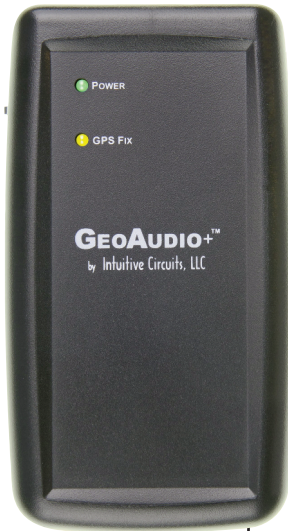


GeoAudio+

**Portable GPS to Audio Encoder / Decoder
with Internal High Precision GPS Receiver and Antenna**

Version 1.00



Description

GeoAudio+ with built-in GPS receiver encodes GPS location, heading, speed, altitude, date, and time into a continuous audio stream that can be recorded by off-the-shelf camcorders and DVR (digital video recorder) systems. The encoded audio, automatically synchronized with the camera video, translates into an exact, permanent record of when and where the events in the video occurred.

GeoAudio+ decode mode is used during the video playback to convert the encoded audio back into a GPS NMEA 0183 USB serial stream that can be used by most PC mapping applications such as Google Earth.

GeoAudio+ includes a 6' 3.5 mm male-to-male audio cable, 6' USB A-Male to Mini-B cable, Microsoft Windows USB driver and diagnostic application disc. 4 AA batteries are not included.

Specifications

Dimensions:	4.25" x 3.50" x 1.25"
Weight:	Without Batteries: 3.9 oz., with 4 AA Batteries: 7.3 oz.
Input Voltage:	5.0 VDC via USB connector, 6.0 VDC via 4 AA batteries
Operating Temperature:	-40 C to +85 C
Audio Modulation:	FSK
Audio Output Level:	-10dB +/- 1dB
Audio Input Level Range:	-40.0 to -8.0 dBV
Acceptable Audio Signal to Noise Ratio:	20.0 dB
Audio In/Out 3.5mm Stereo Jack:	TIP - Left audio channel, RING 1 - Right audio channel RING 2 - Ground
USB Jack:	Mini-B

Internal GPS Receiver Specifications

Receiver:	L1 C/A code, 65-channel
Position Accuracy:	2.5 meters CEP
Velocity Accuracy:	0.1 meters/sec
Time Accuracy:	300ns
Startup Time:	29 second warm/cold start under open sky (average)
Sensitivity:	-161dBm tracking
NMEA sentences:	GPRMC and GPGGA
Update Rate:	1 Hz (once per second)
Dynamics:	4G (39.2m/sec ²)
Operational Limits:	Altitude < 18,000 meters and velocity < 515 meters/sec (simultaneously)

GeoAudio+ includes an internal GPS antenna. An external GPS antenna version of the product is also available.

External Antenna (optional): Active, 3.3 or 5.0 Volts DC with gain up to 30dB and noise figure less than 2db. Male SMA connector.

GeoAudio+ Configuration

GeoAudio+ has an internal 4 dip switch configuration, audio channel selector jumper, and encoding audio output level adjustment. GeoAudio+ comes preconfigured for normal operation. No additional configuration changes are required.

To reconfigure the GeoAudio+ standard configuration disconnect all power to the unit. Carefully remove the 4 case screws (two of the screws are accessible after removing the battery cover). Carefully pull the top and bottom of the case apart so not to put strain on the battery wires.

Dip Switch Configuration:

DIP #	Description
1	USB Baud Rate: OFF = 4,800 baud (default) ON = 9,600 baud
2	Diagnostic Mode: OFF = Normal operation (default) ON = Generate 100 lines of test FSK audio data
3	Raw Debug Mode: OFF = Normal operation (default) ON = GPS NMEA data sent directly out USB port instead of FSK encoding
4	Firmware Flash Upgrade: OFF = Normal operation (default) ON = Firmware flash mode

Note: DIP switch inputs are only checked during power-up.

Audio Channel Selector Jumper:

JP1	Description
L	Audio encoded/decoded on left channel (default)
R	Audio encoded/decoded on right channel

Encoding Audio Output Level Adjustment:

The encoded audio output level of GeoAudio+ can be adjusted via the output level potentiometer VR1. GeoAudio+ supports microphone to line level output. (Tick #5 of #11 is default.)

GeoAudio+ Power

GeoAudio+ can be powered by internal 4 AA batteries or external USB source. The AA batteries can be installed even when a USB power source is supplied. Move the **POWER** switch to the desired position. (See Figure 1.0) The green **POWER** LED on the top of the case will turn on once power is applied.



Figure 1.0 – Power selection switch

GeoAudio+ Cable Hookup and Operation

GeoAudio+ has two operating modes Encode and Decode:

- Encode mode is used during the video recording process to encode the GPS information onto the camcorder or DVR (digital video recorder) left or right audio track
- Decode mode is used during the video playback to convert the encoded audio back into a GPS NMEA serial stream that GPS mapping software recognizes. During decode mode the yellow **GPS Fix** LED will blink.

