GeoSLAM
ZEB-CAM User Guide

CONTENTS

1. INTRODUCTION

The ZEB-CAM is a colour camera accessory for GeoSLAM's ZEB-REVO portable laser scanner. ZEB-CAM incorporates a Hawkeye Firefly 8S action video camera. The image data collected by the camera can be viewed alongside the 3D point cloud created by the ZEB-REVO and used to extract contextual information.

1.1   SPECIFICATION

Camera Type	Hawkeye Firefly 8S
Mode	Video
Video Resolution	1440p
Frames per Second	30
Image Resolution	1920 x 1440
Field of View	~170°x 90°
Logging Medium	Internal SD card
Power Supply	Internal Battery
Battery Life	1-hour continuous use
Image Syncing	Optical flow using integrated inertial sensor

Table 1-1: Specification

1.2   PRINCIPAL OF OPERATION

The operation of the camera on ZEB-CAM is independent from operation of the ZEB-REVO. The camera must be started and stopped manually at the start and end of each scan. The resulting video data is logged directly to an internal microSD card in the camera.

The video data from ZEB-CAM and laser data from ZEB-REVO are combined in the GeoSLAM Hub processing application. A unique optical flow algorithm is used to determine the relative timing between the video and laser data.

The viewer in GeoSLAM Hub can be used to view the video data alongside the point cloud data from the ZEB-REVO.

1.3 LIST OF PARTS

	Part no.	Description
1	GS_610055	ZEB-CAM assembly
2	RS_609_540	5/32" hex key
3	RS_609_556	3mm hex key
4	WEST_M4_8_CAP_3	3 x M4x8mm caps screws
5	EBU_242163	32GB microSD card
6	EBU_242163	microSD card+ SD adapter
7	EBU_177199	microSD card to USB adapter
8a	RS_121_6578	ZEB-CAM cable –REVO RT
8b	GS_610056	ZEB-CAM cable – standard REVO
9	GS_USB_A_miniB	USB A to Mini B charging cable
10	COMDIR_CSC126 BLK	3 x ZEB-CAM cable clips
11	-	Lens cleaning cloth
12	-	Firefly 8S User Guide

Table 1-2: List of parts

2. SAFETY

2.1 GENERAL SAFETY

The ZEB-CAM camera accessory should only be used by trained operators. Always follow basic safety precautions when operating the ZEB-CAM to reduce the risk of personal injury and to prevent damage to the equipment. Do not operate the equipment with suspected defects or obvious mechanical damage. Please refer all servicing of the equipment to qualified service personnel. Only use the components and accessories supplied with your system or other accessories recommended by GeoSLAM Ltd. Before operating the system for the first time please read this guide.

2.2 SYSTEM DISPOSAL

When the ZEB-REVO Portable Mapping System reaches the end of its life-cycle please dispose of the equipment in accordance with Directive 2002/96/EC on Waste Electrical and Electronic equipment (WEEE).

GeoSLAM Ltd is prepared to take back the waste equipment and accessories free of charge at the manufacturing unit in Bingham, UK for proper treatment with the objectives of the WEEE.

2.3 INSTALLATION

The ZEB-CAM can only be used with be used in conjunction with a GeoSLAM ZEB-REVO handheld laser scanner. For instructions how to mount ZEB-CAM see Section 3.1 Mounting ZEB-CAM

2.4 FURTHER HELP AND INFORMATION

Contact GeoSLAM by any of the following methods:

Phone: +44 1949 831814

Email: info@geoslam.com

Website: www.geoslam.com

3. DATA CAPTURE

This chapter describes how to mount ZEB-CAM to the ZEB-REVO and how to operate ZEB-CAM during REVO data capture.

3.1 MOUNTING ZEB-CAM

If the ZEB-CAM is not already mounted on the ZEB-REVO, mount the camera by following these steps:

1   Remove the ZEB handle by unscrewing the orange knurled wheel at the top of the handle.

2   Fit the ZEB_CAM to the base of the REVO using the 3 x M4x8 caps screws supplied with the ZEB-CAM and tighten with the 3mm hex key. Do not overtighten or you risk stripping the threads in the base of the REVO, just nip the screws tight.

