TRACKING IT NOW

GSM/GPRS/GPS WorldTracker AVL
User Manual

WTAVLUM001

Revision: 1.01

Tracking It Now
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The WorldTracker AVL is a powerful GPS Locator designed for vehicle and asset tracking. With superior receiving sensitivity, fast TTFF (Time to First Fix) and Quad-Band GSM frequencies 850/900/1800/1900, its location can be monitored in real time or specified time intervals and reported to a backend server or other specified terminals. The WorldTracker AVL has multiple input/output interfaces which can be used for monitoring or controlling external devices, including the status of a vehicle, and control of a vehicle with its onboard relay output.

Product Overview

0.1. Appearance

0.2. Parts List

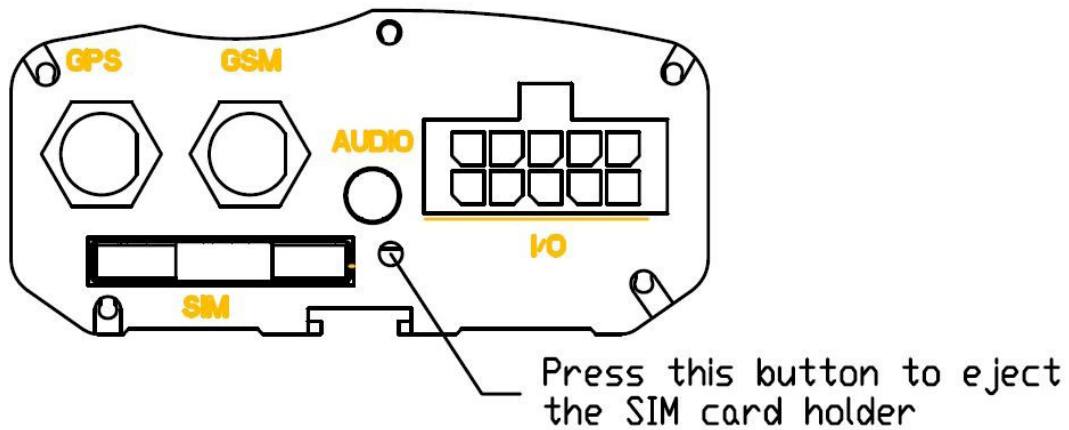| Name	Picture
WorldTracker AVL	
Power Cable with Fuse	
I/O Cable	
Steel Piece	
GPS Antenna	
GSM Antenna	
12V DC Power Supply (Optional)	
USB-232 Data Cable (Optional)	
Relay (Optional)	

1.   Interface Description And Installation Guide

1.1.   SIM Card Interface

To Install the SIM Card:
Step 1: Press the yellow button on the right side of the SIM card slot to eject the SIM card holder.

Step 2: Place the SIM card on the SIM card holder.
Step 3: Install the SIM card holder into the SIM card slot, carefully noting the direction of installation.

