

CAMremote-1

Users Manual

Applies to:

Configuration Software Ver.1.3.2

PCB Revision 1.0/1.1

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Revision history:

Revision	Date	Summary of changes
1.0	23-Mar-2008	First release
1.1	28-Jan-2009	CHDK timing changed

Overview

The CAMremote-1 (CR) is a highly integrated device which is designed for many kinds of remote photography. The main features of the CR are:

- Triggers the shutter of the camera using the following methods:
 - USB remote control using Picture Transfer Protocol if available (USB/PTP)
 - USB remote control if [CHDK](#) firmware add-on is installed on Canon cameras (USB/CHDK)**
 - Infrared remote (IR) control
 - Servo motor “finger” which presses down the shutter button of the camera (SERVO-FINGER)
- Triggers video shooting* using USB/CHDK method
- Controls the zoom function of the camera using USB/PTP, USB/CHDK*, IR or servo motor* method
- Controls camera parameters like shutter speed, exposure, focus, etc. using USB/PTP or USB/CHDK method
- Controls the camera's lens open/close and sleep mode control using USB/PTP or USB/CHDK method
- Controls Tilt (vertical) and Pan (horizontal) servo motor control for automatic photography
- Rotating angles of servo rotors are fully configurable
- Programmable intervalometer for automatic photography
- Ability to connect a 2 or 3 channel R/C receiver or any external switch or electronic device to control the CR
- 7 PC configurable profiles for different settings or different cameras selectable in the field
- Four on-board LED's to indicate active profile or status of the device
- Camera settings easily set in the field for use with CR
- Multiple camera triggering when CRs are connected together (for example stereo photography)
- Compatible with DuneCam/KAPsure systems, adds control over shutter/zoom/settings features using USB/PTP or USB/CHDK method
- Upgradeable firmware via USB for product improvements
- Wide supply voltage range from 3V to 16V
- Very low power consumption 1 – 25mA depending on configuration
- Ultra light and extremely compact size
- Product continually improving as a result of the feedback and suggestions of users

* on request

** CHDK firmware enhancement is a 3rd party solution and VP-Systems is not taking any responsibility of using it and cannot guarantee its 100% functionality.

Note that several features listed above are available only when your camera supports one of the following remote control methods: USB/PTP, IR or USB/CHDK. Check the **Compatibility** chapter for more information.

The CR is configurable and upgradeable using PC with Microsoft Windows operation systems (98, 2k, XP, Vista).

Getting Started

This chapter gives brief instructions how to set up the CR with an R/C receiver or servo motors. Not all possible scenarios are covered here. It is highly recommended that the user read the entire manual prior to using the CR.

Begin with step 6 once the CR has been configured by you or the vendor.

1. Short the UPGRADE header by placing a jumper onto the pins
2. Connect the USB cable to CR and to the USB port of your PC
3. Run the configuration software **camremote.exe** (file name may contain the version number)
4. Configure profile Set #1 (or additional profiles) according to your camera(s) and save
5. Remove CR from the USB port of the PC and remove UPGRADE jumper from header
6. Connect the USB cable to CR and to the USB port of your camera if you are going to use USB. If the SERVO-FINGER method is used, connect the servo cable to CH2. Attach IR cable if IR control is going to be used.
7. *External control:* Connect cables from R/C receiver to CH0, CH1 and CH2
Internal control: Connect the pan servo cable to CH0, the tilt servo cable to CH1 and the power supply (battery) to CH2
8. Turn on your camera (**use playback mode** if USB/PTP method is selected)
9. Wait until green LED lit constantly
10. The CR is now set up and ready to use

Compatibility

The CR is able to release the shutter with the SERVO-FINGER method on any camera but if the camera has a built in remote function then there are additional options available for remote control. Currently, the CR is able to handle several USB/PTP, IR and USB/CHDK supported cameras.