3   Refit the handle into the underside of the ZEB-CAM mount.

4   Connect the Micro-USB end of the ZEB-CAM cable into the socket on the side of ZEB-CAM mount.
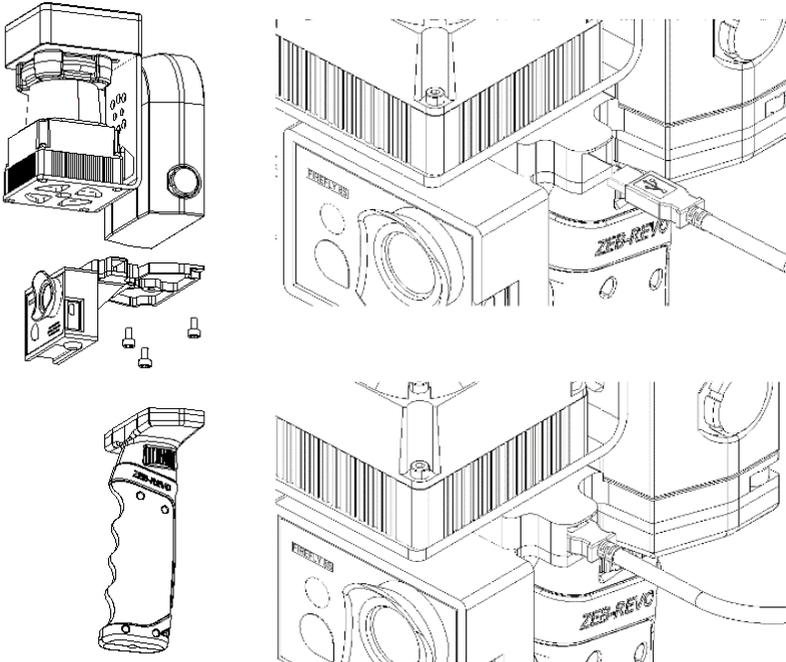
3.2 ZEB-CAM SETTINGS

The Hawkeye Firefly 8S camera is delivered with configuration settings required for use in ZEB-CAM pre-set. If for any reason the camera settings are changed the settings listed in Table 3-1 must be reset to the values shown in order for the ZEB-CAM data to process correctly.

GENERAL SETTINGS	
Quick Capture	On
Delay Off	Off
Light Frequency	Auto
OSD	Off
LCD Brightness	Low
Auto Shutdown	2 min
Screen Off	Off
Status LED	All LED
Beep	On
VIDEO SETTINGS	
Video Resolution	1440P 30fps 4:3
Video Quality	Fine
FOV	Wide
Auto Low Light	Off
Gyro Sensor	-
Motion detect	Off
Dual Files	Off
Video Stamp	Off
Timelapse Video	-
Loop Record	Off
Microphone Volume	Off
Sharpness	Normal
AWB	Auto
EV Value	0.0
ISO	Auto
Metering	Multi

Table 3-1: ZEB-CAM GoPro settings

3.3.1   ZEB-REVO SYSTEM

The section covers data capture with a standard ZEB-REVO system. For ZEB-REVO RT (real-time) users please refer to section 3.3.2

Ensure the microSD card is inserted into the card slot on the back face of the camera (see 5.2 Inserting and removing the memory card).

Ensure there is adequate free space on the SD card.

Ensure the camera battery is adequately charged (see 5.1 Charging the battery).

Connect the ZEB-REVO to the ZEB port on the data logger and connect the ZEB-CAM cable to the AUX port on the datalogger. Turn on the data logger. Once booted, the LED on the ZEB-REVO should pulse red twice per second to indicate that the ZEB-CAM has been detected and the system is in standby mode. Without the ZEB-CAM the LED will pulse once per second.

Initiate a scan as described in the ZEB-REVO User Guide.

After the system has initialised and the REVO LED has changed to green and before activating the rotation of the REVO head, [short} press the Power Button on the front face of the camera.   After approximately 2 seconds the camera emits three beeps, and automatically begins recording video. The Recording Indicator lights up red and the Power Button flashes blue when the camera is recording.

Warning – do not hold down the Power Button [long press]. This will switch the camera from video to time lapse photography mode.   The current mode can be determined by checking the Firefly logo on the front face of the camera. When powered on the logo will light up either:

Blue: Video mode   ✔

Green: Photography mode   ✘

Immediately after starting the video recording, start the REVO rotation by pressing the button on the side of the REVO, pick up the scanner and start the scan.

Perform the scan following the guidelines set out in the ZEB-REVO User's Guide.

At the end of the scan, stop the REVO head rotation and immediately stop the video recording by [long] pressing the Power Button on the front face of the camera. The camera beeps several times and automatically powers off to maximize battery life.

3.3.2   ZEB-REVO RT SYSTEM

The section covers data capture with a ZEB-REVO RT (real-time) system

Ensure the microSD card is inserted into the card slot on the back face of the camera (see 5.2 Inserting and removing the memory card).

Ensure there is adequate free space on the SD card.

Ensure the camera battery is adequately charged (see 5.1 Charging the battery).

Connect the ZEB-REVO to the RT data processing unit as normal and connect the ZEB-CAM cable to the USB socket on the RT data processing unit. Turn on the RT data processing unit and initiate the scan in the same way described in the ZEB-REVO RT User Guide. A camera symbol should be displayed in the user interface to indicate that the camera has been detected.

After the system has initialised and before activating the rotation of the REVO head, [short} press the Power Button on the front face of the camera. After approximately 2 seconds the camera emits three beeps, and automatically begins recording video. The Recording Indicator lights up red and the Power Button flashes blue when the camera is recording.

Warning – do not hold down the Power Button [long press]. This will switch the camera from video to time lapse photography mode.   The current mode can be determined by checking the Firefly logo on the front face of the camera. When powered on the logo will light up either:

Blue: Video mode   ✔

Green: Photography mode   ✖

Immediately after starting the video recording, start the REVO rotation by pressing the button on the side of the REVO, pick up the scanner and start the scan.

Perform the scan following the guidelines set out in the ZEB-REVO RT User Guide.

