PHANTOM REMOTE CONTROL UNIT

PHANTOM

VISION RESEARCH

AMETEK®
MATERIALS ANALYSIS DIVISION

MANUAL

When it's too fast to see, and too important not to.®

www.phantomhighspeed.com

Firmware Version 6.0

PN: ZDOC-64063-MA-0001 Rev 6.0
Last Updated: 18.MAY.2016

VISION RESEARCH

PHANTOM

when it's too fast to see, and too important not to.®

Phantom Remote Control Unit (RCU-2)

MANUAL

100 Dey Road
Wayne, NJ 07470 USA
+1.973.696.4500

www.phantomhighspeed.com

AMETEK®
MATERIALS ANALYSIS DIVISION

www.phantomhighspeed.com

Written and produced by the Marketing Department at Vision Research.

PN: ZDOC-64063-MA-0001 Rev 6.0
Last Updated: 18.MAY.2016

Contents


Menu
Video
RC
CAM
HOME
Status
Setup
Capture
Play
800 x 600
1000fps
1pif
VISION
RESEARCH
RC

1 Introduction

Key Benefits

The Phantom Remote Control Unit (RCU-2) is an ideal companion to your Phantom digital high-speed camera. The small, lightweight, handheld controller allows you to control most settings on Phantom cameras, as well as view and save recorded cines - it even doubles as a video monitor.

The ergonomic design of the Phantom RCU-2 allows you to hold it in one hand while using the other hand to manipulate settings; you can set it on a horizontal surface. You can also set it on a horizontal surface or attach it to the camera using a 1/4-20 mounting point on the bottom of the unit.

The 5" active TFT display is easy to see - even outdoors. The sensitive touch screen allows you to completely control a camera with just the tap of your finger. A scroll / jog dial gives you an alternate (and fast!) way to change many settings or to scrub through a recorded Cine.

Just 7" wide, 4" tall and 3-1/2" deep at the hand-grip / battery compartment, and weighing only 26 ounces, the RCU-2 is big enough to use a video monitor, and small enough to be truly hand-held (17.75cm by 10.2cm by 8.9 cm, 740 gm.)

The RCU-2 can also be powered by battery. This is needed if you want to use the RCU-2 to set up several cameras without the need to restart the RCU-2 each time, or if you are working in a wireless use model.

The Remote Control Unit is not compatible with the all Phantom camera models.

controls


A
B
C
D
E
F
G
Status
HOME
Setup
Capture
Play
800 x 600
1000fps
1pf
VISION
RESEARCH
RC

Active LCD Touchscreen (A)

The 5Æ diagonal, 800 x 480, Active Touchscreen TFT, (Thin Film Transistor- Liquid Crystal Display), LCD allows the end-user to control a Phantom camera.

Menu/Power Button (B)

Used to Power Up the RCU-2. When depressed the RCU-2 will start the power up self diagnostic routine that will take approximately 30-seconds to complete.

It is also use to Power Off the unit. To power off the unit hold the Menu button in for approximately 6-seconds.

The Menu/Power button will restore the menu system view if it is hidden, or, take you back to the Home screen if the menu is already visible.

Video Button (C)

Allows you to sequence through several useful views of the live image to help you prepare your shot. Tap it once to see a full-screen live image, tap it again to get a 1:1 zoom, a third tap will display an image where any saturated pixels are shown in false color.

A/B Buttons (D, E)

The two user-programmable buttons (A and B) are used to apply user-defined profiles, which incorporates several common camera functions, including the ability to load a saved camera setup, to the compatible camera with the press of a button.

Capture/Trigger Button (F)

Used to place the camera into the recording mode, or if already in the recording mode it is used to trigger the camera.

Scroll/Jog Dial (G)

Provides an alternate (and fast) way to change many settings or to scrub through a recorded Cine. It is also used to remotely focus lenses when a compatible Canon EF mount lens is in use.

connectors

Type A USB Interface (A)

Used to save/load user-defined profiles, (see 'Display Screens'). It is also used to upgrade the RCU-2 or Break-out-Box firmware from a Type A USB drive.

Battery Compartment (B)

Contains a BP-511 battery, providing up to 2 hours of battery operation, and doubles as the hand grip for the Remote Control Unit.

Optional Bluetooth™ Antenna (C)

Enables wireless control of a user specified Phantom camera.

Remote Port (D)

Used to connect the RCU-2 to a Phantom camera directly or through a Break-out-Box. It also provides the following signals:

- 24VDC: Nominal power supply voltage The acceptable power supply range is 12VDC to 36VDC. The power supply inputs are protected against polarity reversal, with a shunt diode fused by a 1.25A PTC resetable fuse.
- RS232 Transmit Data1 and RS232 Receive Data1 signals: provide an asychrounous port.
- RS232 Transmit Data1 and RS232 Receive Data1 signals: provide a secondary asychrounous port, however this port is for use by Vision Research Engineering only.
- Analog Video Input: a standard level, 75-ohm input that is not isolated. The input is properly terminated, (75-ohm), to drive analog NTSC or PAL video output from an attached camera.

HD-SDI Interface (E)

Used to provide video to the RCU-2. The serial digital interface coaxial cable with BNC connector has a nominal impedance of 75 ohms. The specified signal amplitude at the source is 800 mV (±10%) peak-to-peak for lower voltages may be measured at the receiver owing to attenuation. Using equalization at the receiver, it is possible to send 270 Mbit/s SDI over 300 meters without the use of repeaters, but shorter lengths are preferred. The HD bit rates have a shorter maximum run length, typically 100 meters.

2 Basic Configurations

Overview

Available in wired and wireless models, the RCU-2 supports the entire high-speed imaging workflow. Set up the camera, trigger the shot, view the Cine on the LCD screen, trim to the frame of interest, and save the result to a Phantom CineMag.

VRI-BT-Dongle-II

Most Phantom camera models are compatible with the RCU-2. Modern v-Series, UHS and Cinema camera models (for example: vXX1 Series, UHS Series, Flex, Flex4K, P65, and HD Series) have a dedicated 'Remote' port that will connect directly with a Remote cable, or are compatible with the BT-Dongle for wireless operation with the Bluetooth version of the RCU.

VRI-CBL-MIRO-RCU

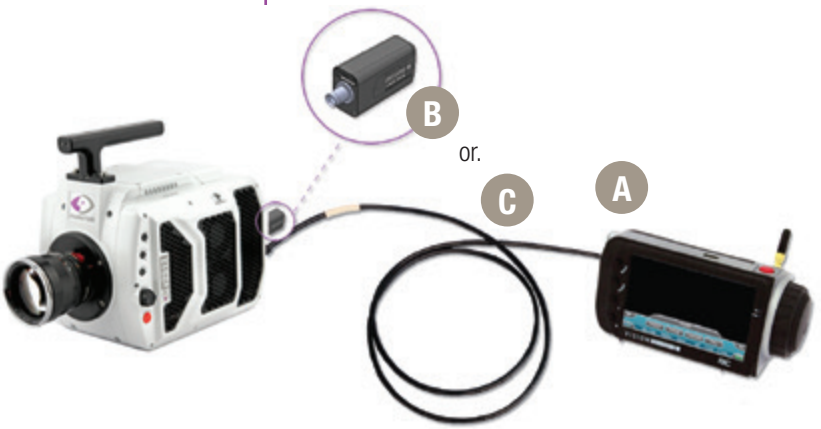
All Phantom Miro cameras require an adapter cable which connects to the power port. For Miro cameras with SDI video, a separate SDI cable will be required for a video preview. Miro camera models do not support Bluetooth wireless operation.

VRI-BOB-RCU
VRI-BOB-RCU-TT

On legacy v-Series cameras without a remote port, the Break-Out-Box (pictured) is required. The Break-Out-Box (BOB) is available with (not shown) and without Bluetooth capability. It is also available with (shown) or without external mechanical shutter cable.

Phantom Cameras w/Remote Port

The configurations shown here are for camera models that include a 'Remote' hardware port on the camera, including the Phantom UHS-Series, Phantom VXX1 Series, and the Phantom Flex, Flex4K, P65, and HD camera models.



VRI-RCU-BT-KIT-REMOTE includes:

A — VRI-RCU-BT; Wireless RCU for Phantom UHS, VXX1, Flex, Flex4K, P65, HD cameras.

