RoIP Voice Activity Detection (VAD) Board

User Manual

V1.0 2012-10-24

1. Overview

DBL's Voice Activity Detection (VAD) Board is specially designed to interconnect a RoIP and a Radio Terminal via the headset interface. This not only helps to facilitate the interconnection, but also enables Radio Terminals without PTT outputs to be able to interface with RoIP. The VAD circuitry on board detects voice signals from the headset port of a Radio Terminal and then generate the corresponding PTT signals required to control the transmit and receive paths of the RoIP connected. Simple trimming pots are available on board to allow fine tuning of the voice detection for optimal and satisfactory performance. With this VAD board, RoIP can now interconnect with both hand-held and vehicle-mounted two way radio terminals for various application requirements.
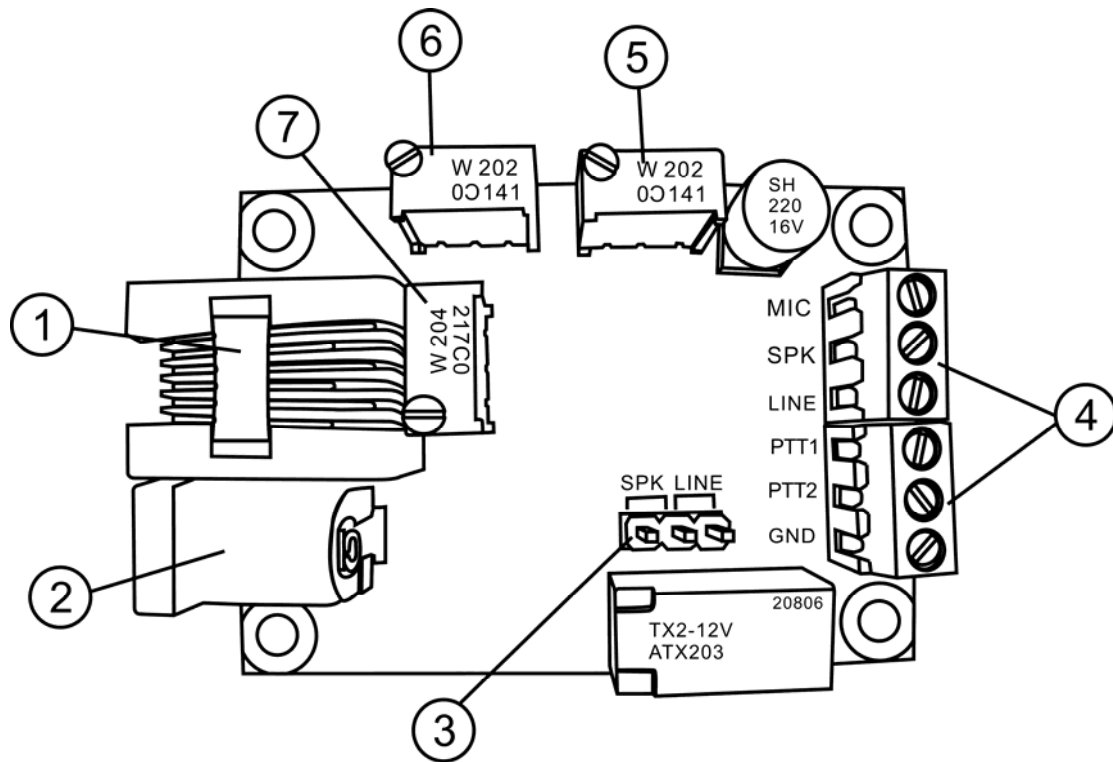
2. Theory of Operation