1.2.   Antenna Interface
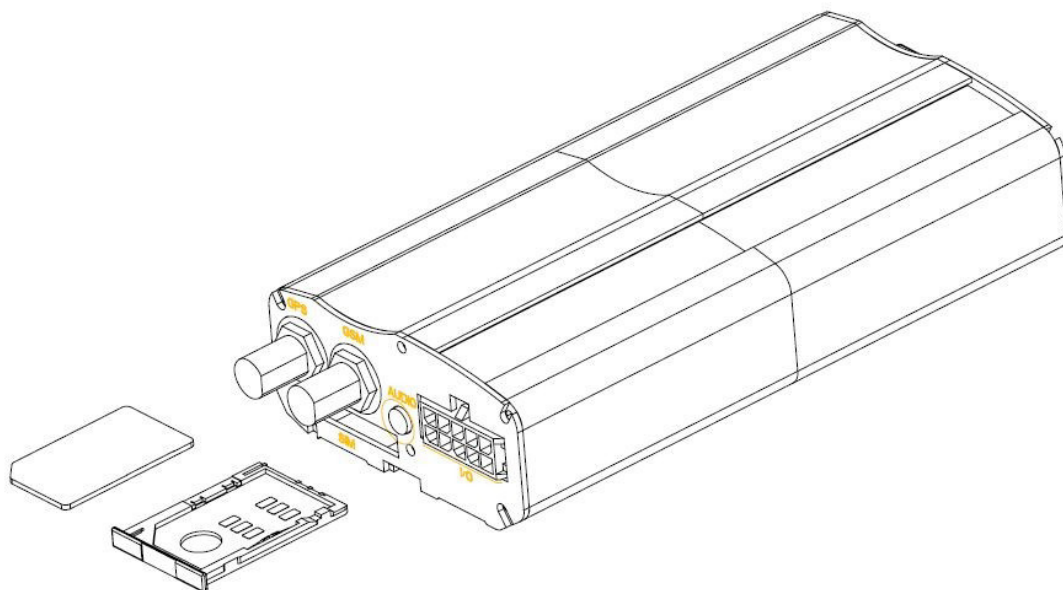
1.2.1.   Install Antennas

There are two SMA antenna connectors on the WorldTracker AVL, one for GPS and another for GSM. Locate the GSM and GPS antennas inside the box, and connect each to the correct SMA connectors as shown blow.
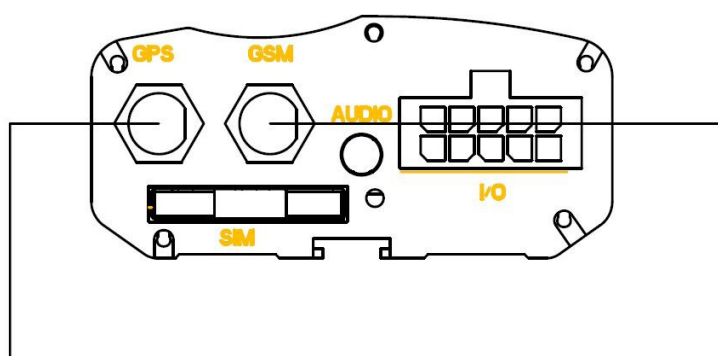
1.2.2. GPS Antenna Specification

GPS Antenna:	Frequency: 1575.42MHz
Bandwidth:	> 5MHz
Beamwidth:	> 120 deg
Supply Voltage:	3.3V
Polarization:	RHCP or Linear
Gain:	Passive: 0dBi minimum Active: 15dB
Impedance	50Ω
VSWR:	< 120 deg
Noise Figure:	< 3

1.2.3. GSM Antenna Specification

GPS Antenna:	Frequency: 1575.42MHz
Frequency and Bandwidth	GSM850: 824MHz to 894MHz EGSM900: 880MHz to 960MHz DCS1800: 1710MHz to 1885MHz PCS1900: 1850MHz to 1990MHz
Direction	Omni-direction
Gain	Passive: > 0dBi
Impedance	50Ω
VSWR:	< 4
Efficient	GSM850: > 40% EGSM900: > 40% DCS1800: > 30% PCS1900: > 30%

1.3. Power Interface

1.3.1. Power Interface Definition

There are four pins on the power connector:
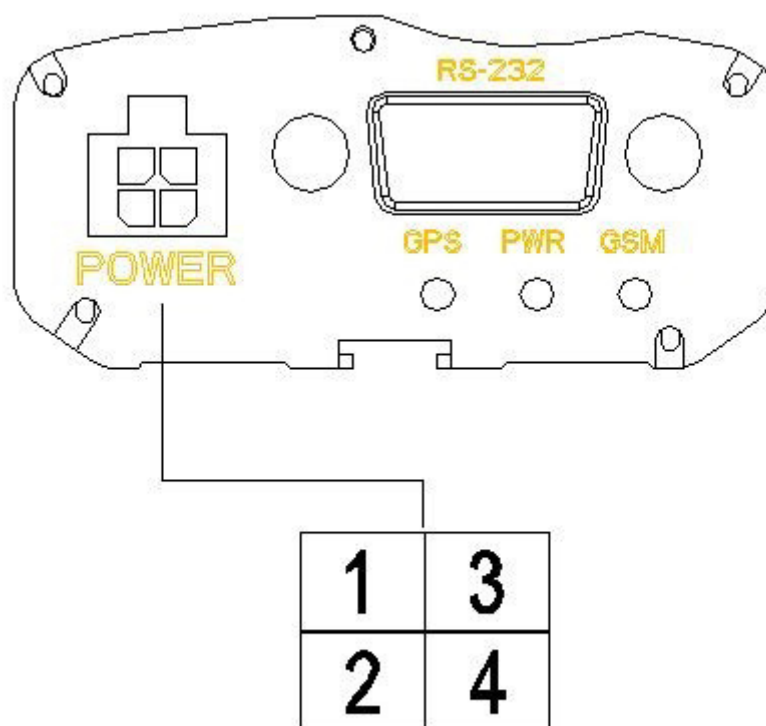
Index	Color of Power Cable	Description	Recommended Function
1	Red	Power (+8V - 32V)	Power
2	Black	Ground	Ground
3	Yellow	Input 1 (Digital, Positive Trigger)	Ignition Key Detect
4	White	Digital Output 1 (Negative Trigger)	