B — VRI-BT-DONGLE-II; Module - Bluetooth Dongle for camera, and

C — VRI-RCU-HD65CABLE-2; Cable - RCU direct to Remote (on-camera) port; 2 meters

Wireless mode does not provide a video display on the Remote Control Unit.

VRI-RCU-KIT-REMOTE-2 includes:

A — VRI-RCU; Wired RCU for Phantom UHS, VXX1, Flex, Flex4K, P65, HD cameras.

C — VRI-RCU-HD65CABLE-2; Cable - RCU direct to Remote (on-camera) port; 2 meters

Miro Cameras

The configurations shown here applies to all Miro camera models. Miro cameras do not support wireless connection via Bluetooth.

VRI-RCU-KIT-MIRO-M includes:

A — VRI-RCU; Remote Control Unit 2 for Miro cameras.

B — VRI-CBL-RCU-BOB-0R6; Cable, RCU to BOB or VRI-CBL-MIRO-RCU 0.6 METERS

C — VRI-CBL-MIRO-RCU; Cable Miro M/LC/R/C to RCU (Y-Cable) converts Miro power to power and RCU ports

Legacy v-Series Cameras w/o Remote Port

The configurations shown here are for camera models that include the large 19-pin Amphenol capture connector and without the dedicated 'Remote' port.

VRI-RCU-BT-KIT-VSERIES includes:

A VRI-RCU-BT; Wireless RCU for VXX10 VXX0 VXX1 & VXX2 Series cameras.

B VRI-BOB-RCU-BT-2 [1]: Break-Out-Box (BOB) for VXX10 VXX0 VXX1 & VXX2 Series cameras, includes RCU port, and Bluetooth

C VRI-CBL-RCU-BOB-2; Cable, RCU to BOB

Wireless mode does not provide a video display on the Remote Control Unit.

VRI-RCU-KIT-VSERIES-2 includes:

A VRI-RCU; Wired RCU for VXX10 VXX0 VXX1 & VXX2 Series cameras.

B VRI-BOB-RCU-2 [1]: Break-Out-Box (BOB) for VXX10 VXX0 VXX1 & VXX2 Series cameras, includes RCU and Power ports

C VRI-CBL-RCU-BOB-2; Cable, RCU to BOB

[1] BOB available with external mechanical shutter cable (not shown) supplies power to external mechanical shutter.

3 Quick Start

Connect RCU-2 to Camera w/Break-out-Box

Connect the BOB-RCU-2 Break-out-Box cable to the Capture port of the camera.

Connect the RCU-2 to Remote cable between the Remote ports of the RCU-2 and Break-out-Box.

Attach the Phantom camera Power Supply Adapter's 4-pin connector to the 20-36VDC/5A Max connector of the break-out box.

Plug the Power-Supply Adapter into the AC power source.

Connect RCU-2 to Camera w/o Break-out-Box

Connect the RCU-2 to Remote cable between the RCU-2 unit and the camera.

Connect a BNC cable between the 'video-in' on the RCU-2 and the HD-SDI on the rear panel of the camera (if available).

Connect RCU-2 to Miro using Y-Cable

If a Miro M/LC/R/C camera is to be connected to an RCU-2 connect it to the single end of the RCU (Y-Cable) to the camera.

Connect the Miro power supply to the appropriate connector on the dual side of the Y-Cable, and lastly connect the RCU-2 to its appropriate dual side connector of the Y-Cable using an RCU to Miro (0.6 meter) cable.

Power Up RCU-2

With power applied to the Phantom camera, power on the Remote Control Unit by depressing the hardware MENU button on the Remote Control Unit.

Set Recording Parameters

Gently depress the 'Setup' button, then the Acq, (Acquisition), button.

Set the'Aspect Ratio': Press the down-arrow (right of 'Aspect Ratio' field) and select an 'Aspect Ratio' from the pull-down selection list.

Define the Resolution, Frame Rate, Exposure, and Post Trigger settings using the Numerical Keypad to specify the desired setting.

To overwrite the present value:

1. Tap the entry field once, (turn entry field yellow), then
2. Tap the key pad to enter the desired value.
3. Tap the Enter key to set the value.
4. To append the value:
5. Tap the entry field twice, (turns entry field white), then
6. Tap the key pad to append the value.
7. Tap the Enter key to set the value.

Press the Return,  icon (upper-left) to return to the Setup Screen.

Perform CSR

Press the 'Capture' button.

Tap the CSR, (Current Session Reference), button

When prompted tap the Begin button.

Perform White Balance (Color Cameras Only)

Tap the 'White Balance' button.

Place a white or neutral non-saturated object in front of the camera.

When prompted tap the Begin button.

'Arm' Camera

Press the Rec, (Record), button.

Trigger

Apply a trigger to the camera by depressing the hardware Trigger' button (on RCU-2), or apply 'Trigger-In' (TTL pulse) signal to the Trigger connector.

Edit Cine

Click the Play button.

Locate the first/last image to be saved by performing a Quick Search:

- Rotate the Jog/Scroll dial until desired point in Cine is achieved, or

- Press and hold down on 'Image Location Identifier' arrow,  , located just below the Cine Editor Bar and slide finger right to quickly advance Cine, slide left to quickly rewind (present image number is displayed above).

Using Video Control buttons:

 Play

 Reverse

 Pause

Click the Mark-In  and Mark-Out  buttons to set the first/last images, respectively, of the Cine to be saved.

Save to CineMag/CineFlash

Tap the 'Save' button to save the edited RAM Cine file to the Phantom CineMag or CineFlash.

Capture the Next Clip

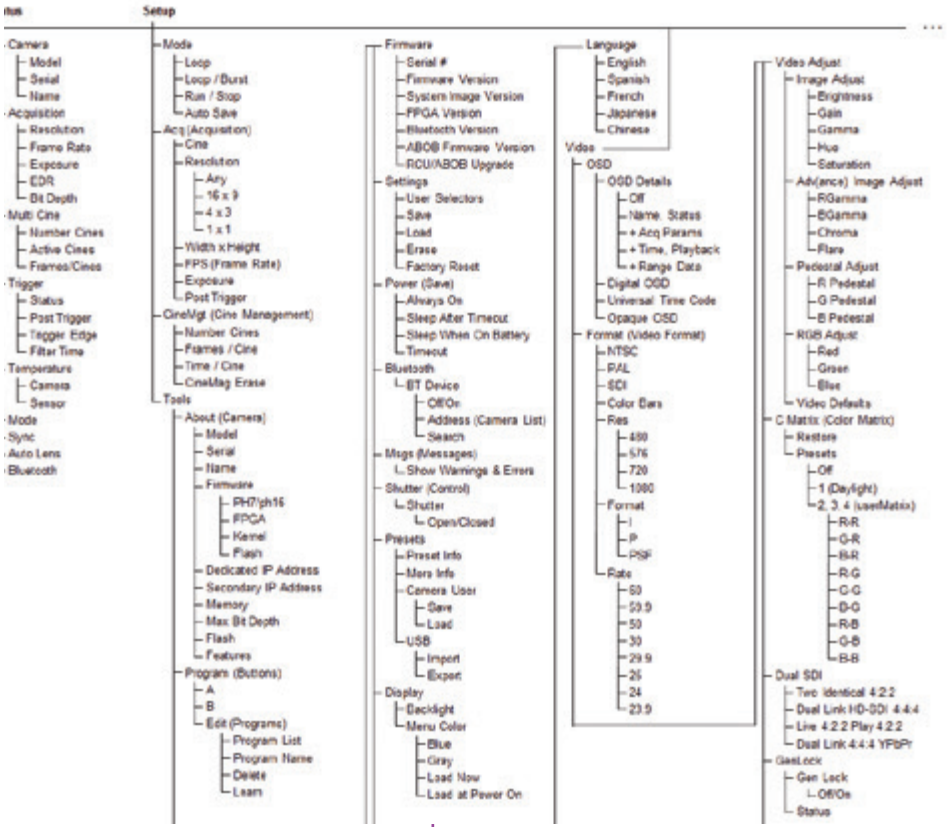
Press the Return button.

Press the Capture Button.