The ENCODE or DECODE operation mode is selected via the slide switch on the side of the case. (See Figure 2.0)



Figure 2.0 – Mode selection switch

Encode Mode (Recording) Cable Hookup:

Use the supplied 6' 3.5 mm audio cable to connect GeoAudio+ to the camcorder mic input or DVR (digital video recorder) audio input. (See Figure 3.0 and 4.0)

Camcorder Recording Hookup

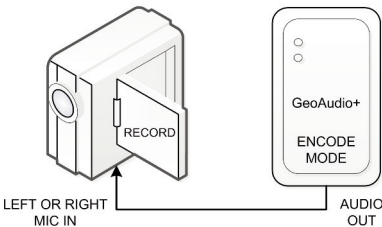


Figure 3.0 – Camcorder Recording Hookup

DVR Recording Hookup

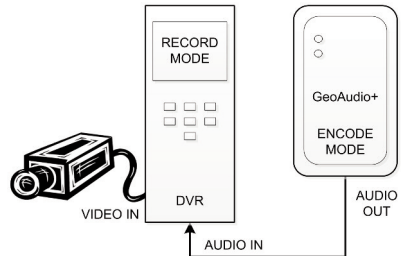


Figure 4.0 – DVR Recording Hookup

An audio adaptor connector may be required.

Encode Mode (Recording) Operation:

After powering-up GeoAudio+ the yellow **GPS Fix** LED on the top of the case will turn on once there is a good GPS fix (a minimum of 4 GPS satellites are being tracked.) If the yellow **GPS Fix** LED does not turn on after approximately 2 minutes then verify that the GeoAudio+ top of the case is facing up to a clear view to the open sky or the optional external GPS antenna has a clear view to the open sky.

Decode Mode (Playback) Cable Hookup:

There are several playback hook-up options:

- Option #1 (see Figure 5.0) - use the supplied 6' 3.5 mm audio cable and 6' USB A-Male to Mini-B cable to connect GeoAudio+ to the user's PC.
- Option #2 (see Figure 6.0) - use the supplied 6' 3.5 mm audio cable and 6' USB A-Male to Mini-B cable to connect the camcorder, GeoAudio+, and the user's PC.
- Option #3 (see Figure 7.0) - use the supplied 6' 3.5 mm audio cable and 6' USB A-Male to Mini-B cable to connect the DVR, GeoAudio+, and the user's PC.

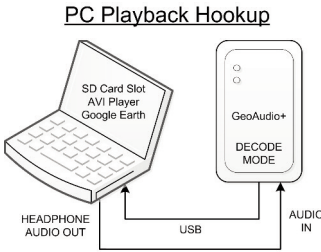


Figure 5.0 – PC Playback Hookup

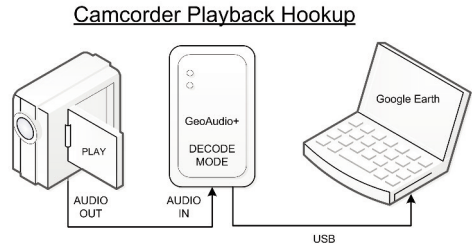


Figure 6.0 – Camcorder Playback Hookup

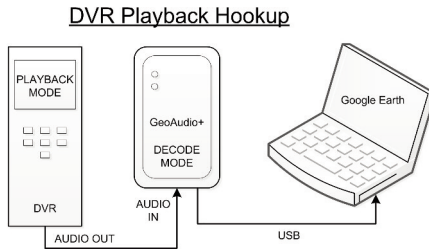


Figure 7.0 – DVR Playback Hookup

Decode Mode (Playback) Operation:

The yellow **GPS Fix** LED on the top of the case will blink during decode mode. For PC operations please see the following sections for USB device driver installation and mapping software configuration. Once the USB device driver has been installed then PC mapping applications such as Google Earth can be used to view when and where the events in the video being played back occurred.

The proper playback audio level must be set for reliable GPS decoding. Start with a low output level then increase until reliable decoding occurs. DO NOT TURN THE VOLUME TO MAX!

GeoAudio+ Windows USB Device Driver and Diagnostic Utility Installation

A USB software device driver must first be installed on a Microsoft Windows® PC before GeoAudio+ can interface with PC applications. GeoAudio+ includes a disc with the Microsoft Windows® USB device driver and GeoAudio+ Diagnostic Utility. Please contact us for information regarding Linux and MAC OS X driver installation.

USB Device Driver:

To install the GeoAudio+ USB driver insert the supplied disc and run CDMxxxxx_Setup.exe. If there are no error messages then the device driver was installed correctly.

The first time GeoAudio+ is connected to the PC and powered on Windows should display two messages “Installing device driver software” followed by “Your device is ready to use.”

GeoAudio+ Diagnostic Utility Installation:

The GeoAudio+ Diagnostic Utility (see Figure 8.0) is a tool for verifying that the GeoAudio+ is connected to the PC properly and decoded GPS information is being received. GeoAudio+ Diagnostic Utility is not required to use GeoAudio+ but helpful for troubleshooting.