1.3.2. Power Connection

The input voltage range of the WorldTracker AVL is 8V to 32V DC. The unit can be connected directly to the vehicle's battery (12V or 24V DC). Refer to the diagram below for establishing a power connection to the WorldTracker AVL.
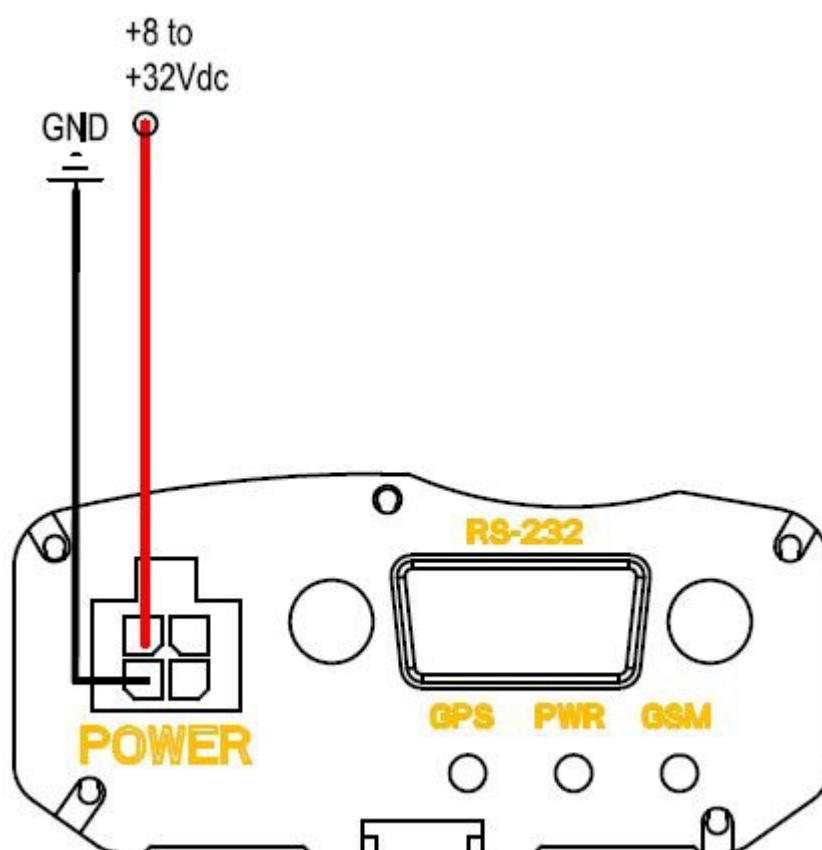
1.3.3. Ignition Detect

Logical State	Electrical State
Active	5.0V to 32V
Inactive	0V to 3V or Open

Tracking It Now strongly recommends connecting Pin 3 to the ignition key to support the power-saver function when the vehicle is off. Please note that input 1 does not have interrupt and the recommended sample rate is 3 seconds.
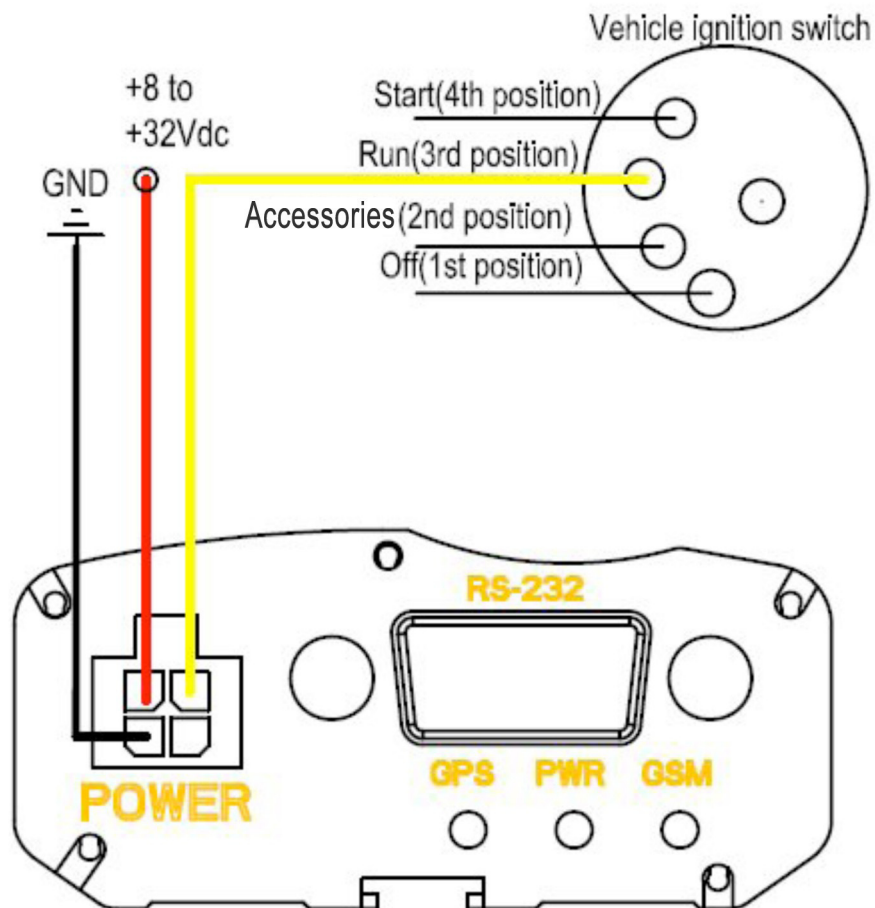
1.3.4. Ignition Control

Pin 4 of the power connector is Output 1 (Digital, Negative trigger). It is open-drain type with no internal pull-up resistor, which may also be used to control a relay, meaning that the user has to provide a pull-up resistor or a relay coil to any positive voltage (32V max.) to detect an inactive output by voltage. It can drive a continuous current of 0.2A.