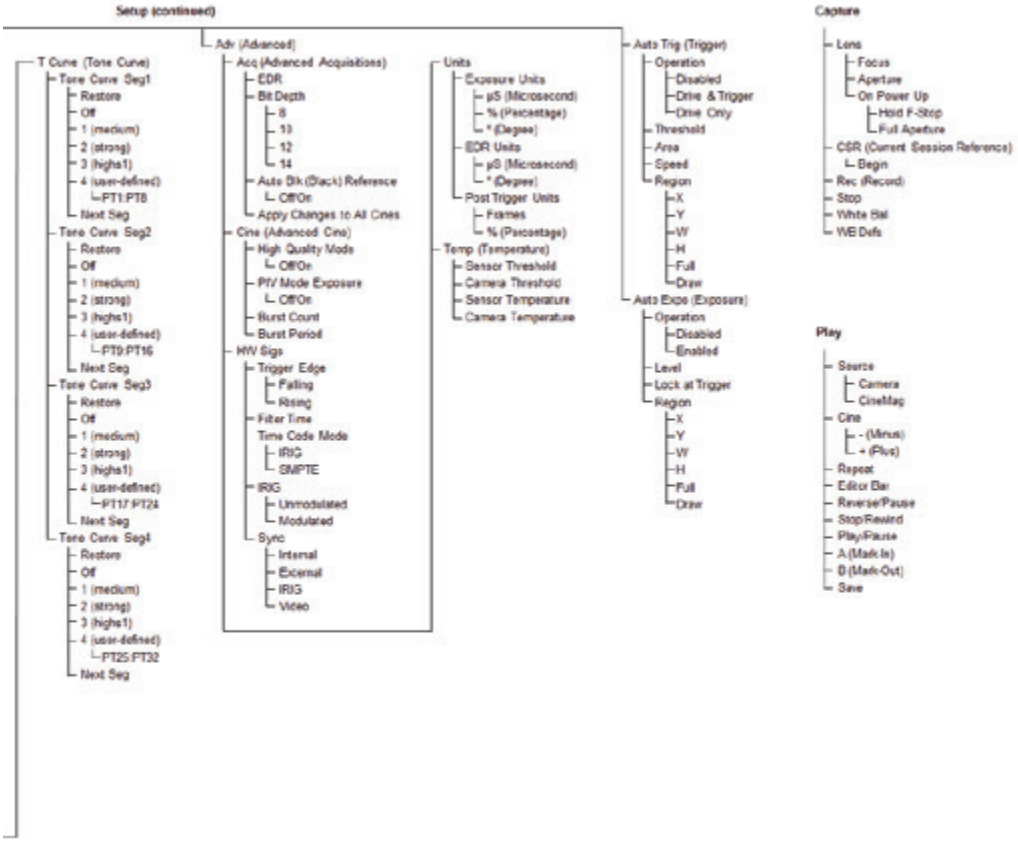
In the 'Cines are recorded in volatile memory of this camera' window, select 'Record' to delete the cines & start a new recording.

In the 'Select 'Preview' to delete the cines & wait for pretrigger' warning message, press the Close button.

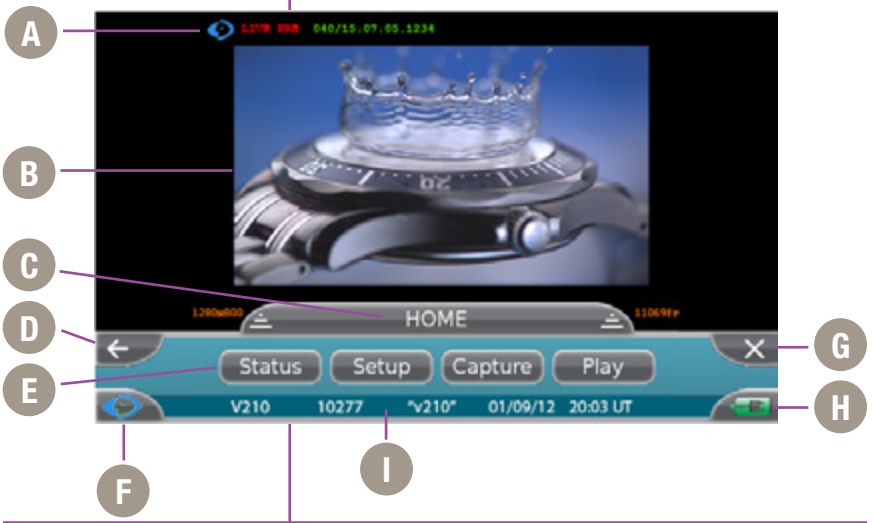
Press the Record button to erase the clip in RAM and begin recording the next shot.


Setup
Camera
Model
Serial
Name
Acquisition
Resolution
Frame Rate
Exposure
EDR
Bit Depth
Multi Cine
Number Cines
Active Cines
Frames/Cines
Trigger
Status
Post Trigger
Trigger Edge
Filter Time
Temperature
Camera
Sensor
Mode
Sync
Auto Lens
Bluetooth
Mode
Loop
Loop / Burst
Run / Stop
Auto Save
Acq (Acquisition)
Cine
Resolution
Any
16 x 9
4 x 3
1 x 1
Width x Height
FPS (Frame Rate)
Exposure
Post Trigger
CineMgt (Cine Management)
Number Cines
Frames / Cine
Time / Cine
CineMag Erase
Tools
About (Camera)
Model
Serial
Name
Firmware
PH7\ph16
FPGA
Kernel
Flash
Dedicated IP Address
Secondary IP Address
Memory
Max Bit Depth
Flash
Features
Program (Buttons)
A
B
Edit (Programs)
Program List
Program Name
Delete
Learn
Firmware
Serial #
Firmware Version
System Image Version
FPGA Version
Bluetooth Version
ABOB Firmware Version
RCU/ABOB Upgrade
Settings
User Selectors
Save
Load
Erase
Factory Reset
Power (Save)
Always On
Sleep After Timeout
Sleep When On Battery
Timeout
Bluetooth
BT Device
Off/On
Address (Camera List)
Search
Msgs (Messages)
Show Warnings & Errors
Shutter (Control)
Shutter
Open/Closed
Presets
Preset Info
Mars Info
Camera User
Save
Load
USB
Import
Export
Display
Backlight
Menu Color
Blue
Gray
Load Now
Load at Power On
Language
English
Spanish
French
Japanese
Chinese
Video
OSD
OSD Details
Off
Name, Status
+ Acq Params
+ Time, Playback
+ Range Data
Digital OSD
Universal Time Code
Opaque OSD
Format (Video Format)
NTSC
PAL
SDI
Color Bars
Res
480
576
720
1080
Format
I
P
PSF
Rate
60
59.9
50
30
29.9
25
24
23.9
Video Adjust
Image Adjust
Brightness
Gain
Gamma
Hue
Saturation
Adv(ance) Image Adjust
RGamma
BGamma
Chroma
Flare
Pedestal Adjust
R Pedestal
G Pedestal
B Pedestal
RGB Adjust
Red
Green
Blue
Video Defaults
C Matrix (Color Matrix)
Restore
Presets
Off
1 (Daylight)
2, 3, 4 (userMatrix)
R-R
G-R
B-R
R-G
G-G
B-G
R-B
G-B
B-B
Dual SDI
Two Identical 4:2:2
Dual Link HD-SDI 4:4:4
Link 4:2:2 Play 4:2:2
Dual Link 4:4:4 YPbPr
GenLock
Gen Lock
Off/On
Status

