



VMS-UAV Pin-Out & Troubleshooting Guide

Version 1.0

March 2015



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VMS-UAV Pin-out Guide

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Preface

Who is this guide for?

This guide is for anyone who will be using the VMS-UAV application. If you are reading this, you are probably one of the following types of people:

- Pilots with or without GIS and photography skills. You may even be a member of the Professional Aeronautic Photography Association.
- Vehicle drivers or vessel pilots with or without GIS or photography skills.
- Operators who are skilled with GIS equipment and cameras.
- UAV hobbyists and enthusiasts who like to record video with their UAV (unmanned aerial vehicle).
- Farmers who use UAV technology to help them with agriculture and monitoring large amounts of land.

Why read this guide?

This brief guide explains the various pins on the VMS-UAV, what they do, how they operate together, and how to use the unit.

Section 1. Introducing the VMS-UAV

The VMS-UAV is considered a smaller sized version of the VMS-333, with limited functionality. The VMS-UAV can only embed GPS data as an audio signal to a video recording—very simple, but still very useful.

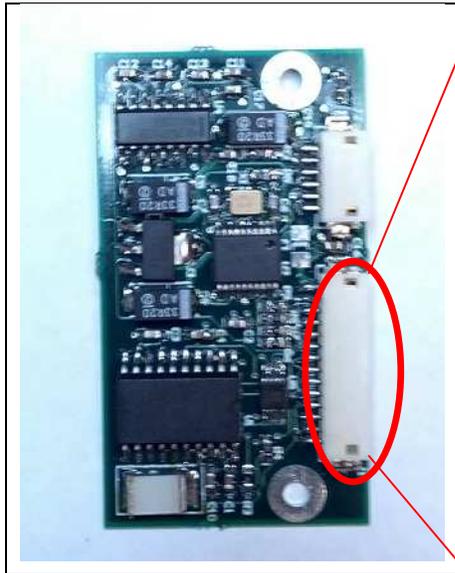
With **VMS-UAV**, you can capture what you see, via an off-the-shelf camcorder, video recorder, or Nikon DSLR camera (with a memory card or hard drive) and embed the converted GPS data as an audio signal into video recordings.

The GPS data is encapsulated in the media files containing the captured video data. These data files are stored on the hard drive or memory card of the video recorder. You can then transfer this data to your personal computer and display the results on a map using isWhere, a Red Hen Systems application. All you need to do is select any video trail on the map to watch the video.

This information can be very useful in corridor management of pipeline and electric transmission right-of- ways. It is also beneficial in managing riparian areas along rivers and streams and other types of corridors, both natural and man-made.

VMS-UAV works with various types of hardwired external (NMEA) GPS receivers. The VMS-UAV can power a compatible GPS antennae, provided it meets the requirements mentioned in the pin-out diagram in [Section 2](#).

Section 2. VMS-UAV Pin Out Description

	Pin #	Description
	1	GPS Power out, 5 VDC
	2	Ground
	3	Feature Trigger 1 (not implemented in firmware yet)
	4	Feature Trigger 2 (not implemented in firmware yet)
	5	GPS IN (RS-232)
	6	SIO OUT or GPS OUT (TTL)
	7	SIO IN or GPS IN (TTL)
	8	GPS OUT (RS-232)
	9	6.5 - 12 VDC IN
	10	GPIO to Z8 chip
	11	Audio Out 1
	12	Audio Out 2 (same output as pin 11)
	13	Audio Ground
	14	Not used

Details

1. Pin1

- The VMS-UAV input power can be between 6.5 and 12 VDC. VMS-UAV uses less than 100 milliamps when operating.
- The LED on the back of the VMS-UAV provides a confirmation "flash" after a successful boot.

2. Pins 5 to 8:

- The GPS input must be the NMEA standard at 4800 baud.
- The LED will periodically flash, indicating that navigation data is being sent to the VMS-UAV.
- If the LED is not flashing, check your wired connections and your GPS antennae.
- Depending on the GPS receiver's output and input signal (RS-232 or TTL), you will use pins 5 and 8 for RS-232, or pins 6 and 7 for TTL.

Note: If you decide to use all four pins (5-8) to input data from *different* devices at the same time, there is a possibility of data loss. For example, suppose you are using a GPS antennae that inputs and receives GPS data on pins 6 and 7 (TTL type signal), while also inputting and receiving Laser Ranger Finder data on pins 5 and 8 (RS-232). In this situation, either the GPS data or the Laser Ranger Finder data may not be sent correctly to the video recording.

To ensure NO data loss, you would use pins 6 and 7 for GPS data –OR– you would use pins 5 and pin 8 for GPS, depending on the signal format (either RS-232 or TTL). You would not use some of the pins for Laser Range Finder data.

Section 3. How it Works

1. The VMS-UAV will begin converting GPS data into an audio signal and sending GPS data to your camera as soon as your GPS receiver has determined its location. **Note:** Please make sure you have an understanding of "cold start," "warm start," and "hot start" when it comes to GPS receivers that are turned on after being off for a certain amount of time.
2. If you connect a speaker to your VMS-UAV, you can listen for the distinct status tones and clicks that indicate the VMS-UAV is functioning properly and is ready to connect to your camera.
3. Once your video has been created, you can view the video with its accompanying track and moving cursor in one of the following Red Hen Systems' software products: isWhere, MediaMapper Desktop, or MediaMapper Server.
4. Most camera video file formats require certain codecs to be installed on your PC in order to play the videos. Install any required codecs you may need and configure them appropriately. For details, go to our Red Hen Systems website, visit the [Download > Manuals](#) page, and scroll down to **Software Manuals** to consult our *isWhere User Guide*, "Section 3. Troubleshooting" or "Section 4. Codec Configuration for Playing Panasonic AG-HMR10 Videos."

Note: If you are using a GoPro camera (or another camera that uses the Advanced Audio Codec) with the VMS-UAV, we suggest you record your video with audio on *both* the left and right audio channels. A stereo-to-mono adapter may assist with this.

Section 4. Troubleshooting

When using the VMS-UAV, you may be tempted to keep your GPS receiver close to your camera; however, this could cause problems in terms of accuracy.

We have tested small lightweight cameras operating in close proximity (within a few inches) to GPS receivers, and have observed a significant reduction in GPS signal strength and number of satellites. Additionally, forums for UAV enthusiasts often include discussions about what happens when they operate their crafts with onboard cameras to record their flights. For example, enthusiasts will set their UAVs to **loiter mode**¹ and have their camera start recording, at which point the UAV begins to fly erratically and sometimes crashes.

We suspect this is because loiter mode relies on having a good GPS lock for the UAV to perform. Most GPS receivers pick up satellite transmissions that are in the 1.5 GHz spectrum. Unfortunately, the cameras placed onboard the UAVs often output electromagnetic noise close to the same 1.5 GHz spectrum used by the GPS receiver, which causes interference. This means the GPS receiver cannot lock onto a satellite and get a good location reading.

There are three methods to compensate for this problem:

1. Increase the distance between the GPS receiver and camera.
2. Add EM shielding between the camera and GPS receiver.
3. Re-orient the camera so that its generated EM field is not in line with the GPS receiver.

Note: To test and evaluate your GPS receiver, visit the website for U-center GNSS evaluation software for Windows:

<https://www.u-blox.com/en/evaluation-software/u-center.html>

¹ **Loiter mode** refers to the UAV staying stationary using the onboard GPS module without any manual control from the operator.