The diagram below shows the concept of the wiring connections of the VAD board to a RoIP and to a Radio terminal.
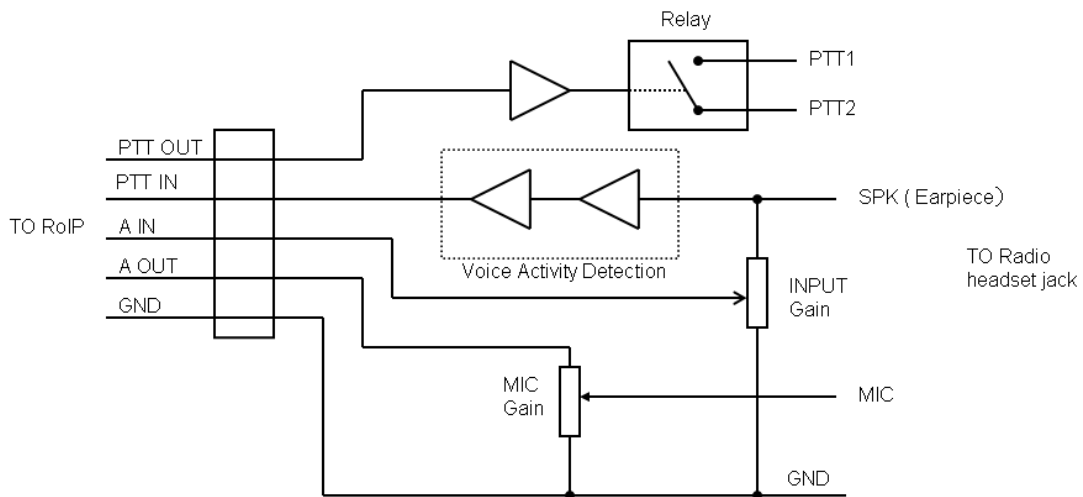
3. VAD Board Component Layout

The diagram below shows the component layout of the VAD Board.

| Item	Label	Description
1	RJ11 Socket	Use a 6-wire telephone cord to connect this socket to RoIP
2	DC Jack	Connect the 12VDC power adapter supplied.
3	Jumper	This jumper selects audio input from SPK or LINE.
4	Radio Terminal Connector	This connector connects to a 2-way radio terminal

5	RoIP Audio Output Volume Control	This pot adjusts the audio level received from a RoIP.
6	Radio Audio Output Volume Control	This pot adjusts the audio level received from a 2-way radio terminal.
7	VAD Sensitivity Control	This pot adjusts the sensitivity of the VAD detection circuit in order to achieve optimal PTT operaton since the audio output level varies from one radio to another.

The pin assignments of the Radio Terminal Connector is described below.

Label	Description	Electrical Characteristics
MIC	This pin is the audio output from a RoIP and it connects to the Microphone input of a 2-way radio terminal.	Internal load is less than 2 K ohms and is used for RoIP audio volume control.
SPK	This pin is the audio output from a 2-way radio terminal and it connects to the audio input of a RoIP.	A 47 ohms internal load is used for radio audio volume control. The maximum input level to the SPK pin is 3.3 VRMS (SPK output from radio).
LINE	This pin connects to the LINE OUT of a 2-way radio terminal if available.	Internal load is 600 ohms and the maximum input level is 150 mVRms (Line output from radio).
PTT1	This pin connects to one of the PTT switch terminals.	When PTT signal is active, PTT1 and PTT2 are connected.
PTT2	This pin connects to the other PTT switch terminal.	
GND	This pin connects to the system ground of a 2-way radio terminal.	

4. Basic Wiring Connection

The diagram below shows the basic wiring connection with a 2-way radio terminal and with a RoIP.