4 Menu Tree


Setup (continued)
Adv (Advanced)
T Curve (Tone Curve)
Tone Curve Seg1
Restore
Off
1 (medium)
2 (strong)
3 (high1)
4 (user-defined)
PT1:PT8
Next Seg
Tone Curve Seg2
Restore
Off
1 (medium)
2 (strong)
3 (high1)
4 (user-defined)
PT9:PT16
Next Seg
Tone Curve Seg3
Restore
Off
1 (medium)
2 (strong)
3 (high1)
4 (user-defined)
PT17:PT24
Next Seg
Tone Curve Seg4
Restore
Off
1 (medium)
2 (strong)
3 (high1)
4 (user-defined)
PT25:PT32
Next Seg
Acq (Advanced Acquisitions)
EDR
Bit Depth
8
10
12
14
Auto Blk (Black) Reference
Off/On
Apply Changes to All Cines
Cine (Advanced Cine)
High Quality Mode
Off/On
PIV Mode Exposure
Off/On
Burst Count
Burst Period
HW Sigs
Trigger Edge
Falling
Rising
Filter Time
Time Code Mode
IRIG
SMPTE
IRIG
Unmodulated
Modulated
Sync
Internal
External
IRIG
Video
Units
Exposure Units
µS (Microsecond)
% (Percentage)
° (Degree)
EDR Units
µS (Microsecond)
° (Degree)
Post Trigger Units
Frames
% (Percentage)
Temp (Temperature)
Sensor Threshold
Camera Threshold
Sensor Temperature
Camera Temperature
Auto Trig (Trigger)
Operation
Disabled
Drive & Trigger
Drive Only
Threshold
Area
Speed
Region
X
Y
W
H
Full
Draw
Auto Expo (Exposure)
Operation
Disabled
Enabled
Level
Lock at Trigger
Region
X
Y
W
H
Full
Draw
Capture
Lens
Focus
Aperture
On Power Up
Hold F-Stop
Full Aperture
CSR (Current Session Reference)
Begin
Rec (Record)
Stop
White Bal
WB Defs
Play
Source
Camera
CineMag
Cine
- (Minus)
+ (Plus)
Repeat
Editor Bar
Reverse/Pause
Stop/Rewind
Play/Pause
A (Mark In)
B (Mark Out)
Save

on-screen display



A. OSD Information
B. Preview/Playback Screen
C. Active Menu
D. Previous Menu Tab
E. Menu Options
F. Camera State
G. Hide Menu
H. Power Status Indicator
I. Camera Information Bar

5 Touchscreen Interface

OSD Information **A**

When enabled, displays the Camera State, Timestamp (day/hr/min/ss/thousands of a second), Resolution, Sample Rate, Shutter Angle (exposure), Internal Memory (time line), Record Time (duration), and Number of Frames Available.

The resolution, sample rate, shutter angle, internal memory, record time and number of frames available information may be hidden by the active menu.

This internal memory 'time line' represents all frames available in the camera's internal memory (RAM buffer/circular buffer). The 'T' symbol above the time line represents the user-defined trigger point.

Preview/Playback Screen **B**

Preview screen displays a 'Live' image on the LCD.

Playback screen displays a recorded Cine file for review, editing, or saving.

Active Menu Tab **C**

Indicates the present menu. To reduce a menu, when in full-screen mode, gently tap the menu tab.

Previous Menu Button **D**

Used to return to the previous menu screen. It can be used all the way up to the root or 'Home' menu.

Menu Options **E**

Selectable options, commands, or parameters associated with the menu shown in the 'Active Menu Tab'.

OSD Information

F

The Phantom logo color will change based on the state of the camera.

Live: camera is not recording to internal memory It displays a 'Live' image on the LCD and attached video monitor.

Capture: camera is recording to internal memory (RAM), and awaiting a trigger signal. It displays a 'Live' image on the LCD and attached video monitor.

Triggered: camera has been triggered, and is filling internal memory ('Post-Trigger' frames). It displays a 'Live' image on the LCD and attached video monitor.

Cine Stored: recording has ended, and a Cine is stored in internal memory. Displays a 'Live' image on the LCD and attached video monitor.

Playback: camera is in PLAYBACK mode. RAM Cines can be selected for playback.

Hide Menu

G

Removes the menu display. To re-acquire the active menu, push the RCU-2's hardware 'Menu' button once.

Power Status Indicator

H

Indicates the power status of the RCU-2 as follows:

- Green w/Plug - AC Powered - Battery Fully Charged Green w/Bolt - AC Powered - Battery Charging
- White and Green - Battery Powered - Charge Life 51 to 99%
- White and Yellow - Battery Powered - Charge Life 31-50%
- White and Red - Battery Powered - Charge Life Less than 30%
- All Red - Faulty Battery (Battery will not charge... needs to be replaced.)

Camera Information Bar

I

Provides important, user-friendly, information about the attached Phantom camera in two bars. To toggle between the bar displays, gently tap on the Camera Information Bar.

The type information displayed varies based on the operational state of the camera, as follows:

- All Operational States

  - Phantom Camera Model
  - Camera Serial Number
  - Camera Name
  - Date and Time Reference (MM/DD/YY hh:mm) TZ (TimeZone)

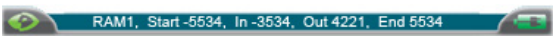
- LIVE PRE

  - Camera State
  - Resolution
  - Sample Rate
  - Exposure Time
  - Post Trigger Frames
  - Maximum Recordable Frames
  - Recording Duration

- LIVE WTR, LIVE TRG, and LIVE CST

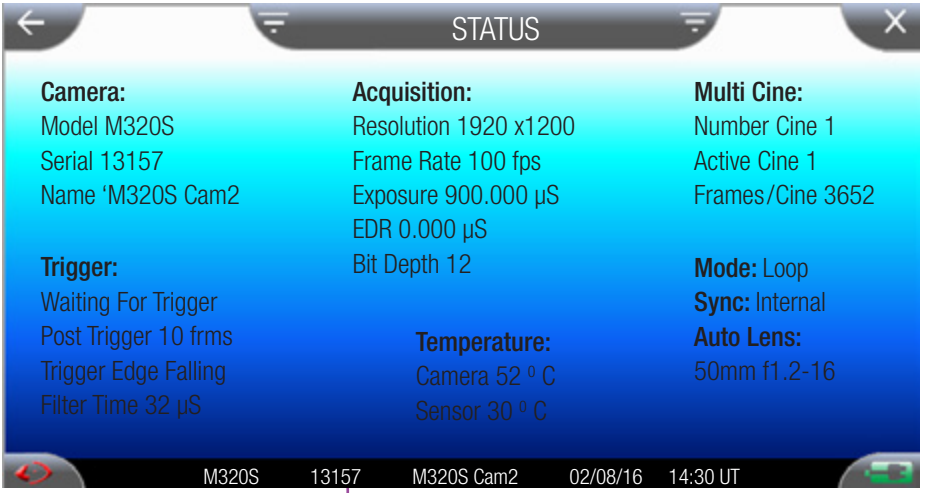
  - Recording Cine Segment

- PLAY CST



  - Saved Cine Location/Number
  - First Image Recor
  - First Recorded Image of Cine
  - First Image Contained within Edited Cine
  - Last Image Contained within Edited Cine
  - Last Recorded Image of Cine

status menu



Camera Status

Model - indicates the type of camera connected.

Serial Number - indicates the serial number of the connected camera.

Name - indicates the user-specified name of the connected camera.

Acquisition Status

Resolution - indicates the resolution (width x height), in pixels.

Frame Rate - indicates the sample rate (speed) the camera will capture at.

Exposure - indicates the Exposure Time (in milliseconds or microseconds).

EDR - indicates the Extreme Dynamic Range™ Exposure Time (in microseconds).

Bit Depth - indicates the bit depth setting of the connected camera (expressed as the number of 'bits' of data used to report each pixel's information).

Muti Cine Status

Number of Cines - displays the number of memory partitions the camera has been evenly divided into.

Active Cine - indicates the active/functioning MultiCine memory partition.

Frames/Cine - indicates the maximum number of images (frames) that can be recorded to the active memory partition determined by the amount of memory allocated to the active partition, and how the acquisition parameters have set.

Trigger Status

Operational State - indicates the present state of the connected camera. The various operational states include:

- Waiting for Pre-Trigger
- Waiting for Trigger
- Cine Stored

Post Trigger - represents the number of images (frames) recorded after the trigger signal is detected by the camera.

Trigger Edge - indicates whether the 'Rising Edge' (leading) or 'Falling Edge' (trailing) of a TTL supplied input trigger signal is used to trigger the camera.

Filter Time - indicates the length of time the trigger signal must be held at (low or high) to be a valid trigger signal.

Phantom cameras hold the trigger signal high; therefore, if 'Rising Edge' is selected the TTL pulse must be held low for ten times (10x) the Filter Time to be considered a valid trigger pulse.

Temperature Status

Camera - indicates the current temperature of the camera.

Sensor - indicates the current temperature of the sensor.

Mode Status

Indicates one of three operational modes including:

- Loop - camera stores recorded image data into the camera's memory buffer.
- Loop/Burst - camera initially stores recorded image data into camera's memory buffer. Once the Cine has been recorded the Cine is automatically saved to an attached Phantom CineMag or CineFlash.
- R/S (Run/Stop) - image data is recorded directly into an attached Phantom CineMag.