USB/PTP

Controllable features of USB/PTP supported cameras are listed in following table:

Camera	Shoot	Zoom	Parameters	Extras	Note
Canon PowerShot A-series: A510, A520, A640 A60*, A70, A75*, A85*, A95*	Ok	Ok	Tv, Av, F, SQ	L, S	
Canon PowerShot A310	Ok	NA	TBD	S	
Canon PowerShot G-series: G5, G6, G7, G9 ¹	Ok	Ok	Tv, Av, F, SQ	L, S	¹ RAW mode is unavailable
Canon PowerShot S-series: S50*, S60, S70, S80, S410*, S500* S1 IS*, S2 IS*, S3 IS* SX100*	Ok	Ok	Tv, Av, F, SQ	L, S	
Canon IXUS series: S110 (Digital IXUS v)* S200 (Digital IXUS v2)* S230 (Digital IXUS v3)* S300 (Digital IXUS 300)* S330 (Digital IXUS 330)* S400 (Digital IXUS 400)* S410 (Digital IXUS 430)* S500 (Digital IXUS 500)* SD100 (Digital IXUS II)* SD110 (Digital IXUS IIs)*	TBD	TBD	TBD	TBD	
Canon dSLR's:	To be supported in near future				
Nikon:	To be supported in near future				

* Not tested yet, may work but probably need improved firmware of the CAMremote-1

Descriptions: (**Tv** – Shutter speed, **Av** – Aperture, **F** – Focus unlock / lock, **SQ** – Size and quality, **L** – Lens open/close control, **S** – Sleep mode, **NA** – Not available, **TBD** – To be defined)

The following cameras have remote control disabled and don't work with CR in USB/PTP mode:

- Canon PowerShot A-series: A410, A420, A430, A450, A460, A530, A540, A550, A560, A570 IS, A610, A630, A650 IS, A700, A710 IS, A720 IS
- Canon PowerShot S-series: S100, SD10, SD20, SD30, SD40, SD200, SD300, SD400, SD430, SD450, SD500, SD550, SD600, SD630, SD700 IS, SD750, SD800 IS, SD850 IS, SD870 IS, SD900, SD950 IS, SD1000

Note that Canon cameras have remote control limitations in USB/PTP mode and several camera features are not available. For example startup time is slower compared to normal camera startup, there are longer pauses between shots, there is a longer latency time between shutter release command and shoot, there are no on-screen display texts/icons on LCD/Video-out, no short post-view after shot, no manual focus (a workaround is available for focus).