DC12V

DC12V

PTT1 & 2 — PTT switch

SPK — Earpiece

MIC — MIC

GND

RJ11 to RoIP channel

Headset Jack
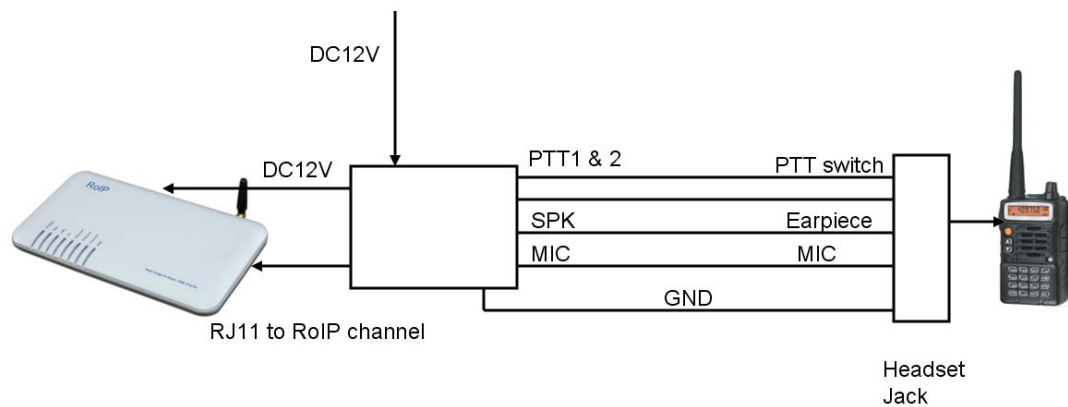
Here are the recommended installation procedures.

a) The DC plug from the VAD board should be connected to the DC jack of the RoIP.

b) Use the telephone wire provided (6-pin) to inter-connect the VAD board and the RoIP.

c) Connect the Radio Terminal connector to a 2-way radio terminal (please see examples in the next section for more details).

d) Connect the DC Jack of the VAD Board with the power adapter provided.

e) Plug the power adapter in an AC outlet.
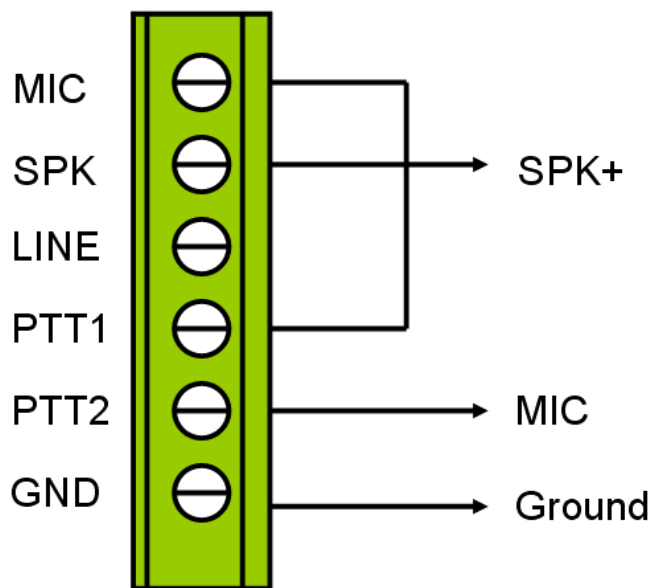
The photo below shows a typical setup for RoIP.

