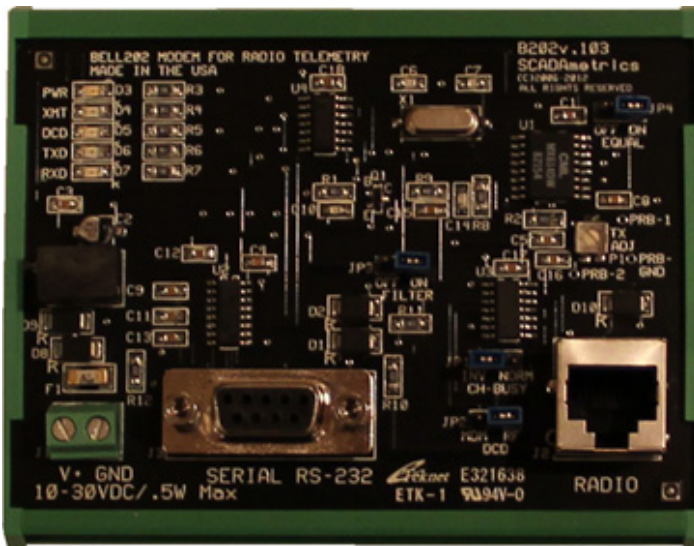




# Bell 202 Modem

## DIGITAL COMMUNICATIONS FOR RADIO TELEMETRY



**2 YEAR WARRANTY**



### Standards-Based, Non-Proprietary Modem For Radio Telemetry...

The SCADAMetrics Model B202 Modem is designed to provide non-proprietary, Bell-202 data modulation and demodulation for many popular analog telemetry radios.

The unit offers the following notable features:

- Wide-Input Power Range 10-30VDC.
- Computer/PLC/RTU Interface: RS-232/DB9F.
- MODBUS- and DF1-Compatible
- Radio Interface: RJ45F.
- Industrial Din-Rail Mount.
- LED's: Power, Transmit, Receive, TxD, RxD.
- Adjustable Transmit Audio Level.
- Selectable RF or Modem Carrier Detect.
- Carrier-Detect Byte Filtering Option.
- Receive Signal Equalizer Option.
- 'Dumb' Mode Operation.

The B202 modem permits users to mix various makes and models of compatible radios within a telemetry system, thereby alleviating the problem of vendor-lockin.

In accordance with FCC CFR 47 Part 15.103(a,b,c) – the B202 is intended to be used as a control system component at public utility facilities, industrial plants, and within commercial transportation vehicles. It is also intended to be used within industrial, commercial, & medical test equipment. Not intended for consumer applications.

This new design is based upon the MX614 modem IC (CML Micro), and it is also fully compatible with legacy Bell-202 modems that are based upon the TCM3105 modem IC (Texas Instruments), such as the Calamp DM-3282, Maxon SD-FSK, and Paccomm UAS-1200 & HT-1200A. Compatibility is anticipated with a wide range of popular analog telemetry radios, including models from the following manufacturers:

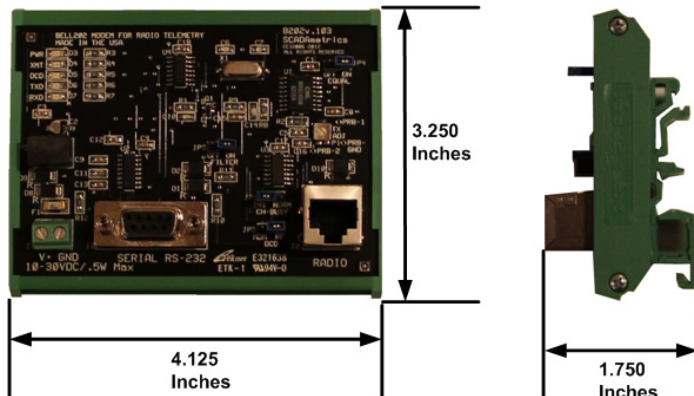
- Ritron
- Tectnet / Maxon
- GE / Microwave Data Systems
- Calamp
- RF Neulink