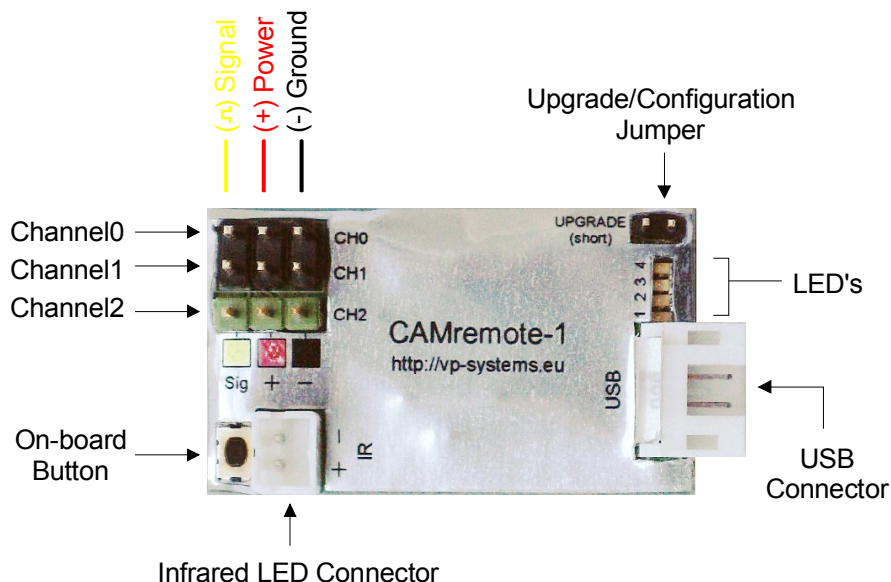
USB/CHDK

The CHDK firmware add-on is a third-party software developed for Canon PowerShot cameras. Remote controllable features are determined by CHDK firmware and user scripts but not by the CR. The CR sends commands to camera via USB but CHDK scripts instruct the camera to perform the operations. The following Canon cameras have remote control support added to CHDK firmware and work in USB/CHDK remote mode:

- Canon PowerShot A-Series: A570, A610, A620, A630, A640, A710
- Canon PowerShot G-Series: G7
- Canon PowerShot S-Series: S2 IS, S3 IS
- Canon IXUS Series: IXUS700/SD500

Visit [CHDK remote control web page](#) to get latest information about supported cameras.

CAMremote-1 Board



Power Supply

The CR can take its power from an R/C receiver connected to any of CR's channels (CH0-CH2) or can be powered from any power source which provides 3V to 16V. If a servo motor is connected to any of channel(s) be sure you don't exceed the maximum voltage that the servos can accept (usually 4.8...7.2V) **otherwise the servo(s) will be damaged!** Supply voltage terminals are (+) and (-) on any channels (CH0-CH2). Read the specifications of your servo motor before applying higher voltages!

WARNING! The CR has no reverse voltage protection circuitry and incorrectly connecting the supply voltage will damage the device!

Onboard LED's

The CR has 4 Light Emitting Diodes (LED's) on board where LED's #1...#3 are red (or yellow) and #4 is green. The LED's show the state of the CR (green LED blinks quickly) when it performs operations. During photography session when green LED is on, red LED's show code of active configuration profile. Indication codes of the configurations are shown in each configuration tab on software window (see more info from chapter **Configuration Software**).

Channels

The CR has 3 bidirectional channels (CH0 – CH2) which receive signals from an R/C receiver (or any other electronics device including mechanical switches) in order to control the functionality of CR. In automatic mode (Intervalometer or Panorama modes) the CR drives servo motors which can be connected to CH0 and CH1. Channel CH2 is used for servo “finger” if needed (custom functionality is also possible upon request).

A USB Connector

USB Connector is used to connect CR to camera or to PC.

Upgrade Jumper

Insert a jumper to the UPGRADE header when configuring the CR or upgrading the firmware. Remove it when starting a photography session otherwise CR stays in upgrade/configuration mode. When CR is connected to a PC, it supplies 5V to CR through USB for powering. Note this voltage goes to terminals (+) and (-) of CH0-CH2. **Remove any power supply from CH0-CH2 during upgrade/configuration to avoid any damage to PC or external power supply.** There is no need to remove any servos connected to CR's channels.

Only the red LED #1 is lit (not blinking) when CR is connected to a PC.

Infrared LED Connector

Connect the infrared LED cable plug to this connector and mount the infrared LED close to the camera's IR sensor. If tiny IR plug is used, attach CAMremote-1 board onto camera so that IR LED points to camera's IR sensor. Use tape or Velcro to attach it.

On-board Button

An on-board button is used to select the desired profile. A short click of the button switches the CR to profile selection mode and the onboard LED's start to blink to display the current profile identification. Pressing the button again selects the next profile and the blinking LED's display the next profile identification. If the button is not pressed for 3-4 seconds, the currently displayed profile will be selected.

Holding the button down for at least 4 seconds instructs the CR to command the camera to release the shutter. This is useful to test the readiness of the camera for a photographic session. Note that CR is able to send this command to camera only when the green LED is lit and the camera is turned on.