5. Wiring Connection Examples

Example 1: MOTO GP88 2-way Radio Terminal

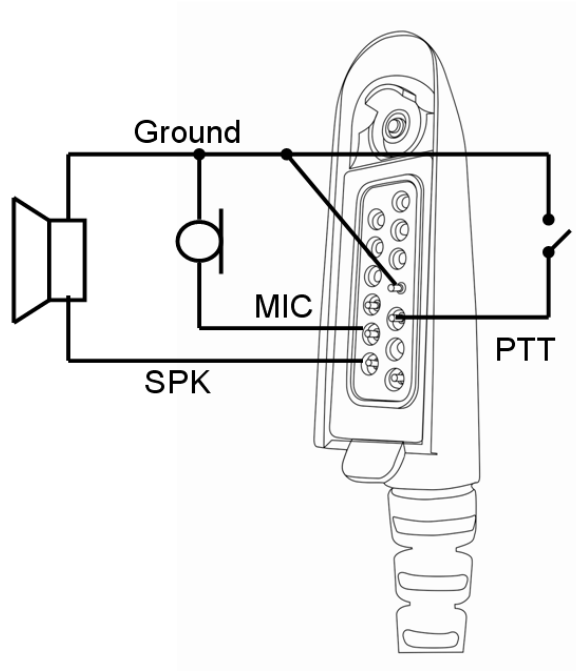The GP88 headset interface is shown below.
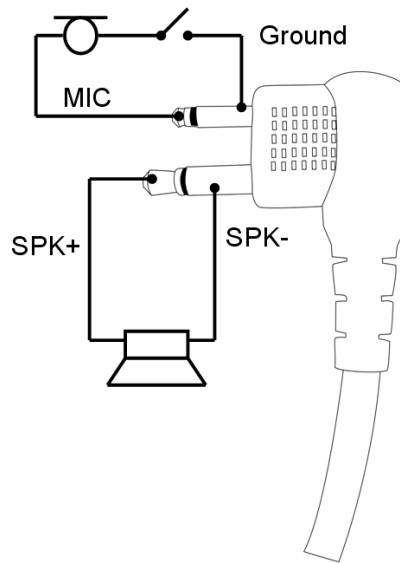
The Radio Terminal Connector should be connected to the above headset as shown below.
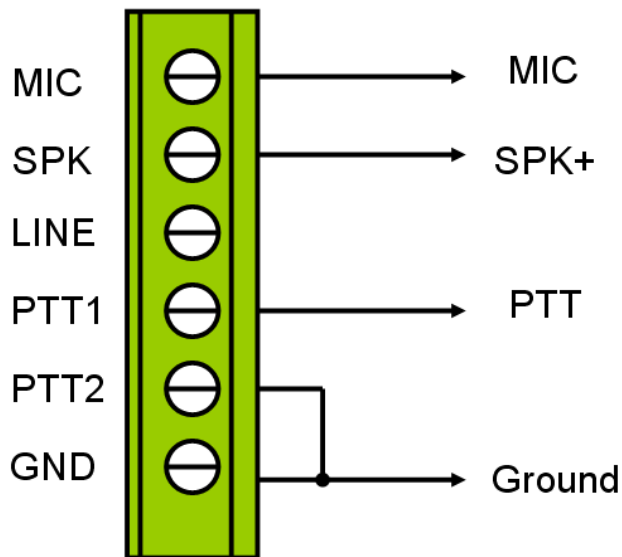

Example 2: MOTO GP338/328 2-way Radio Terminal

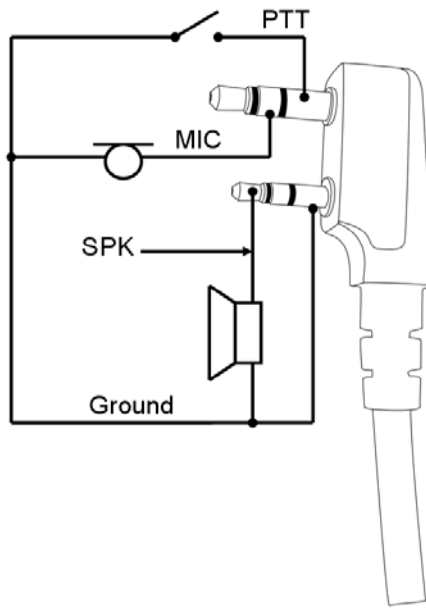The GP338/328 headset interface is shown below.

The Radio Terminal Connector should be connected to the above headset as shown below.
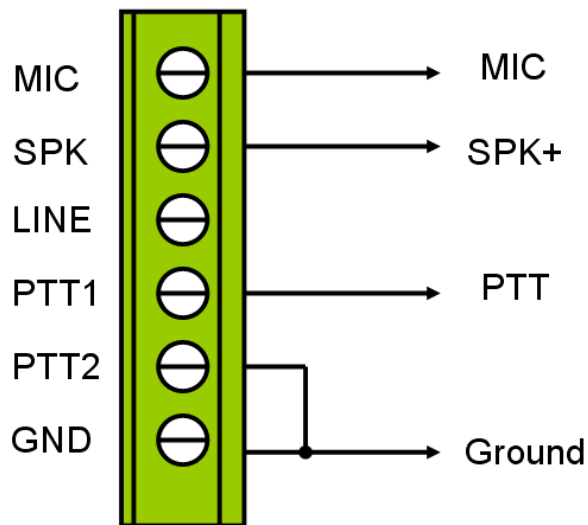