Sync Status

Indicates the user-defined frame rate clock source including:

- Internal - frame rate clock is generated by the camera's crystal frequency oscillator.
- External - frame clock is controlled by an F-Sync signal from a second Phantom camera or any source that produces a +5V, TTL Low-going, 4µs wide pulse, including function generators or pulsed lasers.
- IRIG-B - frame clock is controlled by an IRIG-B Time Code signal input.

Lens Status

Indicates the focal length and aperture of a lens attached to the camera via a Canon EOS Lens Mount (if applicable).

Bluetooth™ Status

Indicates if Bluetooth™ control is On or Off.

setup menu

Mode

Use to specify one of three operational modes:

- Loop - camera stores recorded image data into the camera's memory buffer.
- Loop/Burst - camera initially stores recorded image data into camera's camera's memory buffer. Once the Cine has been recorded the Cine is automatically saved to an attached Phantom CineMag or CineFlash.
- R/S (Run/Stop) - image data is recorded directly into an attached Phantom CineMag.

Acq (Aquisition)

Used to define the following capture parameters:

- Cine - signifies the memory (Cine) partition being configured when in MultiCine.
- Resolution - instructs the camera to restrict the resolution to meet the following aspect ratio requirements:
  - 16 x 9
  - 4 x 3
  - 1 x 1
  - Any (user-specified)

Width x Height - specifies the size of the image to be recorded.

When a specific 'resolution' has been selected, (16 x 9, 4 x 3, or 1 x 1), and the user specifies values that do not meet the resolution ratio requirement, the camera automatically changes these settings to the nearest width-by-height that meets the 'resolution' setting.

If set to 'Any', the user can define these parameters using the Continuous Adjustable Resolution feature, which provides adjustments between minimum / maximum drop-down list values.

- Frame Rate - defines the 'Sample Rate' (speed) the camera will capture at. The available speeds will change according to the 'Width x Height' defined. Smaller values allow higher speeds.
- Exposure - defines the amount of time the sensor is exposed to light (in µs of exposure time). A smaller exposure time reduces the chance of motion blur.
- Post Trigger - defines the number of frames after the trigger point to be stored in the camera's internal memory (RAM/circular buffer).

CineMgt (Cine Management)

Used to partition (segment) a camera's internal memory (RAM/circular buffer), and view the number of frames that can be stored in each MultiCine partition and its maximum recording duration.

- Cine Partitions- specifies the number of memory segments, or partitions, camera's internal memory (RAM/circular buffer) will be evenly divided into.
- Frame/Cine - displays the number of frames that can be stored in each MultiCine memory partition.
- Time/Cine - displays the maximum recording time (duration in seconds) for each MultiCine memory partition.
- CineMag/CineFlash Erase - used to erase Cine stored on an attached Phantom CineMag or CineFlash.

Erase removes all the Cines stored on an attached Phantom CineMag/CineFlash.

Tools

Used to view/define the following camera options:

- About Camera - provides information about the connected camera, including:
  - Model - the type of connected Phantom camera.
  - Serial - the serial number of the connected Phantom camera.
  - Name - the user-specified camera name of the connected Phantom camera.
  - Firmware - the ph7/ph16 (camera model specific), FPGA, Kernel, and Flash firmware versions loaded in the camera.
  - Dedicated IP Address - the camera's Vision Research assigned IP address.
  - Secondary IP Address - the camera's user-defined IP address (if applicable).
  - Memory - the size (in gigabytes) of internal memory (RAM) installed in the camera.
  - Maximum Bit Depth - the image pixel bit depth.
  - Flash - the size (in gigabytes) of non-volatile Flash memory installed in the camera.
  - Features - For Use by Vision Research Engineering Group Only.
- Program Buttons - enable the end-user to specify the use of the displays A/B buttons.
  - A/B Program Selection Pull-Down Lists is used to select a stored program to run when an A/B hardware button is pressed.
  - A/B Enable Pull-Down Selection Lists is used to enable/disable the use of the selected program associated with the A or B hardware buttons.

- Edit - displays the following Edit Programs display window options:
  - Program Pull-Down Selection List - used to create a list of programs that associated with the A and B buttons.
  - Program Name Field - used to create or edit the name of the program associated with the A and B buttons.
  - Delete - deletes programs from the list.
  - Learn Enable Box - when enabled (checked) allows the creation of the operations that the A and B buttons will perform when pressed.

- Firmware - displays the Serial Number, Firmware Version, System Image Version, FPGA Version, Bluetooth™ Model Version and ABOB (Break-out-Box) Firmware Version installed in the RCU-2. It also provides an:
  - Upgrade Selection List - used to select the RCU-2 or ABOB (Break-out-Box) to upgrade the firmware.
  - Upgrade Button - used to initiate the firmware upgrade process to an RCU-2 or ABOB (Break-out-Box).

When performing an update beyond Version 4.4 an I2C communication issue can arise failing to update the kernel that would make the RCU-2 unrecoverable by the end-user. In this case the unit would have to be sent to Vision Research to be recovered.

- User Settings - mimics the 'User Settings' of cameras that support the On-Camera Control display, (requires >689 firmware).
  - User - this pull-down selection list is used to select one of six settings slots.
  - Save - saves the camera's current settings into the selected user setting slot number.

- Load - loads the contents of the user setting's slot into the camera's current settings.
- Erase - erases the contents of the selected user setting slot.
- Factory Reset - resets the camera's settings to factory defaults.

- Power Save - options include:
  - Always On - instructs the Remote Control Unit to be on until the end user powers it down.
  - Sleep After Time Out - instructs the Remote Control Unit to go into sleep mode after a user-specified period of time of inactivity (extended battery life approx. 2-hours).
  - To re-activate the display move the RCU-2, touch the LCD touch screen, push any of the RCU-2 hardware buttons, or rotate the jog/shuttle dial.
  - Sleep When On Battery - instructs the Remote Control Unit to go into sleep mode after a user-specified period of time of inactivity (extended battery life approx. 2-hours).
  - To re-activate the display move the Remote Control Unit, touch the LCD touch screen, push any of the RCU-2 hardware buttons, or rotate the jog /shuttle dial.
  - Timeout - specifies the amount of time the Remote Control Unit must be inactive to place the unit into sleep mode.
- Bluetooth - used to:
  - Enable/Disable an attached Bluetooth™ device, and
  - Set the Bluetooth™ Address
  - Search for available Bluetooth™ devices.
- Messages - used to enable/disable warning and error popup messages.

- Shutter Control - used to set the mechanical shutter of a Phantom camera to one of the following:
  - Open - instructs the camera's mechanical shutter to close when a CSR, (Current Session Reference) is performed, and re-open when the process has completed.
  - Closed - forces the shutter, of an automatic mechanical shutter, to remain closed until instructed, by the end-user, to re-open the shutter.

Shutter Control can only be used with Phantom cameras equipped with an internal mechanical auto-shutter, or an automatic external mechanical shutter.

- Presets - requires >730 firmware and includes the following options:
  - Preset - used to select one of six preset files (slots A through F) on the Remote Control Unit.
  - Preset Info Indicator - displays basic information about the stored preset: model, serial, name, timestamp.
  - More Info - displays more detailed information about the preset settings.
  - Camera User - used to select a user-settings slot within the camera.
  - Camera User Save - save the selected slot (1-6) user settings in the camera to the selected preset (A-F).
  - Camera User Load - loads the contents of the selected preset (A-F) into the selected user-settings slot (1-6) of the camera. These settings will also be applied to the current settings of the camera simultaneously.
  - USB - Camera settings stored in the Remote Control Unit's presets can be imported/exported to a USB flash drive to exchange with another Remote Control Unit. In the future, these file may also be generated via the Phantom (PCC) Camera Control application.

- USB Import - used to import the selected preset (A-F) from a USB flash drive into the Remote Control Unit.
- USB Export - used to export the selected preset (A-F) from the Remote Control Unit onto an attached USB flash drive.

- Display - the following options are used to:
  - Backlight -adjusts the back light intensity of the Remote Control Unit.
  - Menu Color - changes the display screen to blue or gray immediately (Load Now), otherwise the change will occur upon reboot (Load at Power Up) of the Remote Control Unit.
  - Language - changes the display menus to one of the following languages, English, Japanese, Chinese, Spanish, or French.

Video

Used to define various video output options and only need to be configured when a Phantom camera is connected to an external monitor. Setting these parameters will just affect what is displayed on the attached monitor. The Video options include:

- OSD - the On-Screen Display options define the following:
  - OSD Detail - specifies what camera information is to be displayed on the screen of the attached monitor, including:
    - Off - no information displayed.
    - Name, Status - displays the name and current status of the camera.
    - Acqui params - displays the setting specified via the Acquisition menu.
    - Time, Playback - displays the absolute time and the playback rate.
    - Range data - displays all range data information.