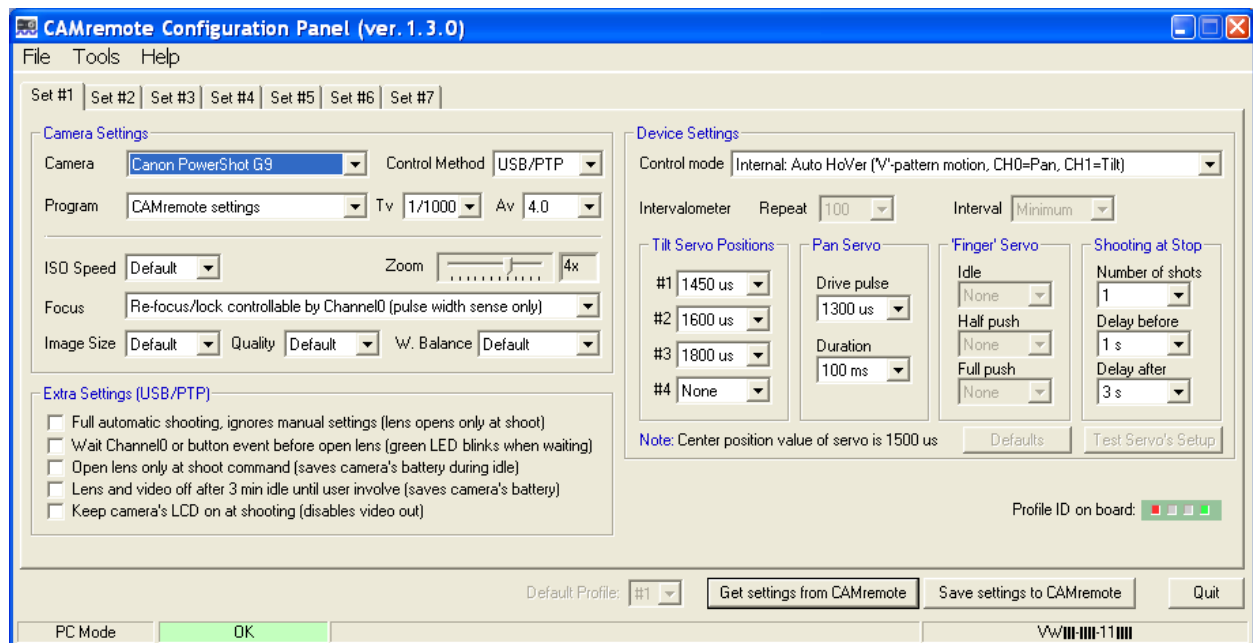
If the button is held down at power on, CR goes into bootloader mode (all LED's blink 14 times). The bootloader mode is useful for recovery if a firmware upgrade has failed and CR is not able to communicate with the PC.

Functions of the on-board button

Short click	Profile selection mode, on-board LED's start to blink showing current profile identification
After short click, press the button until the LED's show the desired profile	Select next profile
3-4 sec click	Shutter release
Hold down at the power on moment	Bootloader mode, LED's blink 14 times

Configuration Software

The CR is programmable using PC with special configuration software. The software runs on Microsoft Windows operating systems (2000, XP, Vista) and CR requires one free USB port. No driver installation is required. The "New Hardware Found" message appears on the screen when CR is first connected to the PC and the operating system automatically installs a suitable driver. Once installed, the configuration software may be run. A screenshot of the software is shown in the following picture.



When the software starts up, it automatically attempts to read configuration data from CR and displays any retrieved items on screen.

The communication status bar is on the bottom of the window. If communication between CR and PC has been successful it displays an **"OK"** message on a green background, otherwise it displays **"CAMremote I/O error"** on a red background.

Seven user configurable profiles are available. Click on tabs **Set#1...Set#7** to open a specific profile for configuration. Every profile includes a graphical representation of CR's on-board LEDs. When CR's on-board LED's are lit in the same configuration the specific profile is selected and active. Note that this profile identification is displayed only when the green LED is lit, otherwise CR may show other operational information on the LED's.

