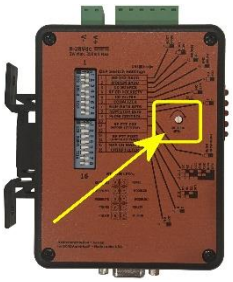
# Amplitude Tuning Procedures

## Models SB.202 and TL.202

The purpose of this document is to detail the factory calibration procedures for the model SB.202 Smart Bell.202 modem and the model TL.202 Leased Line Adapter.

The SCADAmetrics model SB.202 modem is based upon the **CML Micro MX614DW chipset**, which produces a default transmit audio signal level of -2.2dBV, and expects the same level on its audio receive line. When the modem's transmit audio is connected directly to the audio input of an analog radio, the load impedance is generally quite high, although the modem's final-stage emitter-follower is capable of driving a relative low impedance load

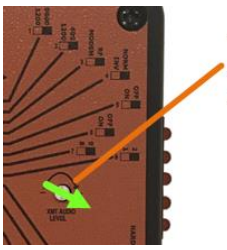
During SCADAmetrics' manufacturing process, and prior to testing, the modem's TxAudio Output Level potentiometer (See illustration right) requires a pre-setting.

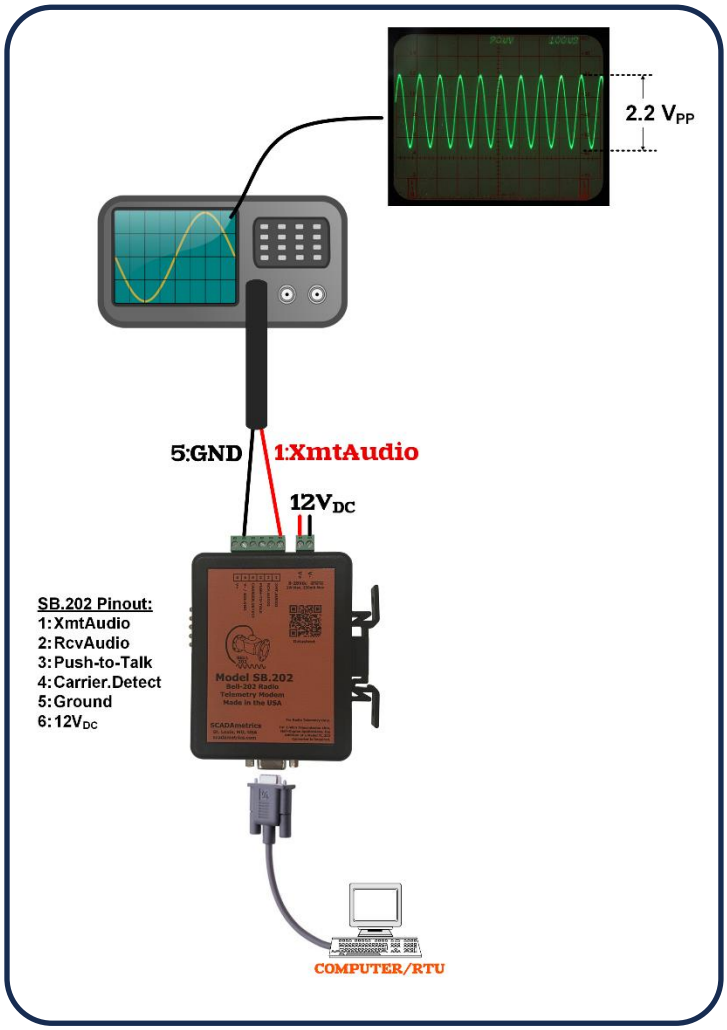


A too-low transmit signal level will reduce the system's signal-to-noise ratio; whereas a too-high signal (greater than 4.5$V_{PP}$) will result in harmonic waveform distortion due to sine-wave clipping.