To install the GeoAudio+ Diagnostic Utility insert the supplied disc, run setup.exe, and follow the installation instructions.

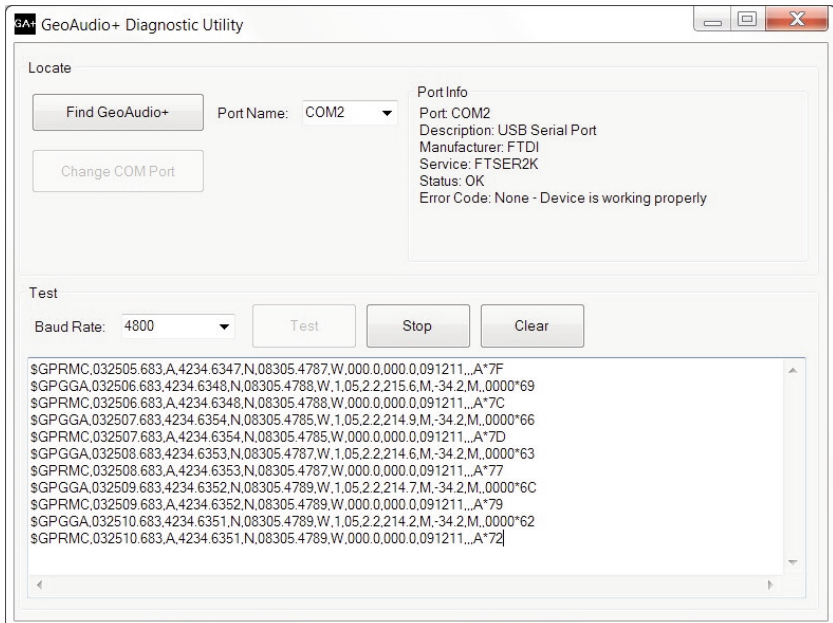


Figure 8.0 – GeoAudio+ Diagnostic Utility

Mapping Application - Google Earth

GeoAudio+ can interface with most GIS (geographic information system) mapping applications such as Google Earth. Google Earth requires a 4,800 baud rate so confirm GeoAudio+ is configured for 4,800 baud (see Dip Switch Configuration above).

The supplied GeoAudio+ virtual COM port software driver causes the GeoAudio+ USB device to appear as a PC serial COM port. Mapping software such as Google Earth can access the GeoAudio+ USB device in the same way as it would access a standard PC serial COM port attached to an external GPS receiver.

To access Google Earth GPS real-time mapping functionality go to the Google Earth's menu bar option "Tool" then select "GPS." From the "GPS Import" window (see Figure 9.0) select the "Realtime" tab. The "protocol" option must be set to NMEA.

Once the "Start" button is clicked then Google Earth will search for valid serial COM Ports. Once the GeoAudio+ serial COM Port is found (GeoAudio+ must be decoding data at that time) then Google Earth will begin updating the map.

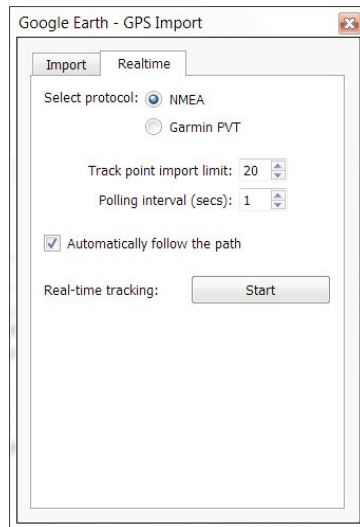


Figure 9.0 – Google Earth - GPS Import Window

Trouble Shooting Tips

Problem	Solution
Green POWER LED off (won't power up)	<ul style="list-style-type: none">• Verify POWER switch in correct position• Verify good AA batteries installed properly
Yellow GPS Fix LED off while in Encode mode	<ul style="list-style-type: none">• Wait 2 minutes for GPS satellite lock• Verify that the GeoAudio+ top of the case is facing up to a clear view to the open sky (for internal GPS antenna version)
Mapping software not updating GPS real-time position	<ul style="list-style-type: none">• Verify cables are connected properly and GeoAudio+ in Decode mode (blinking yellow LED)• Run the GeoAudio+ Diagnostic Utility• Verify GeoAudio+ and DVR devices are configured properly (see configuration section above)• The audio output consists of a “squawking” sound

Warranty & Service

If the product fails to perform as described in our product description or specification, within 1 year from the date of shipment to the buyer, we will repair or replace the product and/or accessories originally supplied. Failure due to improper installation, misuse, abuse or accident is not covered by this warranty. Incidental and consequential damages are not covered by this warranty. The buyer must first obtain a Return Material Authorization number by calling (248) 588-4400, or send email to support@icircuits.com. Ship the defective product (with RMA number) to Intuitive Circuits, 3928 Wardlow Ct., Troy, MI 48083, freight prepaid.

Intuitive Circuits, LLC

3928 Wardlow Ct.
Troy, MI 48083
Voice: (248) 588-4400
Fax: (248) 588-4455
<http://www.icircuits.com>