The electrical conditions of it are:

Logical State	Electrical State
Enable	< 1.5V, max current is 0.2A
Disable	Open or the pull-up voltage (max 32V)

Users may use this pin to control a relay output. Refer to the figure below for an example on controlling the ignition key. Please refer to section 3.4.5 for detailed information on how to drive a relay with digital output.
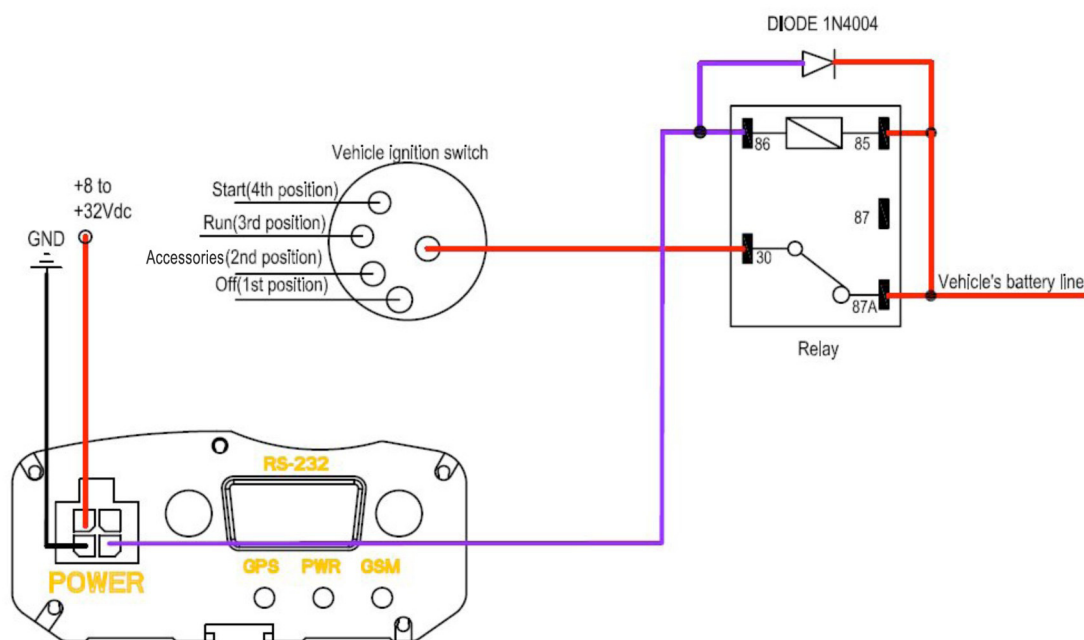
1.4. I/O Interface

There are several inputs and outputs on I/O cable. The following table provides their definitions:

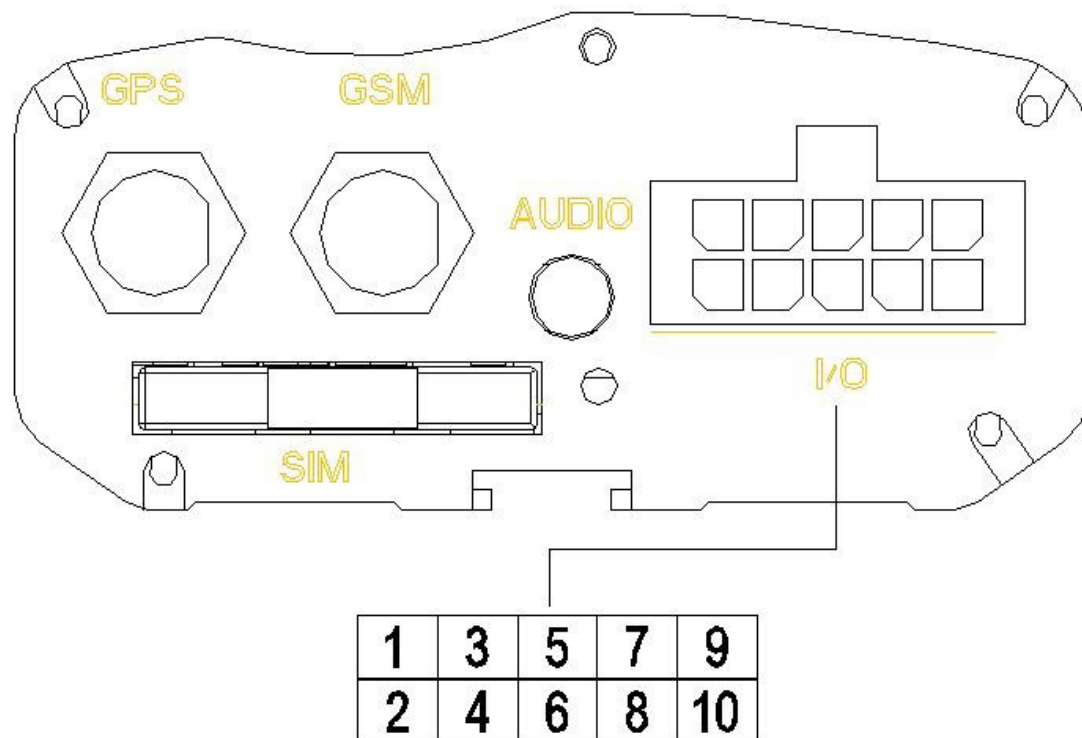| Index	Color on I/O Cable	Description	Recommended Function
1	White	Input 2 (Digital, Positive Trigger)	
2	Black	Input 3 (Digital, Positive Trigger with Interrupt)	
3	Brown	Input 4 (Digital, Negative Trigger with Interrupt)	Panic Button
4	Yellow	Input 5 (Digital, Negative Trigger)	
5	Gray	Input 6 (Analog, Input Voltage Range: 0 - 28V)	
6	Purple	Digital Output 2 (Negative Trigger)	
7	Red	Digital Output 3 (Negative Trigger)	
8	Green	Digital Output 4 (Negative Trigger)	
9	Orange		
10	Blue	Digital Output 5 (Built in Relay)	