**SCADAMetrics**  
**scadametrics.com**  
 St. Louis, Missouri USA  
 (636)405-7101

## Specifications...

### Mechanical/Electrical

Manufacturing Location:	USA
Dimensions:	4.125" x 3.250" x 1.750"
Weight:	3.8 Ounces
Temperature:	-30C to +85C
Relative Humidity:	5% to 95%, Non-Condensing
Panel Mounts:	Two (2) Universal Din-Rail Clips
Supply Voltage/Power:	10VDC to 30VDC, 0.50W max
Supply Current:	42mA @ 12VDC, Typical 84mA @ 24VDC, Typical
Term. Blk. Conductors:	16AWG Max, 26AWG Min
Internal Power Efficiency:	90%, Typical
Circuit Protection:	Fused (375mA) + TVSS Diode + Reverse-Polarity Protection Diode



### Serial Communications

Interface Port:

#### **RS-232C (DB9F Jack, DCE):**

- 1: DCD (Transmitted to DTE)
  - 2: TxD (Transmitted to DTE)
  - 3: RxD (Received from DTE)
  - 4: N/C
  - 5: GND
  - 6: N/C
  - 7: CTS (RTS from DTE)
  - 8: N/C
  - 9: N/C
- Speed: 300 to 1200 bps  
Handshaking: None (Requires External RTS/PTT Control)  
Protocol Compatibility: MODBUS, DF1,  
Custom Binary & ASCII Protocols

### Radio Communications

Modulation Type:

AFSK (Audio Frequency Shift Key), Bell-202

Interface Port:

#### **RJ-45F:**

- 1: TxAudio (Adj: 0-1 Vpp / 0-0.354 Vrms)
- 2: RxAudio
- 3: PTT (Active Low)
- 4: Channel Busy
- 5: Ground
- 6: N/C
- 7: N/C
- 8: DC Power  
(Non-Fused, Mapped from V+ Terminal)

### Configuration Jumpers

Radio Channel Busy Normal (~5V=BUSY) JP1 = NORM  
Radio Channel Busy Inverted (0V=BUSY) JP1 = INV  
(Sets Polarity of Radio Channel Busy/Carrier Detect)

DCD Source = Radio Ch. Busy JP2 = RADIO  
DCD Source = Modem Energy Detect JP2 = MDM  
(Sets The Source Of DCD Signal: Radio or Modem)

DCD Byte Filter ON JP3 = ON  
DCD Byte Filter OFF JP3 = OFF  
(Filter ON: Data Only Passed Thru When DCD Asserted)

Receive Equalizer ON JP4 = ON  
Receive Equalizer OFF JP4 = OFF  
(See Explanation On Page 6 of MX614 Datasheet)

## FAQ's...

• **Is the B202 a 'smart' modem?** No, the B202 modem is a 'dumb' modem. The benefits are total control of the modulation and demodulation process and enhanced ability to troubleshoot. However a 'dumb' modem requires the user to key the transmitter through software prior to and during data transmission using the RTS serial port pin. The user also must provide logic to detect and separate valid packets from extraneous noise. This is typically done by framing each packet with a pre-determined byte sequence.

• **What are the power requirements of the B202?** The B202 provides the user with a great deal of flexibility in that it will operate on any voltage between 10-30VDC. However, it is almost always preferable that the user power the modem with the same voltage source that is used to power the radio – which will generally be ~12VDC. Pin 8 of the RJ45 jack provides a direct connection back to the V+ terminal block. If the radio is to be powered with a separate voltage source, then it is imperative that Pin 8 of the RJ45 jack should not be connected to the radio.

• **Does the B202 require programming?** No, the unit features 4 jumpers for tailoring the modem to your radio and application, and one trim pot for adjusting the transmit audio level.

• **Do you offer radio interface cables?** Yes. Because many of the popular telemetry radios feature DB9, DB25, or DB15 interface ports; and it's now extremely easy and popular to create custom cable assemblies with RJ45F-to-DSub Adapters. This allows us to offer cable assemblies for many popular telemetry radios. Our cable assemblies generally consist of an RJ45F-DSub Adapter and a premium shielded CAT5 patch cable (24-gauge, solid-copper conductors).

• **What documentation is available?** The B202 is offered as a non-proprietary modem device whose operation can be troubleshoot and repaired by qualified technical personnel. For this reason, complete documentation is provided – including operations manual, schematics, and the modem IC datasheet.

• **What are the Bell-202 modulation tones?** The Bell-202 standard uses 1200 Hz for 'MARK' (Binary '1'), and 2200 Hz for 'SPACE' (Binary '0').

**SCADAmetrics**  
**scadmetrics.com**  
**St. Louis, Missouri USA**  
**(636)405-7101**