- Digital OSD - displays the OSD fields on an attached monitor or viewfinder when enabled (checked).
- Universal Time OSD - the OSD time reference will be adjusted and displayed to utc (GMT) Universal Time Code (Greenwich Means Time) when enabled, (checked).
- Opaque OSD - removes the background color (black) from the OSD informational fields when disabled (unchecked).

- Video Format - defines the output video format from the camera, including:
  - NTSC - camera will transmit NTSC (National Television System Committee) video signal format; 59.94 half frames (called fields) per second and 525 lines per field, (480 lines in each field are the image, and the last 45 are the 'vertical blanking interval' (VBI), designed to give the electron gun time to reposition itself from the bottom of the last field to the top of the next), to an attached compatible monitor.
  - PAL- the camera will transmit PAL (Phase Alternating Line) video signal format; 25 fields per second and 625 lines per field, to an attached compatible monitor.
  - PAL is the analog television system used in most of Western Europe, Australia and other countries.
  - SDI - the camera will transmit a user-specified HD-SDI signal format to an attached compatible monitor. The end-user will be able to specify the Resolution, Format, and Rate.
  - Color Bars - displays the SMPTE Color bars, generated by the camera and output over the video signal. They are used for setting up a video monitor.

- Resolution - used to specify the number of vertical resolution lines of an attached HD compatible monitor. The supported resolutions include:
  - 480 - available when the NTSC (National Television System Committee) video signal format is selected; 59.94 half frames (called fields) per second and 525 lines per field, (480 lines in each field are the image, and the last 45 are the “vertical blanking interval” (VBI), designed to give the electron gun time to reposition itself from the bottom of the last field to the top of the next), to an attach compatible monitor.
  - 576 - available when the PAL (Phase Alternating Line) video signal format is selected; 25 fields per second and 625 lines per field, to an attached compatible monitor.
  - 720 - denotes 720 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1 of 1280 lines and a frame resolution of 1280 x 720 or about 0.92 million pixels.
  - 1080 -camera transmits 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a frame resolution of 1920 x 1080 or over two million pixels.
- Format - specifies how the lines of resolution are scanned by an attached HD compatible monitor. The supported format types include:
  - I (Interlaced) - draws the odd lines, then the even lines of each frame alternately.
  - P (Progressive) - all the lines of each frame are drawn in sequence.

- PSF (Progressive Segmented Frame) - divides each frame into two segments, one with the odd lines and the other with the even lines. The segments are equivalent to interlaced fields, but unlike interlaced video, there is no motion between the two fields that make up the video frame: both fields represent the same instant in time. This allows for a progressive picture to be processed through the same electronic circuitry that is used to store, process, and route interlaced video.

– Rate - specifies the frame rate cycle (Hz) of an attached HD compatible monitor.

- For cameras connected to a 720p compatible monitor the following rates are supported; 60Hz., 59.9Hz. (59.94Hz. actual rate), and 50Hz.
- For cameras connected to a 1080p, 1080i, or 1080psf compatible monitors the following rates are supported; 30Hz., 29.9Hz. (29.97Hz. actual rate), and 25Hz.
- For cameras connected to a 1080p compatible monitor the following rates are supported; 24Hz., and 23.9Hz. (23.976Hz.)

- Video Adjust - used to define the following options:

– Image Adjust - used to adjust brightness, gain, gamma, hue, and stauration.

– Adv (Advanced) Image Adjust - used to adjust red gamma, blue gamma, chroma, and flare.

– Pedestal Adjust - used to adjust red, green, and blue pedestals.

– RGB Adjust - used to adjust the red, green, blue values.

– Defaults - when selected, resets all the Image Adjustment settings back to factory defaults.

Adjusting pedestal values redefines separate video monitor (R)ed, (G)reen, (B)lue brightness adjustments.

- C Matrix (Color Matrix) - Color Matrix is an advanced color matching tool, which previously was reserved for video engineers to match the HD-SDI output of cameras in a broadcast environment. In some Phantom cameras, a user 'Matrix' can be specified to fine-tune the color of both the Cine image and HD-SDI output.

  By adjusting the user 'Matrix' the image can be finely tuned, so that individual colors can be adjusted in terms of tint and saturation. A common use for this is to match the color with another camera on the same shoot accurately.

- Dual SDI - used to define the video feed mode from supported Phantom cameras. Presently, there are four modes supported, including:

  - Two Identical 4:2:2 - provides both the live and playback feed, from RAM, over the video memory channel. The high-speed channel is used as the recording source for the Phantom CineMag, if fitted.
  - Only one video pipeline is used at a time.
  - Dual Link HD-SDI 4:4:4 - the SDI, (Serial Digital Interface), outputs are used together as a dual-link output, allowing 4:4:4 image sampling.
  - Live 4:2:2 Play 4:2:2 - the two video pipelines are used simultaneously. The video memory channel is used to source a live video feed, while either the high-speed memory channel or the Phantom CineMag is used to source the playback feed.
  - Both the analog/component output, and the SDI-2 (Serial Digital Interface-2) output always carry the uninterrupted live feed.

    OSD, (On-Screen Display), information can be inserted on either of these outputs. SDI-1 is reserved for the playback feed.

    If no playback is taking place, a black image is outputted.

- Dual Link 4:4:4 YPbPr - the two SDI (Serial Digital Interface) outputs are used together as a dual-link output, allowing 4:4:4 image sampling. The live feed, and optional On-screen Display (OSD) annotations are sent to the analog/component output, while the playback feed uses the dual-SDI outputs.

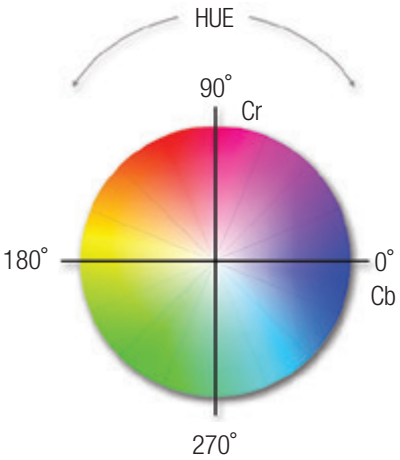
- GenLock - synchronizes playback to a properly terminated (75-ohm) video signal (not exceeding +1.56V maximum), utilizing a composite video inbound signal, or synch live video, by synchronizing the SDI outputs to the GenLock signal.

  It also synchronizes live video, by synchronizing the SDI outputs to the GenLock signal.

- T Curve (Tone Curve Segment) - allows for manual control over the tone curve of the image. Tone curves change the shadow-to-highligh relationship between the original values (on X axis) and resulting values (on Y axis).

  Tone curves can be useful to boost mid tones of the image without affecting highlights or shadows, for example. They can also be used to push the darks lower, which may result in richer images when details in the shadows are not required. There is a relationship with overall image gamma, which has a predefined curve, which is the equivalent of Rec709.

  The interface is very similar to the color 'Matrix' interface except that there are up to 32 entries in a tone curve which span four entry screens. Each subsequent entry screen is entered by touching the button labeled 'Next Seg'.



- M Matrix (Miulti Matrix) - compatible with the v642 only, fine tunes the color output of the camera's HD-SDI, leveraging independent adjustments of saturation and hue of each of the 16 axes of the Cr/Cb color circle . Working with video matrix, hue, gamma and chroma adjustments enable certain Phantom cameras to color match with professional broadcast camera systems.
  - Axis - the axes are 22.5 deg apart, and are identified by their angle. Angle measurements start from the positive Cb direction (the ight horizontal on a vectorscope), and proceed counter-clockwise, with the 90 deg axis pointing up, 180 deg axis pointing left, and 270 deg axis pointing down.
  - Hue - defined in degrees specify the gradation of color (color perception) of the color defined via the Axis setting.
  - Sat - specifies the amout of color saturation applied.

Advanced

Used to define the following options:

- Acq - allow the end-user to define:
  - EDR - Extreme Dynamic Range™) sets a unique exposure time (defined in microseconds or a percentage of the defined 'Exposure Time') to pixels that may become saturated (over exposed).
  - Bit Depth - sets the bit depth (expressed as the number of 'bits' of data used to report each pixel's information) setting of the connected camera.