The button **Get settings from CAMremote** reads the configuration data from CR. Click on it if CR is connected to the PC after the software has been started. The button **Save settings to CAMremote** stores all configuration data to CR. Click on it when all profile configurations are completed. This will store all profiles in CR. The CR may now be removed from the PC.

When configuration is completed, the profile settings can be exported to Notepad for printing by clicking on **Profiles to Notepad** from **File** menu. Printed copy would be like a reminder when choosing profiles in the field.

Firmware Upgrade

The firmware of the CR is upgradeable by the user. The configuration software checks the firmware version of CR when the software starts or by pressing the **Get settings from CAMremote** button. The software will suggest that the user upgrade the firmware if it is an older version. Press **Yes** button to perform an upgrade. You can perform a firmware upgrade (or downgrade) manually by selecting **Update Firmware** from **Tools** menu.

Camera Settings

Settings for **ISO Speed, Zoom, Image Size, Quality** and **White Balance** are beyond the scope of this document. They may be found in the camera's User Manual.

The CR software will enable/disable various settings according to selected items. This will help the user to understand which features are available or unavailable in specific modes.

Camera

Choose the exact model of your camera from the list because configuration parameters will vary according to the selected camera. If the camera is not listed, choose the closest model. When use of a camera with CHDK firmware add-on is desired, select from the list **Any (CHDK Compatible)**. When use of a simple servo-triggered camera choose **Any (Uses servo control only)**.

Control Method

Choose a suitable control mode depending on the method you would like CR to interface with your camera: using **USB/PTP, IR, USB/CHDK** or **Servo**. This list will vary according to the selected camera model. Note: when USB/PTP mode is selected CR attempts to communicate with camera before it will be ready for shooting. The red LED #1 blinks at every 3sec intervals until CR is not able to negotiate with camera.

The CR generates pulses on USB when performing commands in USB/CHDK mode. Commands and pulse widths are shown in following table. Use them in your CHDK scripts to detect a right command and instruct the camera to perform the operation.

Command	Pulse width (in milliseconds)
Shutter Release	15 ms
Zoom In	65 ms
Zoom Out	100 ms
Focus	165 ms
Power Off	200 ms

Program (USB/PTP only)

Choose a suitable program from list. Setting options, including **Auto**, **Aperture priority**, **Shutter priority** are not described here but may be found in the camera's User Manual.

The selection **'M' settings (Set on field)** uses the camera's last settings which were manually set when the camera dial was on the 'M' position. This allows the photographer to set the camera settings manually before starting a new photography session with CR. Note that some cameras have C1 and C2 settings but those are not accessible in USB/PTP mode and will be ignored.

The selection **CAMremote settings** allows the CR to use settings (**Tv, Av, ISO, Quality/Size, White Balance**) set by the configuration software. Note when **CAMremote settings** is selected it will overwrite the camera's last manual settings during photography session.

Focus (USB/PTP only)

Manual focus is not available in USB/PTP mode. A workaround is to point the camera toward an object, command CR to perform focusing, and then lock the focus. Note that focusing always takes time before shooting so try to keep the need for focusing minimal if fast shooting is important. Choose a suitable focusing method from the list according to your requirements. Re-focusing can be controlled manually by the user during photography session when choosing **Re-focus/lock controllable by Channel0**. Read more info from chapter **Device Settings**.

Extra Settings (USB/PTP only)

Full automatic shooting, ignores manual settings (lens opens at shoot) – This setting uses camera feature to open lens and shoot picture using automatic shutter speed and aperture parameters and ignoring all user settings. This is same command Windows sends to camera when user clicks on **Take a new picture** link on the Camera Task window (XP, Vista only). After shooting the camera closes the lens.

Wait Channel0 or button event before open lens (green LED blinks when waiting) – This setting waits for an external signal to be applied to Channel0 or waits for a button click before CR opens the lens. This is useful when CR and the camera are powered up but there is need to protect the camera lens during the setup of the photographing system (pole, helicopter/plane/kite lift-off etc).