Example 3: Kenwood Series 2-way Radio Terminals
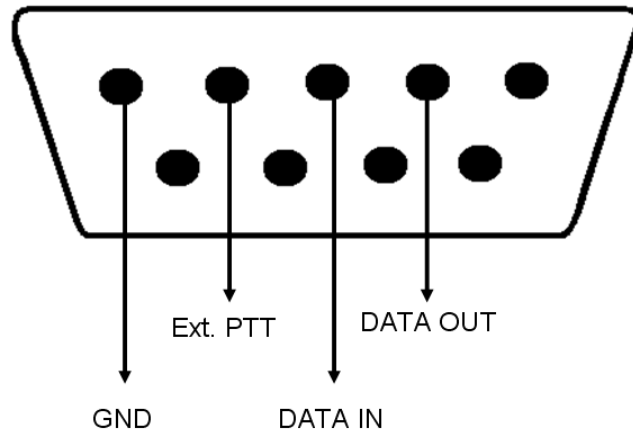
The Kenwood's series headset interface is shown below.

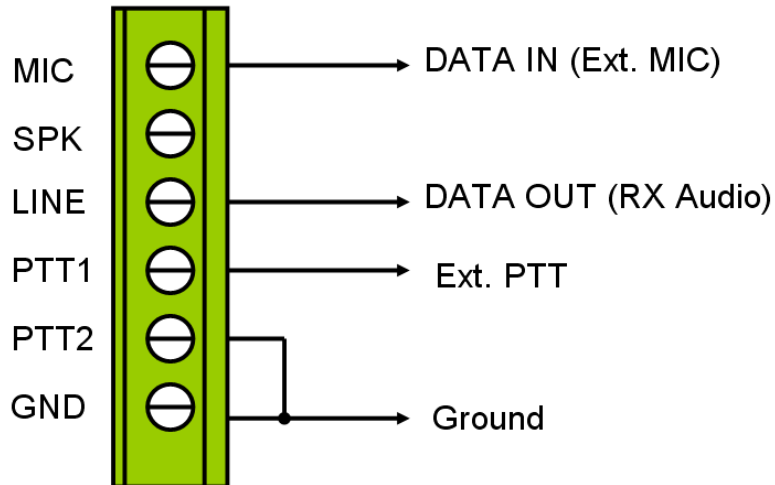The Radio Terminal Connector should be connected to the above headset as shown below.