Therefore, a **SB.202 TxAudio Signal Level** of 2.2$V_{PP}$ should be the goal, and this is achieved by setting the potentiometer to the **4:00 o'clock position**.

| **SB.202 Optimal Signal Levels** | |
|---|---|
| **Optimal TxAudio Output Level (Adjustable via Pot)** | **2.2 $V_{PP}$ / 0.778 $V_{RMS}$** |
| **Optimal RxAudio Input Level (Non-Adjustable)** | **2.2 $V_{PP}$ / 0.778 $V_{RMS}$** |



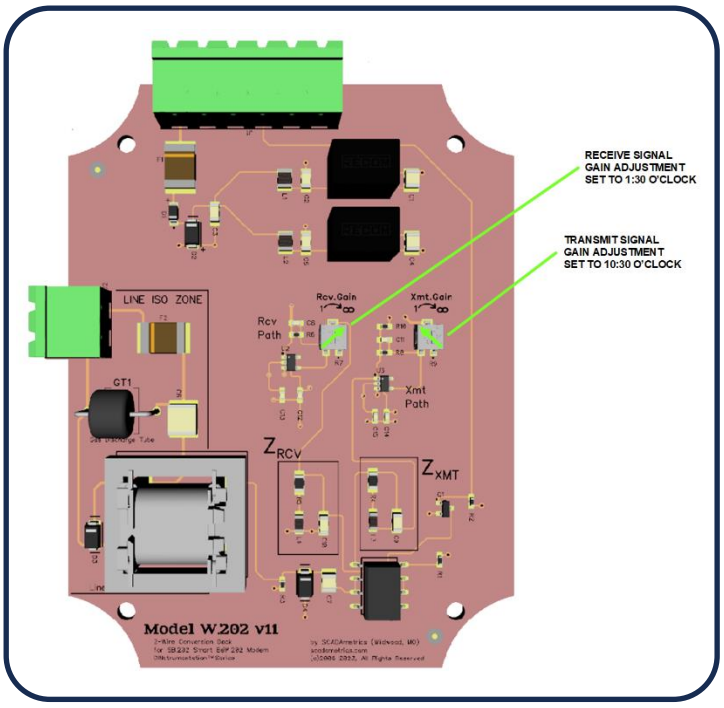

After tuning the SB.202 TxAudio Level potentiometer, attention is turned to the **model TL.202 Leased Line Adapter**.

| **TL.202 Optimal Signal Levels** | |
|---|---|
| **Leased Line / Twisted Pair Optimal Transmit (Output) Level (Adjustable via Pot)** | **2.2 $V_{PP}$ / 0.778 $V_{RMS}$** |
| **Leased Line / Twisted Pair Optimal Receive (Input) Level (Adjustable via Pot)** | **2.2 $V_{PP}$ / 0.778 $V_{RMS}$** |

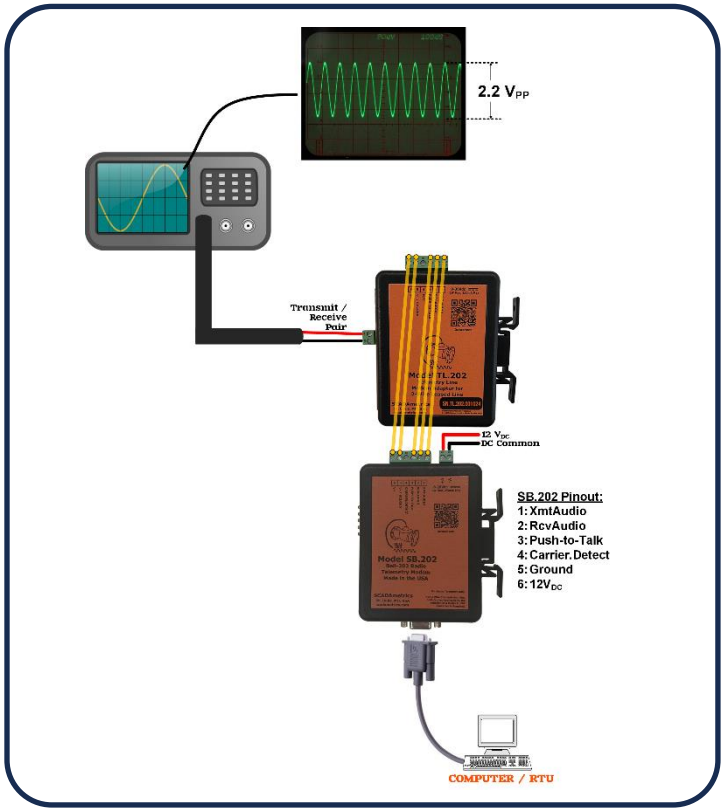
In order to make the adjustments, the four (4) case screws should be removed, along with all three (3) green terminal block plugs.