1.4.1. Electrical Conditions for Digital Inputs

For negative trigger inputs, the electrical specifications are:

Logical State	Electrical State
Active	0V to 0.8V
Inactive	1.7V to 32V or Open

For positive trigger inputs, the electrical specifications are:

Logical State	Electrical State
Active	5.0V to 32V
Inactive	0V to 3V or Open

Example connections are shown in following figure:

Input(1,2,3)
+8 to +32Vdc
Active   Deactive
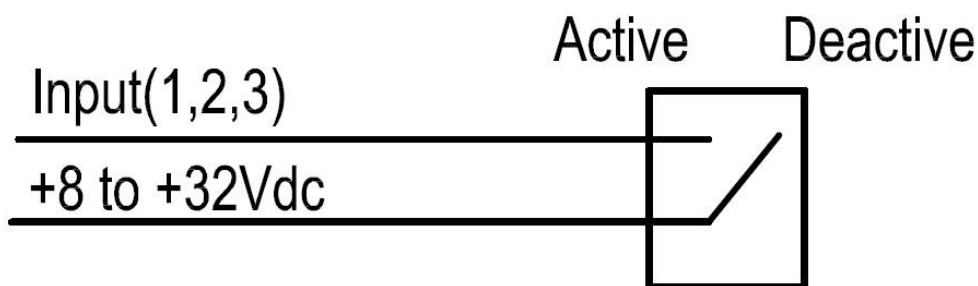
Example connection for positive trigger digital inputs:

Input(4,5)
Ground
Active   Deactive
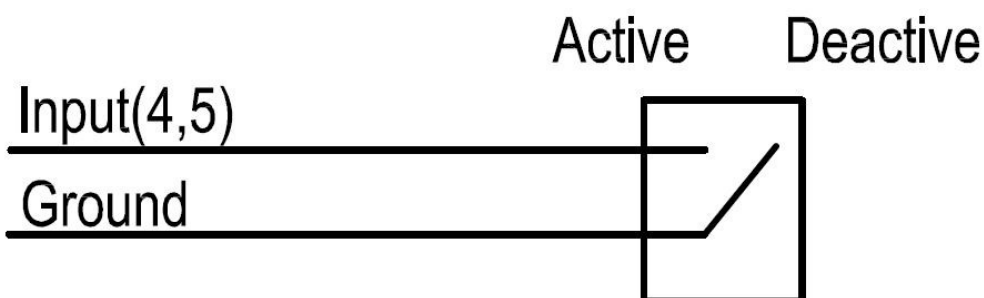
Example connection for negative trigger digital inputs:

1.4.2. Digital Input without Interrupt

Input 2 and input 5 are digital inputs which do not have an interrupt. The sample rate for these two digital inputs is 100ms to 25 seconds. The recommended sample rate is 3 seconds. Please note that a high sample rate will also result in high power consumption. Input 2 is positive trigger and input 5 is negative trigger.

1.4.3. Digital Input with Interrupt

Input 3 and input 4 are digital inputs which have an interrupt. Input 3 is positive trigger and input 4 is negative trigger.

Refer to section 3.4.1 for example connections.

