
3-5 | 4-6 |
| JP9    | Reserved | - These jumpers are factory installed and must not be altered after shipment. | 3-5 | Installed  
4-6 |
| JP10   | Earth | - Jumper inserted connects (-) power input to (S) shield on terminal block | 1-2 | Removed |
### Jumper Settings for Rack Mount (5008) Modem (Rev A)

- **Bold Italics** indicates factory settings

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Usage</th>
<th>Notes</th>
<th>Jumper Meaning</th>
</tr>
</thead>
</table>
| JP1    | DTR/DSR | • Uses DTR as “clear-to-send” signal, instead of CTS  
• Uses DSR as “request-to-send” signal instead of RTS  
• Normal mode (RTS/CTS) has no jumpers installed | 1-2 DSR  
3-4 DTR |
| JP2    | Receiver gain | • Sets receiver gain to –35 or –45 dB  
• Exactly one jumper must be installed | 1-2 -45 dB  
3-4 -35 dB |
| JP3    | Receiver squelch | • For half duplex mode, adds 156 millisecond delay between end of transmitted message and enabling receiver  
• Receiver constantly enabled if not installed | 1-2 156 msec |
| JP4    | 2W/4W | • Selects 2-wire (half duplex) or 4-wire (full-duplex) operation  
• Exactly 2 jumpers must be installed | 1-2 2-wire  
3-4 4-wire  
5-6 4-wire  
7-8 |
| JP5    | Carrier | • Selects switched or constant carrier  
• Remove jumper for switched carrier | 1-2 Removed |
| JP6    | 900Hz soft carrier turn-off | • Installed if 900Hz-carrier turn-off is not required.  
• Removed if 900Hz-carrier turn-off is required.  
• Note: Must be installed for V.23 CCITT operation | 1-2 Installed |
| JP7    | Transmit level range selection | • If installed, SW1 settings interpreted as 0 to –15 dB  
• If removed, SW1 settings interpreted as –16 to –32 dB | 1-2 Installed |
| JP9    | Reserved | • These jumpers are factory installed and must not be altered after shipment. | 3-5 Installed  
4-6 |

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Power Connection
View the end of the board with the RJ-11 connector at your left and the three-position power connector at your right. The three power connector pins are as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Pin</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leftmost</td>
<td>1</td>
<td>+</td>
<td>Power Positive</td>
</tr>
<tr>
<td>Middle</td>
<td>2</td>
<td>-</td>
<td>Power Negative (return)</td>
</tr>
<tr>
<td>Rightmost</td>
<td>3</td>
<td>S</td>
<td>Earth ground (not normally used)</td>
</tr>
</tbody>
</table>

RJ-11 Cabling
The standard RJ-11 jack terminates in 4 spade lugs. The following table contains the cabling options for both 4-wire and 2-wire operation.

<table>
<thead>
<tr>
<th>RJ-11 Cable</th>
<th>4-wire mode (full duplex)</th>
<th>2-wire mode (half duplex)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Transmit</td>
<td>Transmit/Receive</td>
</tr>
<tr>
<td>Green</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>Receive</td>
<td>Unused</td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RS-232 Cabling
The following table itemizes RS-232 pins utilized. Pins not listed are not used.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Frame Ground</td>
<td>5</td>
<td>Clear To Send (CTS)</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data (TD)</td>
<td>7</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data (RD)</td>
<td>8</td>
<td>Carrier detect (CD)</td>
</tr>
<tr>
<td>4</td>
<td>Request To Send (RTS)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Common Problems and Solutions

<table>
<thead>
<tr>
<th>Description of Problem</th>
<th>Recommended Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messages sent by the ASE modem are not received at the other modem</td>
<td>Make sure that the RTS/CTS time (SW4) on the ASE modem is longer than the carrier detect time on the other modem.</td>
</tr>
<tr>
<td>Messages sent by another modem are not received at the ASE modem</td>
<td>Make sure that the RTS/CTS time on the other modem is longer than the “CD On Delay” time (SW3) on the ASE modem.</td>
</tr>
<tr>
<td>Frequent communication errors in messages received at non-ASE modem</td>
<td>The ASE modem supports two methods for disabling the carrier, selected by the jumper at JP6. Try the alternate setting.</td>
</tr>
</tbody>
</table>
**Product Codes**

Product codes are of the form **SM-MMM-P-K**

<table>
<thead>
<tr>
<th>MMM</th>
<th>Modem type</th>
<th>B</th>
<th>P</th>
<th>V</th>
<th>K</th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PC board only</td>
</tr>
<tr>
<td>V23</td>
<td>V.23 CCITT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VME chassis mounting bracket</td>
</tr>
<tr>
<td>P</td>
<td>Power Option</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Metal box</td>
</tr>
<tr>
<td>I</td>
<td>12 to 160 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>5 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For example:

**SM-202-X-V** specifies a Bell-202 modem with the 5 V power option and VME mounting bracket.
Diagram: Rack Mount Modem Board

Single Channel Modem

Rack Mount Enclosure

Jumper and Switch Locations

Models SM-202-X-V
Models SM-V23-X-V

Part: AD341-5008, Revision A

File: \wsw\c\drawings\SingChanModemRevA-Rack.vsd

Applied Systems Engineering, Inc
Revision 1
March 12, 2002

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Diagram: Box Mount Modem Board

Single Channel Modem
Box Mount Enclosure or Board Only

Jumper and Switch Locations

Models SM-202-x-M, SM-202-x-B
Models SM-V23-x-M, SM-V23-x-B
Diagram: Rack Mount Enclosure Backplane

Single Channel Modem
Rack Mount Enclosure Backplane Connections

Rear View

Notes:
None

Models SM-202-X-V
Models SM-V23-X-V

File: \wsw\c\drawings\SingChanModemRevC-Chassis.vsd

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