Open lens only at shoot command (saves camera's battery during idle) – This setting opens the lens only when shoot command is detected. The CR applies all settings to the camera which are defined in the **Camera Settings** frame of the configuration software. Note: it requires a few seconds before the camera opens the lens, starts up and is able to shoot a photo. This is useful when using long time photography like astronomy, observing plant growth etc. After shooting the Camera closes the lens and thus the camera goes into low power mode.

Lens and video off after 3 min idle until user involve (saves camera's battery) – This setting enables the power save feature of the camera where after 3 minute idle time (no activity on input channels, button or intervalometer) the camera closes the lens and goes into low power mode. Any interruption from channels, button or intervalometer will wake the camera up. Note: it requires a few seconds before the camera opens the lens, starts up and is able to shoot photos.

Keep camera's LCD on at shooting (disables video out) – This setting turns the LCD on and disables the video signal on the video terminal. This is useful when testing the CR on the bench.

Device Settings

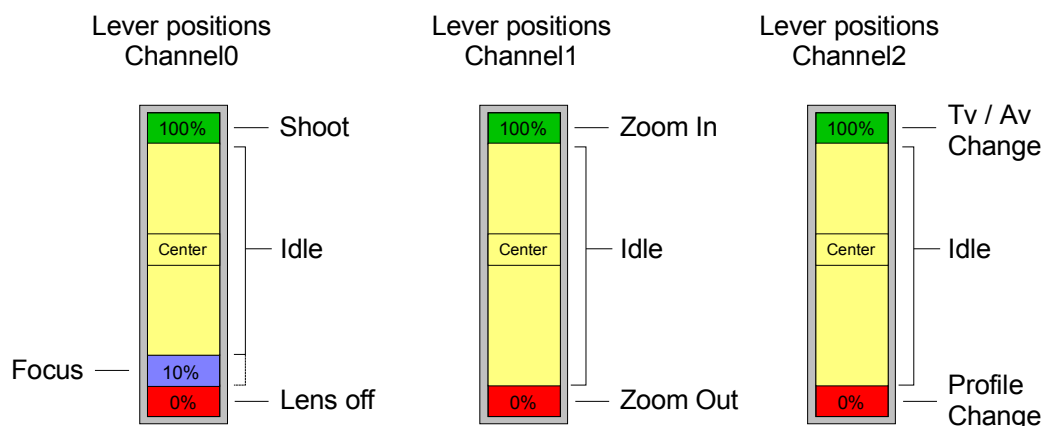
Device settings let the user choose the operating mode of the CR and configure several servo motor related parameters.

Note that zoom, focus, lens control and Tv/Av (shutter speed/aperture) control are available only if your camera supports USB/PTP mode. For CHDK-compatible cameras, special CHDK scripts may be used to control a variety of camera settings and features. More info about CHDK scripts will be available on the CR web page (soon).

Control Mode

Control Mode setting is used to set how CR is controllable: externally by user (or any electronic device) or internally by CR program. Channels CH0-CH2 of the CR are inputs when selected value is **External** and CR is waiting commands via Channels. If selected value is **Internal** then channels of the CR are outputs in most cases (are able to drive servos). There are 6 options how CR can be controlled. More info about these options are listed below.

External: 3-channel RC receiver (CH0=Shoot, CH1=Zoom, CH2=Alt) – This setting configures Channel0-2 (CH0-CH2) to inputs and shoot, zoom and Tv/Av parameters are externally controllable by RC receiver. Channels are sensible to pulse width coding signal. Most RC transmitters/receivers are generating pulse width from 1 milliseconds (0%) to 2 milliseconds (100%) according to position of lever on control panel of transmitter. Descriptions of lever positions and how CR interprets them are shown in following picture.