Input 4 is also recommended to support the panic button function. Refer to the following diagram:
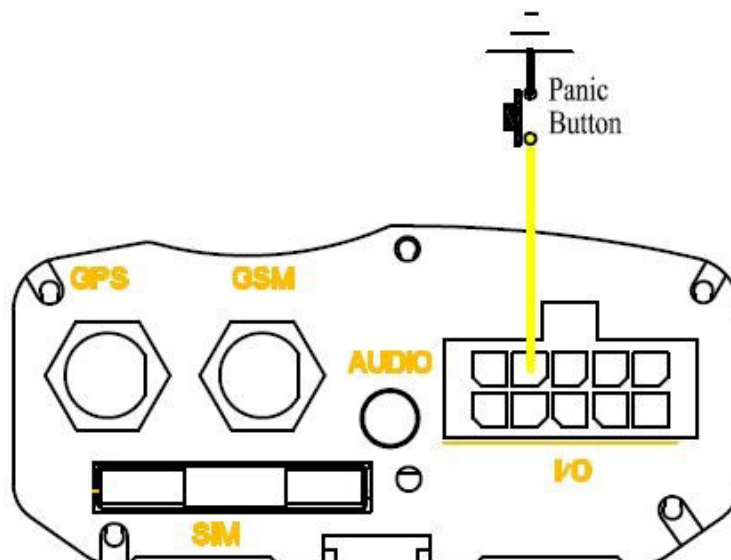
1.4.4. Analog Input

Pin 5 of the I/O cable is used for analog to digital conversion. The input voltage range is 0V to 28V with a tolerance to 32V. Please note, this is an average value based on the sample rate of 10 seconds, which means the burst on voltage input may not be detected.
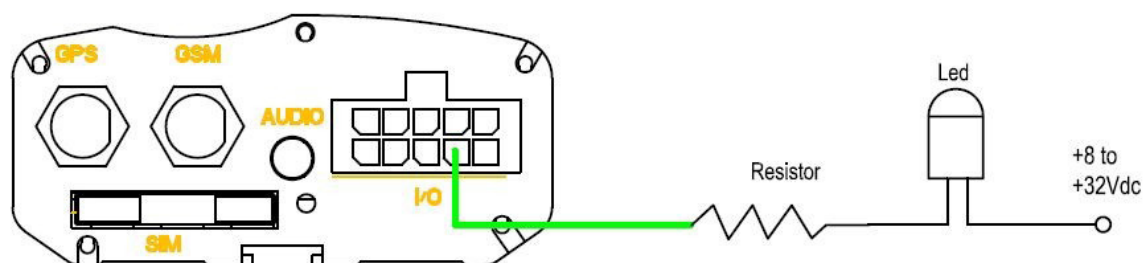
1.4.5. Digital Output

The outputs are an open-drain type with no internal pull-up resistor which may also be used to control a relay. This means that the user must provide a pull-up resistor or a relay coil to any positive voltage (32V max) to detect an inactive output by voltage. Each output can drive a continuous current of 0.2A.
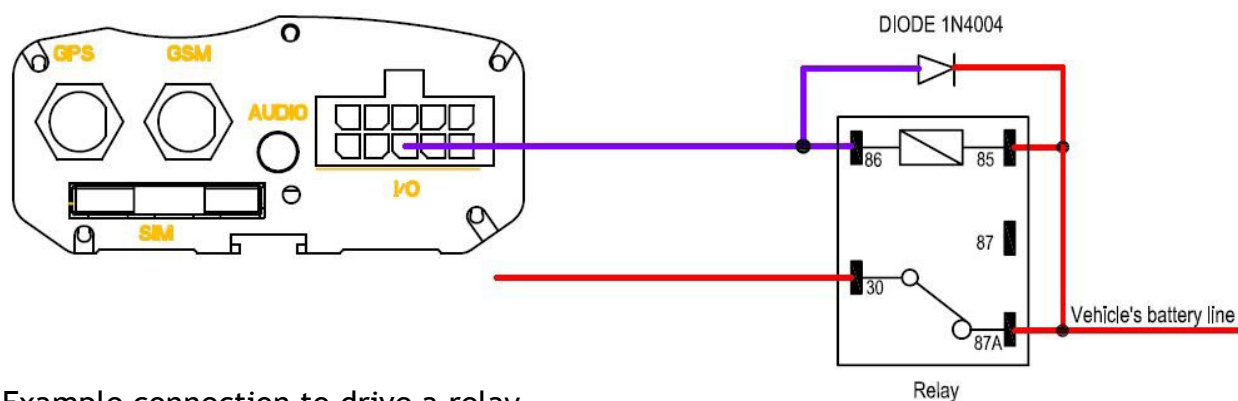
The electrical conditions are:

Logical State	Electrical State
Enable	< 1.5V, max current is 0.2A
Disable	Open or the pull-up voltage (max 32V)

The outputs are used for cutting/restoring GND. See the figures below for example connections:

Example connection to drive an LED.

Example connection to drive a relay.

If the digital output is used to drive a relay, a catch diode is shown across the relay coil. This is necessary to prevent damage to the digital output when the relay is turned off. Many modern relays come with this type of diode pre-installed within the relay itself. If the relay has this diode, ensure the proper relay polarity connection is used. If this diode is not internal, it should be added externally. A common diode such as a 1N4004 will work in most circumstances.