The **Leased Line Transmit Gain** (**R9** on the TL.202 PCB) should be set to the **10:30 o'clock position**. This will result in the desired transmit signal level of 2.2 $V_{PP}$.

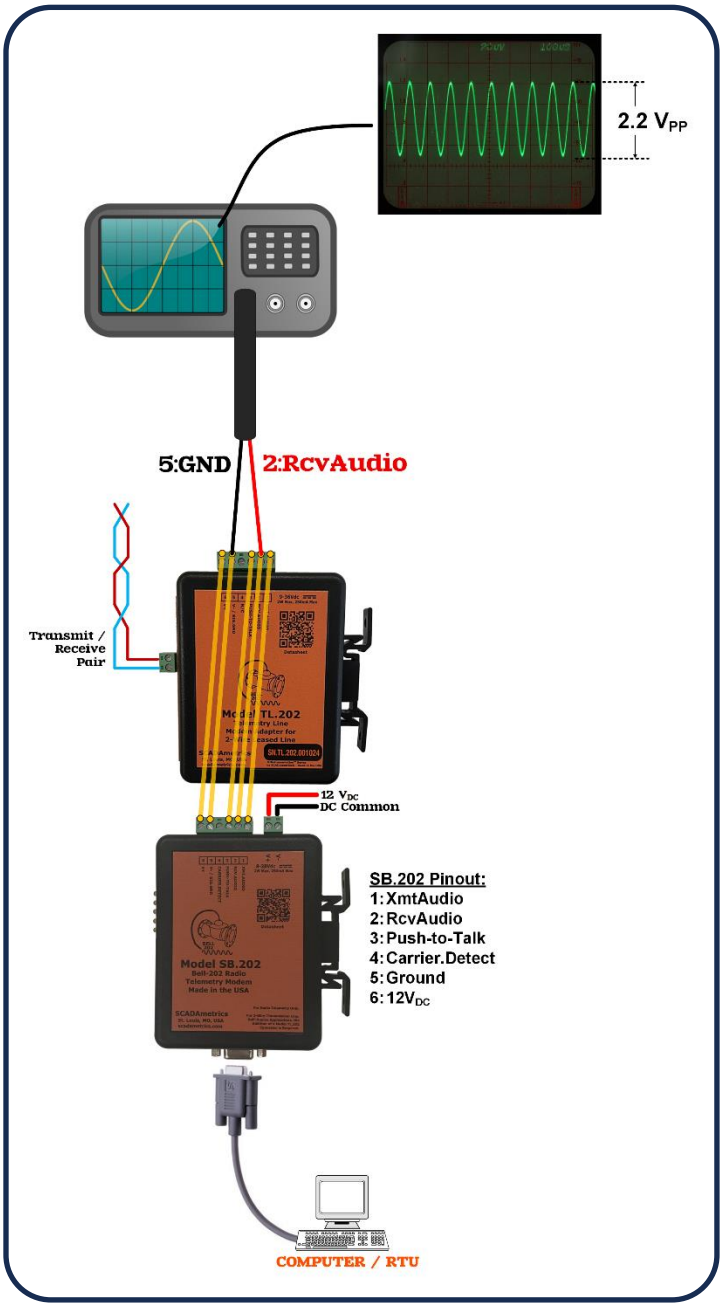
Next, the **Leased Line Receive Gain** (**R7** on the TL.202 PCB) should be set to the **1:30 o'clock position**. When a 2.2 VPP signal is received on the twisted pair / leased line, this will result in a 2.2 VPP signal being transmitted to the SB.202 modem's RxAudio line.




An Oscilloscope Measurement of the Leased Line should validate that the correct voltage level is present: 2.2$V_{PP}$:




As a final step, an oscilloscope measurement of the **RxAudio Input Level to the SB.202** should validate that the correct voltage level is present: 2.2 $V_{PP}$.




**SCADAmetrics**
**scadametrics.com**
**Wildwood, Missouri USA**
**636.405.7102**