CH2 is used to define functionality of CH0 and CH1. When CH2 is on idle position or left connected then CH0 can be used to trigger the shutter, re-focus (optional, depending on *Focus* setting) and lens on/off control and CH1 can be used to control the zoom of the camera. Move lever to 100% to shoot the photo. Keep it on that position to repeat a shooting. Move it to center position to stop shooting. Camera closes the lens if lever is set to minimum position (0%) and wakes up when moved away from minimum position. Useful before completing the session to keep camera in safe condition (during descent of the helicopter/kite/pole/blimp etc).

When CH2 is at maximum position (100%) then CH0 can be used to change shutter speed value and CH1 can be used to change aperture value. Value increases by one step if lever is set to max position and decreases when position is set to min. Center position is idle.

When CH2 is at minimum position (0%) then CH0 can be used to change configuration profile. Move CH0 lever to 0% and back to idle position to change profile to previous one. Move CH0 lever to 100% and back to idle position to change profile to next one. Note: only same type of Control Mode profiles are available, others are ignored. Use on-board button to change any profile.

External: Rising edge sense (CH0=Shoot, CH1=Zoom+, CH2=Zoom-) – This setting configures CH0-CH2 to inputs where shoot (CH0), zoom-in (CH1) and zoom-out (CH2) are externally controllable by rising edge of the signal. Signal source can be whatever electronic device like microcontroller, motion detector or simple switch (or button) which provides voltage to input pin(s). Simplest way to generate rising edge signal is to short **Signal** and **(+)** pins for a moment.

External: By DuneCam/KAPsure (shutter/zoom/settings via CH0) – This setting configures CH0 to input and shoot, zoom, lens open/close and Tv/Av settings are externally controllable by DuneCam, KAPsure or any other programmable electronic system. CH0 is sensible to pulse width coding signal. Pulse width and its related commands are shown in following table.

Pulse Width (in microseconds)	Command
2000	Shoot
1900	Lens Close / Sleep
1800	Re-focus / Lock focus
1700	Zoom-In
1600	Zoom-Out
1500	Next Profile
1400	Previous Profile
1300	Shutter speed increase (Tv+)
1200	Shutter speed decrease (Tv-)
1100	Aperture increase (Av+)
1000	Aperture decrease (Av-)

Use scripts to perform Lens close/open, Zoom, Tv/Av and Profile change. Use Shoot command to wake up the camera if it was commanded to sleep. Read DuneCam Users Manual to get more info how to create and use scripts.

Internal: Intervalometer – This setting sets CR to an automatic shooting mode where the shooting interval and count are user selectable. Choose the maximum number of shots desired from the **Repeat** list and the desired time interval between shots from the **Interval** list. Note: the shooting operation requires a few seconds to complete which causes an additional delay to the interval. Select the value **Minimum** from the **Interval** list if the fastest possible shooting is required. The camera closes the lens and goes into sleep mode when the shooting counter reaches the maximum value selected from the **Repeat** list (USB/PTP mode only). Hold down the onboard button for 3-4 sec to restart the shooting sequence.

Internal: Auto HoVer ('V'-pattern motion, CH0=Pan, CH1=Tilt) – This setting sets CR to an automatic shooting mode with programmable pan and tilt positions. A 360° modified pan servo is connected to CH0, and a tilt servo is connected to CH1. Depending on the camera being used, the user can choose to trigger the camera using USB, IR, or a finger-servo (use the special Y-shaped servo extension cable to connect both the finger-servo and power supply to CH2). The pan and tilt positions are programmable via the **Tilt Servo Positions** and **Pan Servo** lists. The CR uses the following sequence when controlling the servos: tilt to position #1, position #2, position #3, position #4, then pan using user-selected **Drive Pulse** and **Duration** values. CR then repeats the sequence. At every tilt position, the camera shoots the number of photos chosen in the **Number of Shots** list. To prevent camera shake due to servo movements, select suitable time values from the lists **Delay Before** and **Delay After**. If **IR** is selected from the **Control Method** in **Camera Settings** frame, use suitable **Delay After** value to allow camera to complete the shoot command before next step (usually 3-7 sec depends on shutter speed and image size).