1.4.6.   Digital Output with Built-in Relay

The built-in relay output is open-drain type with no internal pull-up resistor. This means that the user must provide a pull-up resistor to any positive voltage to detect an inactive output by voltage. The switch capacity of the relay contact is 60W, so it can drive a continuous current of 2A at the input voltage of 30V, and 1.85A at the input voltage of 32V.

The electrical specifications are:

Logical State	Electrical State
Enable	0V
Disable	Open or the pull-up voltage (max 32V)

The output is used for cutting/restoring GND, and it can directly drive a LED. Refer to the figure below.
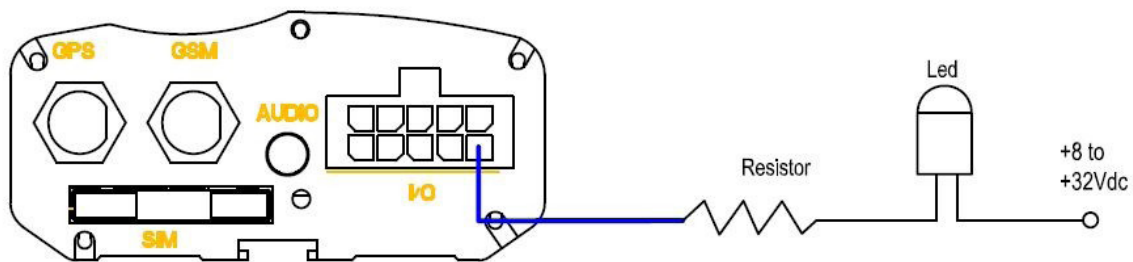
1.5. Indicator light Description
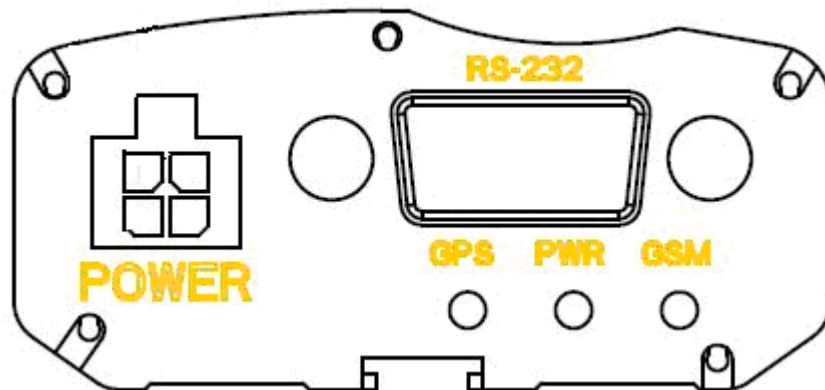
The WorldTracker AVL contains 3 LEDs. Refer to the table below for information on each LED and their related indications:

Logical State	Electrical State	
GPS LED	Stop GPS LED. This LED will typically be activated for 30 minutes before GPS is stopped.	Closed
	Stop GPS LED. Within 30-minutes after boot, GPS is set to need mode, with no positioning requirements.	
	Start GPS LED, and no positioning requirements.	
	Start GPS LED. GPS will activate and enable power-saver mode. Once detected, close the GPS static or flameout	
	NEMA check fail.	Slow light
	Data invalid or no data.	
	GPS is fixing.	Fast light
	GPS has fixed.	Ever-light
PWR LED	Stop power LED. This LED will normally activate for 30 minutes before the power is stopped.	Closed
	Disable backup battery.	
	Disable backup battery, internal battery is low.	Slow flash
	Enable backup battery, the device is charging.	Fast flah
	Enable backup battery, charging has completed.	Ever-light
GSM LED	Network searching	Fast flash
	SIM pin locked	
	Network has been registered	Slow flash