Example 4: A Typical Vehicle Mounted 2-way Radio Terminal

The DB-9 interface port of a vehicle mounted 2-way radio terminal is shown below.
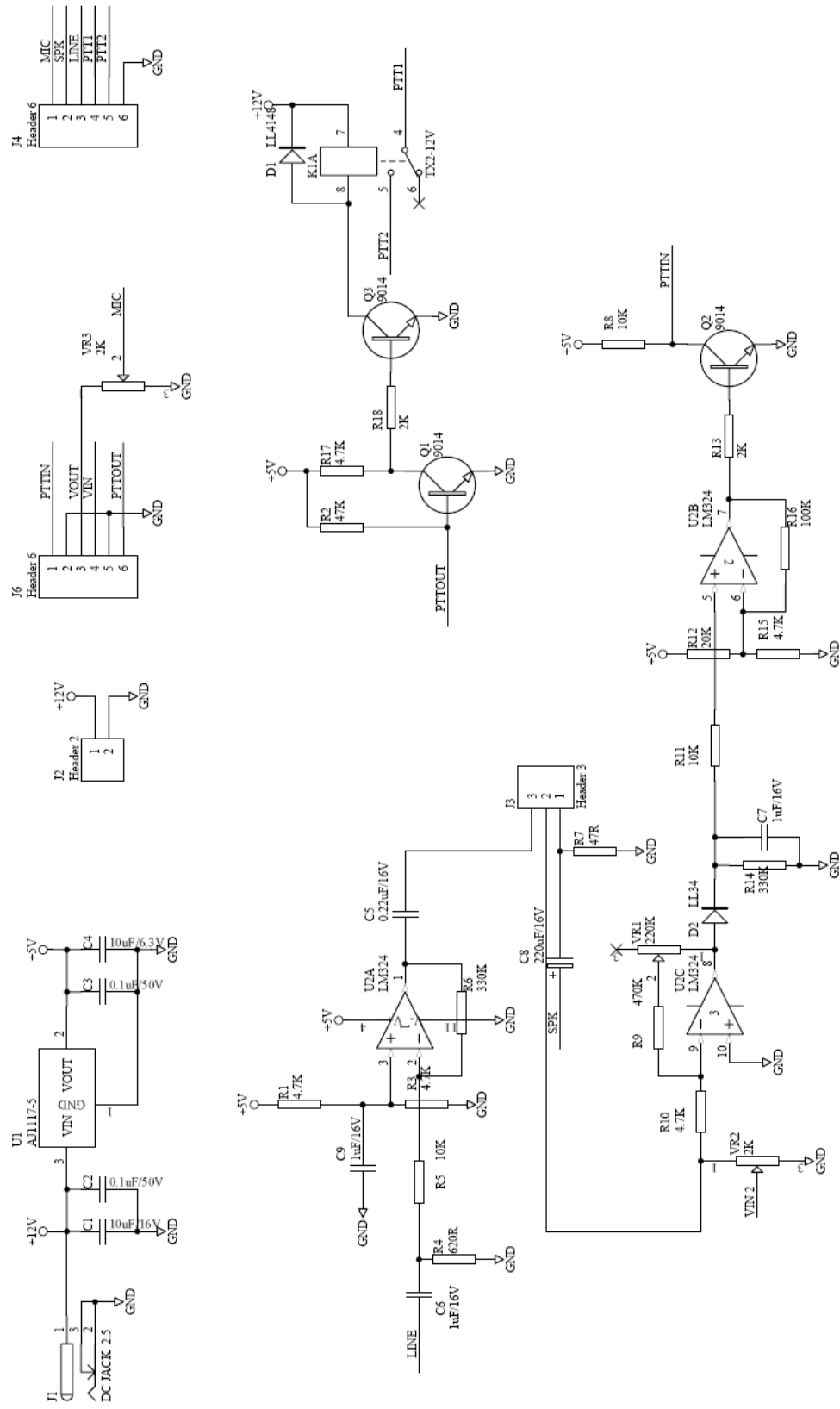
Ext. PTT   DATA OUT

GND   DATA IN

Note: DATA IN and DATA OUT are used for analog audio in and out; they are not the Rx and Tx data pins for RS-232 communications.

The Radio Terminal Connector should be connected to the above headset as shown below.

MIC ⊖ ──────────→ DATA IN (Ext. MIC)

SPK ⊖

LINE ⊖ ──────────→ DATA OUT (RX Audio)

PTT1 ⊖ ──────────→ Ext. PTT

PTT2 ⊖

GND ⊖ ──────────→ Ground

6. VAD Board Schematics

7. Hints

a) When using a handheld radio terminal, VAD sensitivity, voice quality and level are related to the headset volume settings. Please make sure that the corresponding trimming pots or control switch are properly put in lock position.

b) When setting the VAD sensitivity, it is helpful to monitor the corresponding Channel LED. When audio signal is received, the LED turns on for voice transmission. When it is off, the channel is in the status of receiving audio signal.

c) When making an extended telephone cord for RoIP and VAD board connection, please make sure the 6 wires are in the correct order.

d) When the VAD sensitivity is too high, any excessive noise will cause the VAD to set the PTT signal in active stage incorrectly.

e) Please check the audio output level from a vehicle-mounted radio terminal. If it is greater than 150 mVRMS, it must be attenuated before feeding it to the VAD board.