8-bit to 14-bit images need exactly the same amount of light to saturate the sensor. What differs is the fineness in number of levels recorded.

- Auto Blk (Black) Reference - when set to 'On' a black reference operation will be performed when the camera is placed into the capture or 'waiting for trigger' mode with the results being saved with the Cine.

- Apply Changes to All Cines - selecting this checkbox will copy all future changes in acquisition parameters to all cines.
- Cine (Advanced Cine) - used to define the following:
  - High Quality Mode - instructs a Phantom Flex camera to use a proprietary multi-sampling technology to enhance each frame. Each frame is analyzed for noise and image artifacts that can occur under continuously changing shooting environments.
  - This ensures the best possible images will be recorded even when the resolution, frame rate, and/or exposure time have been changed, or if the ambient and/or camera temperatures are changing.

High Quality Image Mode reduces maximum frame rates by 1/2 and each frame and requires twice the internal camera memory. However, the saved Cine files will be the same size as in Standard Mode and recording directly to a Phantom CineMag has the identical speed and size specifications as Standard Mode.

  - PIV Mode Exposure - designed for use in PIV (Particle Imaging Velocimetry) applications. When enabled Frame Straddle (inter-frame gap) of Phantom cameras will be reduced.
  - Burst Count - sets the number of frames in a burst, ('Off' disables Burst Mode).
  - Burst Period - sets the interval between frames in a burst (defined in microseconds).

Burst Count and Burst Period are validated by the camera and clamped to ensure valid values. When clamping occurs, the Burst Count has priority over Burst Period, and both will have priority over the exposure time.

Behavior of the camera will be modified in the following way, when viewing live images, with a Burst Count larger than one the camera will retrieve images from the most-recent burst, starting with the first frame in the burst.

- HW Sigs (Hardware Signals) - used to define:
  - Trigger Edge - defines whether the 'Rising Edge' (leading edge) or 'Falling Edge' (trailing edge) of a TTL supplied input trigger signal is used to trigger the camera.
  - Filter Time - defines the length of time the trigger signal must be held at (low or high) to be a valid trigger signal.

If 'Trigger Edge' is set to 'Rising Edge' the signal must be held low for a minimum of ten (10x) times the 'Trigger Filter' prior to going high to be a valid trigger signal.

  - Time Code Mode - used to select the type of timing system (IRIG or SMPTE) used to generate a time code.
  - IRIG - used to specify the type of IRIG-B (Inter-Range Instrumentation Group) time code standard supplied to the camera.
  - The type of IRIG input signals expected by a Phantom camera can be an either an unmodulated (TTL) or modulated IRIG-B signal.
  - Sync - instructs the camera to utilize one of the following frame sync clock sources:
    - Internal - instructs the camera to utilize its' internal crystal oscillator to drive the camera's Sample/Frame Rate (speed).
    - External - should be selected when an externally supplied frame sync clock pulse is used to drive the camera's sample rate.

- IRIG - should be selected when an IRIG-B signal is supplied to drive the camera's sample rate.
- Video - allows the camera to capture frames at a rate that is a multiple of the video frame rate, with a defined phase relationship to the video signal. It brings the following benefits:
  - When both recording and playback need to be synchronized (such as in stereoscopy applications), an FSYNC connection between cameras is no longer needed - GenLock will suffice.
  - Cameras can capture at the 'fractional' frame rates of 23.98, 29.97 and their multiples.
  - Live output of the camera maintains a stable phase in relation to frame capture.

- Units Options - used to define the following:
  - Exposure Units - specifies how the Exposure Time unit will be displayed:
    - µs (Microseconds) - select to specify the Exposure time in microseconds.
    - % (Percent) - select to specify the Exposure time as a percentage of the maximum exposure value.
    - ° (Degrees) - represents the degree of the open segment of the shutter (shutter angle). A value of 360° corresponds to a full period of the frame.

- EDR Units - Extreme Dynamic Range Units specify how the EDR Exposure time units will be displayed:
  - µs (Microseconds) - select to specify the EDR Exposure in microseconds.
  - % (Percent) - select to specify the EDR Exposure as a percentage of the specified 'Exposure' value.
- Post Trigger Units - specify how the Post Trigger units will be displayed:
  - Frames -instructs the camera to use a user-specified number of frames to define the 'Post Trigger' value.
  - % (Percent) - instructs the camera to us a percentage of the maximum value described in the 'Frames' description to define the 'Post Trigger' value.

- Temperature - used to set and display the following temperature options:
  - Sensor Threshold - sets the temperature threshold of the camera sensor. When exceeded the on sensor cooling circuits activate to reduce the temperature level of the sensor to its ambient temperature.
  - Camera Threshold - sets the temperature threshold of the camera. When exceeded the camera's fan will increase its speed to help cool the camera back to its ambient temperature
  - Sensor Temperature - indicates the current temperature of the sensor.
  - Camera Temperature - indicates the current temperature of the camera.

Auto Trigger Options

Image-Based Auto-Trigger (IBAT) allows selected Phantom camera models to trigger themselves when the image changes in a selectable region of the frame. For some Phantom cameras, there is a mode which allows this feature to generate a hardware trigger signal for multi-camera installations.

WARNING:

The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.

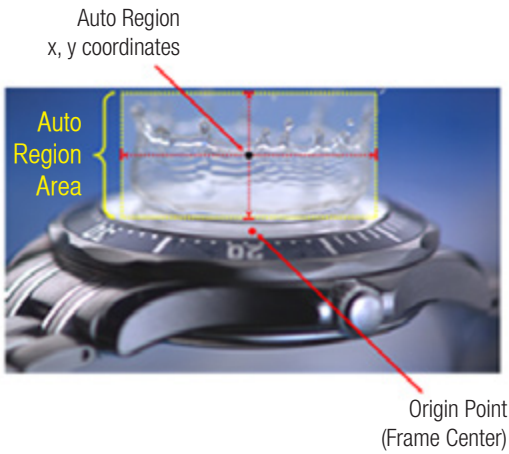
The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.

CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

The Auto Trigger display is used to define the following options:

- Operation - several operating modes are possible for the Image-Based Auto-Trigger system, including:
  - Disabled - the camera will not trigger itself when the image changes occur in a selectable region of the frame.
  - Drive & Trigger - the camera will drive both the auto-trigger and trigger itself when an auto-trigger is detected.
  - Drive Only - the image changes are analyzed, and when an auto-trigger condition has been satisfied, the camera will generate a trigger signal, however, the camera will not trigger itself.
  - Drive Only is useful when external control of the auto-trigger feature is desired, for instance, it is required that the auto-trigger feature is disabled for some known transient event. The auto-trigger signal from the camera will be routed through some exterior device and back into the trigger input of the camera.

- Threshold - defines the amount a pixel value must change for auto-trigger purposes.
- Area - defines the percentage of pixels required to meet the 'Threshold' setting within the auto trigger 'Region' which generates the auto trigger event.
- Speed - defines the number of frames (interval) between updates the auto-trigger region is checked.
- Region - specify the auto-trigger area (limited to a one mega pixel area) used to compare each captured frame to an earlier copy of the same region that has been stored in a dedicated memory to determine if specified conditions have been met to trigger the camera.



The 'Region' parameters include:

- X - defines the x-coordinate of the pixel, in the center of the auto-trigger region in respect to the center of the frame, (origin point).
- Y - defines the y-coordinate of the pixel, in the center of the auto-trigger region in respect to the center of the frame, (origin point).
- Width - defines the width of the auto-trigger region starting with the pixel coordinated defined via the 'X' parameter.

- Height - defines the height of the auto-trigger region starting with the pixel coordinated defined via the 'Y' parameter.
- Full - instructs the camera to use the entire frame as the auto-trigger region, except if it is greater than one mega pixel.
- Draw - allows the end-user to draw a rectangle around the desired auto-trigger region up to one mega pixel in size.

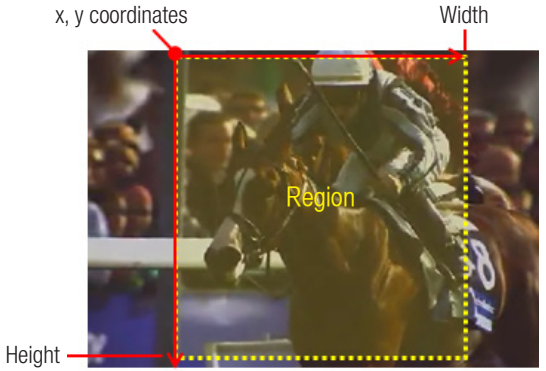
Auto Expo (Auto Exposure)

The Auto Exposure feature is extremely useful when conditions adversely affect setting the camera's exposure.