1.6. Audio Interface

The audio connector on the WorldTracker AVL unit is designed to connect a non-balanced, hands free audio system. It is designed for use with a 2.5mm stereo plug with the following configuration. It is important to note the common GND. This common GND is used only for audio ground, and should not be used as a power ground. The speaker interface can be connected to a 32ohm speaker or an audio amplifier for driving a louder speaker. A microphone, as shown below, is recommended.
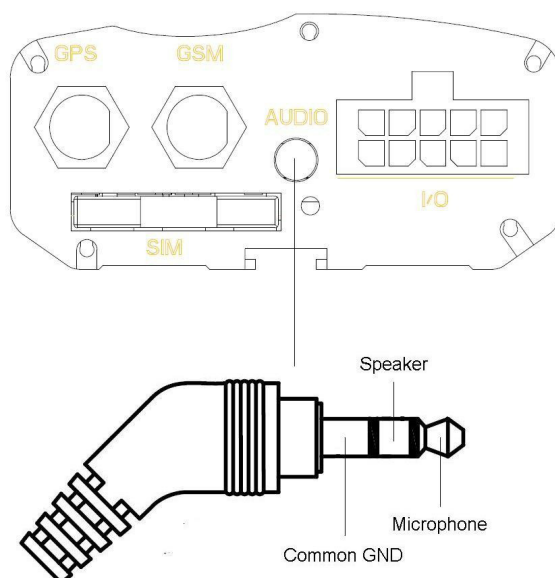
Audio Jack Interface Definition
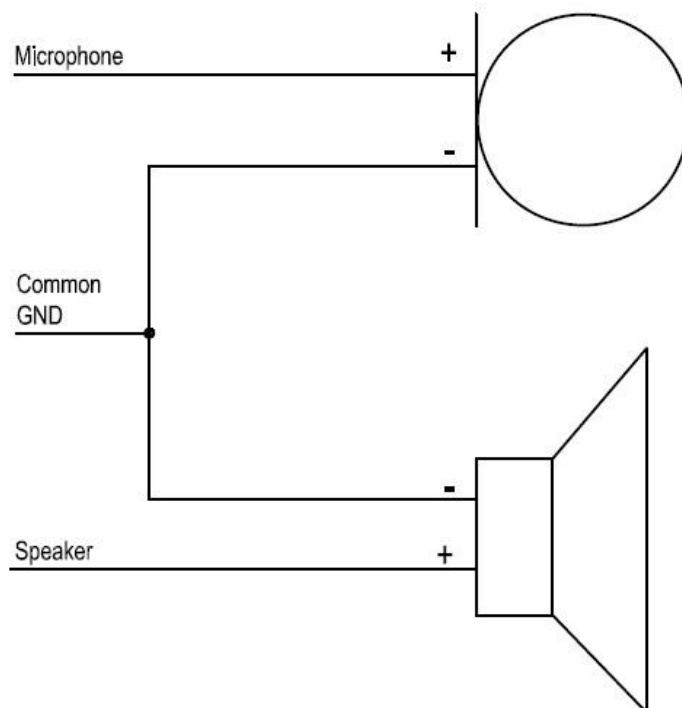
Example connection for Audio

Microphone Input Characteristics

Parameter	Min	Type	Max	Unit
Working Voltage	1.0	1.5	2.0	V
Working Current	200		500	uA
External Microphone Load Resistance		2.2		k Ohm

Speaker Output Characteristcs

Parameter	Min	Type	Max	Unit
Speaker Load Resistance	16	32		Ohm
Speaker Output Level	0		2.4	Vpp
Max. Driving Current Limit of Speaker			50	mA

1.7. RS232 Interface

WorldTracker AVL uses an RS232 interface which can be used to configure the runtime parameters of the unit.
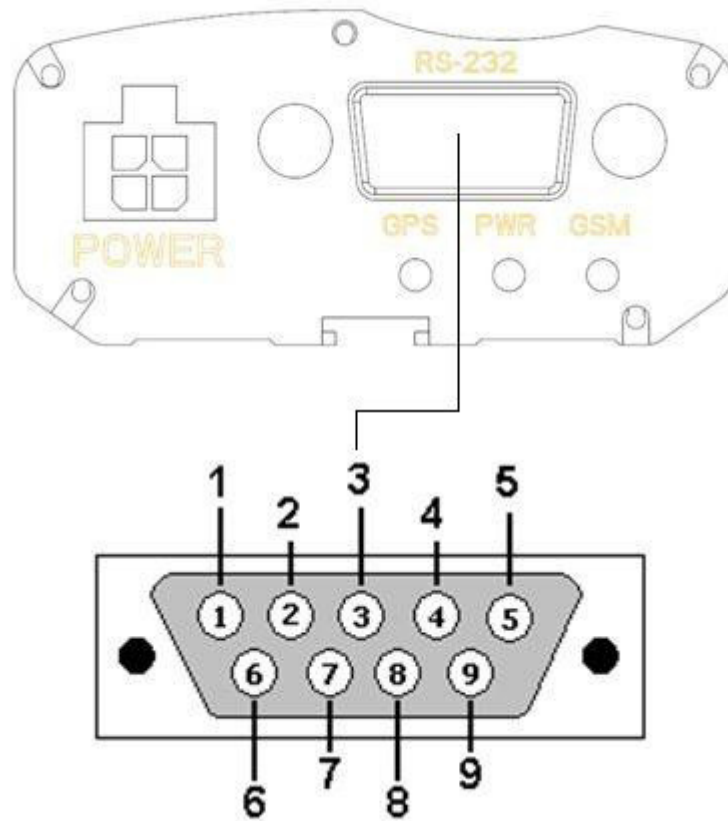
RS232 DB-9 Connector Pin Description (PC side)

Pin Index	Signal Name	Signal Description
1	CD	Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	None	None
7	RTS	Request to Send
8	CTS	Clear to Send
9	RI	Ring Indicator

1.8.   Fasten The Device

Use the included steel pieces and screws to fasten the device as shown.