At the end of the scan, stop the REVO head rotation and immediately stop the video recording by [long] pressing the Power Button on the front face of the camera. The camera beeps several times and automatically powers off to maximize battery life

4. DATA PROCESSING

The ZEB-CAM records video data to an internal microSD card in MP4 format. Remove the microSD card from the camera (see section 5.2) and copy the MP4 file(s)* from the AMBA folder on the SD card to the processing computer using the microSD to SD or microSD to USB adapter.

Select the corresponding video MP4 file(s)* when requested to do so by the GeoSLAM Hub application.

*ZEB-CAM video files are limited in files size to 3GB due to a limitation of the FAT32 disk format. Videos in excess of 3GB (approximately 25 minutes) are split into multiple MP4 files or chapters, each with a common file name plus index number to differentiate each chapter. All chapters must be selected at the start of processing for the data to process correctly.
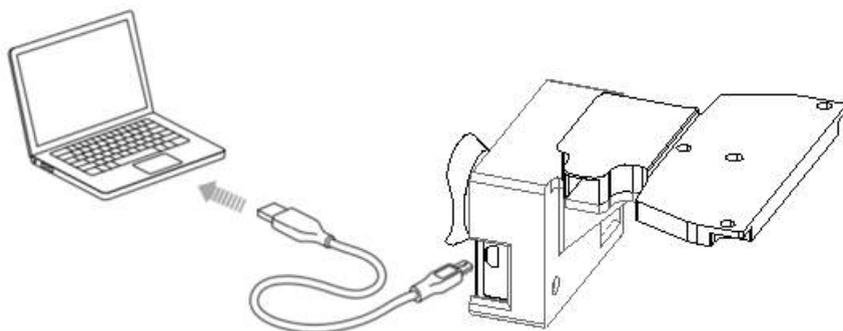
5. ZEB-CAM BASICS
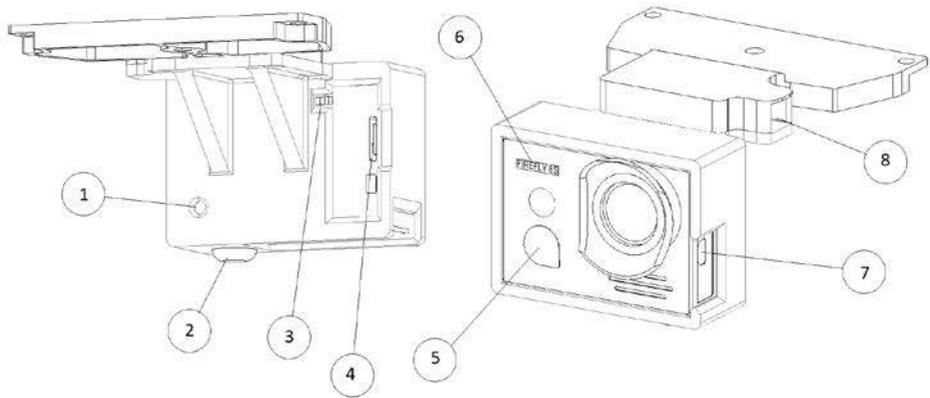
|	
1	Recording indicator
2	Retaining screw
3	Battery status indicator
4	microSD Card Slot
5	Power Button
6	Mode indicator
7	Mini-USB charge port
8	ZEB-CAM cable port

Table 5-1: ZEB-CAM

The integrated battery comes partially charged. No damage occurs to the camera or battery if used before being fully charged. To Charge the Battery:

1	Connect the supplied USB cable to the Mini B USB port on the side of the camera.
2	Connect the other end to a 5V 1A USB power source, e.g. a standard USB port on a computer.
3	Some power sources will cause the camera to power on and start recording. In this case, long press the Power Button to turn off the camera. Charging will continue when the camera is turned off.

The Power Button light blue while the battery is charging and turns off when charging is complete. When charging the camera with a computer, be sure that the computer is connected to a power source. If the camera status lights do not turn on to indicate charging, use a different USB port.
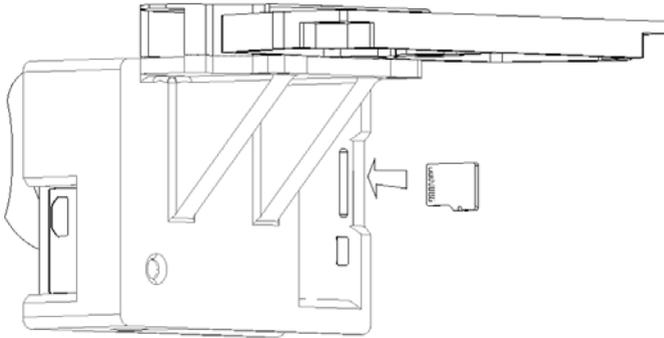
To insert the memory card:

    1   Ensure the camera is powered off.
    2   Insert the microSD memory card into the card slot on the back face of the camera with the label facing away from the camera
    3   Press the card in until it latches in place

To remove the memory card

    1   Ensure the camera is powered off.
    2   Gently press the memory card in to unlatch it.
    3   Carefully extract the memory card

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