Internal: Auto Panorama (CH0=Pan) – This setting sets CR to automatic shooting mode where CH0 is driver for a horizontal (Pan) servo motor. The CH2 will be a servo-finger driver if **Servo** is selected from the **Control Method** in **Camera Settings** frame. The desired amount of pan servo rotation is user programmable via the **Pan Servo** list. After each servo rotation, the camera shoots the number of photos selected in the **Number of Shots** list. To prevent camera shake due to servo movements, select suitable

time values from the lists **Delay Before** and **Delay After**. Either a 360° modified servo or a Parallax (Futaba) Continuous Rotation servo should be used. If **IR** is selected from the **Control Method** in **Camera Settings** frame, use suitable **Delay After** value to allow camera to complete the shoot command before next step (usually 3-7 sec depends on shutter speed and image size).

Recommended pan and tilt settings:

Tilt Servo Positions is used to select desired tilt. There are 4 positions available. Choose **None** if you want to skip any position(s). The listed values are in microseconds. A value of approximately 1000us will move the tilt servo to one extreme (either horizon or straight down) and a value of approximately 2000us will move the servo to the other extreme. A value of 1500us will move the servo to a center position (approximately 45°). These values are rules of thumb, and most servos are able to rotate more than 180°, so you can experiment with larger or smaller values too.

Pan Servo parameters are used to control a Pan servo position. A 360° modified servo or a Parallax (Futaba) Continuous Rotation servo should be used. When a 360° modified servo is used, use the Drive Pulse parameter to set the direction of the rotation. Usually 1500us is the center point but this may vary depending on the modification. The servo rotor turns left if the value selected is less than the center value and turns right if the value selected is greater than the center value. The servo makes a smaller rotation if the value selected is closer to center point. Use the **Duration** setting to determine how long the servo motor is driving its rotor. For example the servo rotates about 45° if the **Drive Pulse** is set to 1400us and the **Duration** is 400ms.

When a Parallax CRS servo is used, the **Drive Pulse** parameter can vary from 100us to 2000us.

You may need to experiment with different values to find a suitable combination.

Support

CAMremote is continually improving as a result of the feedback and suggestions of users. Ideas for improvements and requests for new feature are welcome and greatly appreciated. Bug reports will be investigated and corrected as soon as possible. To report a problem or request a new feature, please contact us by email at support@vp-systems.eu or through our web page <http://vp-systems.eu> -> Contact. Visit CAMremote's [support page](#) to get updated software and documentation.

Troubleshooting

If an error occurs, please consider the following instructions. If you are unable to solve the problem, please contact us by e-mail or through our web page. Please don't try to repair the device yourself or you will void the warranty.

Problem	Cause	Solution
All LED's are on after power on	CR didn't start correctly	Unplug CR from power supply or from USB port of the PC and plug again
All LED's blink 14 times after power on	Firmware of CR is corrupted	Update the firmware using configuration software
All LED's are off after power on	No power supply on CH0, CH1 or CH2. If connected to PC, no jumper inserted to UPGRADE header	Check wires of power supply and polarity of connector which is attached to CH0-CH2. If upgrade/configuration mode is in use, insert jumper to UPGRADE header
Only LED #1 is remains on after startup and camera doesn't shoot	CR is in upgrade/configuration mode	Remove jumper from UPGRADE header

Specification

Board size 36 x 21 mm (1.42" x 0.83")

Board weight 3g (0.106 oz)

Board weight with USB and three servo cables 18 g (0.635 oz)

Supply voltage 3...16 V

Power consumption without servos 1-25 mA

Channel connectors: 3-pin JR/Futaba style

Maximum input voltage on Signal pin of CH0-CH2 10 V (survival)

Warranty 1 year.