The Auto Exposure feature cannot be used simultaeously with the EDR (Extreme Dynamic Range) feature. If enabled EDR will automatically be disabled.

The Auto Exposure display is used to define the following options:

- Operation - used to enable/disable Auto Exposure.
- Level - allows + or - the equivalent of F-stops from the default value of 50% of average exposure. (ph16 cameras)
- Or, it specifies the desired average gray scale level for the specified area, to be realized by the automatic exposure process, (i.e., for an 8-bit pixel image depth, mid gray is 128, black is 0, and saturation is 255). (ph7 cameras)
- Lock at Trigger - when enabled (checked) auto exposure locks in the exposure setting the moment the camera detects a trigger signal.
- Region - specifies the auto-trigger area (limited to a one mega pixel area) used to compare each captured frame to an earlier copy of the same region that has been stored in a dedicated memory to determine if specified conditions have been met to trigger the camera.



The ‘Region' parameters include:

- X - defines the x-coordinate of the pixel, in the center of the auto-trigger region in respect to the center of the frame, (origin).
- Y - defines the y-coordinate of the pixel, in the center of the auto-trigger region in respect to the center of the frame, (origin point).
- Width - defines the width of the auto-trigger region starting with the pixel coordinated defined via the ‘X’ parameter.
- Height - defines the height of the auto-trigger region starting with the pixel coordinated defined via the ‘Y’ parameter.
- Full - instructs the camera to use the entire frame as the auto-trigger region, except if it is greater than one mega pixel.
- Draw - allows the end-user to draw a rectangle around the desired auto-trigger region up to one mega pixel in size.

Lens

Used to adjust/set the focal length and f-stop of a lens attached to the camera via a Canon EOS Lens Mount remotely.

- Focus - moving the slider to right adjusts the focus toward infinity.
- Aperture (f-stop) - moving the slider to the left instructs the lens aperture to open. Adjusting it to the right instructs the lens aperture to stop down.

CSR (Current Session Reference)

Initiates the Current Session Reference process. CSR is a calibration procedure that computes the pixel offsets on an area of the sensor that is the next greater value of the defined resolution.

The offsets can be computed for any frame rate, exposure or resolution, thereby giving a precise reference dependent on the acquisition parameters and camera/sensor temperature. Current Session References only apply to the set of acquisition parameters used when the CSR was calculated, changing any of these parameters requires the need to perform a CSR again.

Record

Places the Phantom camera into the recording mode, continuously recording to a user-specified storage area.

If a Cine already exits in the camera's memory buffer or if there are no available memory segments to record to when MultiCine (Partitions) is used a warning message will appear.

It is also used to delete Cine files stored in the camera's internal memory (RAM/circular buffer) and start a new recording.

Preview

Instructs the camera to stop recording image data and place the camera back into the 'Preview' mode.

White Bal (White Balance)

Instructs the camera to initiate the automatic 'White Balance' process.

In ph16 camera models, it adjusts the color temperature (the red and blue components of white balance) and color compensation (the magenta and green components of the white balance).

With ph7 camera models the R, G, B (Red, Green, Blue) values are adjusted.

WB Defs (White Balance Defaults)

Resets all the White Balance settings back to factory defaults.

play menu

Source — Used to select the location of the Cine file to be reviewed, edited, or saved. Options include:

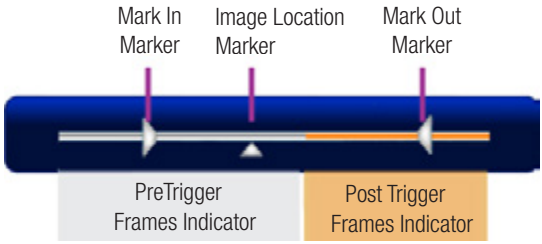
- Camera - allows the user to select a Cine file stored in the camera's internal memory (RAM).
- CineMag - allows the user to select a Cine file stored on an attached Phantom CineMag.
- CineFlash - allows the user to select a Cine file stored on an attached Phantom CineFlash.

Cine — Used to select a Cine from the list to play.

Repeat — Instructs the camera to 'loop' the playback of the Cine.

Edit Bar — Used to edit unnecessary images from the beginning and the end of the recorded Cine prior to saving. Editing a Cine will create smaller files, reduce the save time, and make Cine playbacks more efficient.

The Edit Bar consists of:



- Mark-In Indicator - represents the starting point (first image) location of the Cine being reviewed.
- Image Location Identifier - represents the location of the image being displayed as it relates to its position in the Cine file. This indicator can also be used, by the end-user, to perform a Quick Search through the selected Cine file.
- Mark-Out Indicator - Indicates the last image of the entire Cine to be saved.

Playback Buttons


Plays the Cine file in reverse.


Pauses/Stops playback.


Plays the Cine file.

Mark-In Button

Sets the starting point of the Cine file to save.

Mark-Out Button

Sets the end point of the Cine file to save.

Save Button

Saves Cine file to the an attached Phantom CineMag or CineFlash.


HOME
Setup
Capture
Play
RC

6 Navigation & Use

Navigation through the Remote Control Unit menu structure is accomplished primarily through the use of the 'touch-sensitive' LCD display. The following describes various navigational and use processes.

Power Up

Press the hardware Menu button. The RC indicator starts white for approximately 25-second, then turns cyan, and the Phantom logo will appear on the display for approximately 20-seconds.

The Camera LED activates Green, and the 'Home' menu displays on the LCD.

Power Down

Press and hold the hardware Menu button for approximately 6 seconds.

Reduce/Enlarge the Menu Display Screen

Tap the displayed menu's tab located top-center of the screen.

Accessing a Menu

Tap the Menu/Sub-menu option desired.

Return to Previous Menu

Tapping the 'Return' icon  located in the upper-left-hand corner of the menu screen (moves back one level).

Closing the Menu Display Screen

Tap the Exit  icon in the upper-right-hand corner of the menu to close the menu display.

Re-Acquire the Menu Display

Press the hardware Menu button on the Remote Control Unit.

Relocating the Image Area

Press on and drag the image to the desired location.

Select / Define Camera Options Tools

The Remote Control Unit makes enabling, selecting or defining a camera option extremely easy by providing three distinct selection methods:

- Radial Button - Tap to enable (yellow) or disable (white) the associated option.
- Pull-Down Selection Lists - Tap the down-arrow to the right of the entry field, then tap the desired option to select it. (Selected option will be highlighted in yellow.)
- Numerical Key Pads - used to overwrite or append the numerical value of the selected entry field:
  - Overwrite - tap the entry field one time (entry field turns yellow), then enter the desired value using the numerical key pad. Tap the 'Enter' button to set the specified value.
  - Append - tap the entry field two times (entry field turns white), then enter the desired value using the numerical key pad. Tap the 'Enter' button to set the specified value.
- Sliders - to move the slider drag the slider to the right (increase) or left (decrease) to change the value, or tap on the slider one time then rotate the 'Jog / Scroll' dial to move the slider.
- Enable Box - tap the 'Enable Box' to enable (check) or disable (uncheck) the associated option.
- Minus / Plus Buttons - tap the - or + buttons to adjust the associated variable.

The Remote Control Unit will select the nearest valid value and display the corrected entry in red an invalid variable has been entered.

Performing a RCU-2 Firmware Upgrade

1. Download the firmware update from the Vision Research web site.
2. Extract the two files contained in the 'zipped' directory and copy them to your computer desktop. One will be called 'rcu.fw' and the other 'rcu_upgrade'. There should be no file extension on 'rcu_upgrade'.
3. Insert a FAT or FAT32 formatted USB memory stick into the computer/laptop, then
4. Copy the two files to the USB memory stick.

Once the upgrade process is completed, the "rcu_upgrade" file will be deleted from the USB memory stick. Therefore, to upgrade multiple Remote Control Units you must copy this file from your desktop to the USB memory stick for each Remote Control Unit being upgraded.

5. Ensure the RCU-2 is powered off.
6. Remove the USB memory stick from computer/laptop, then
7. Insert it into the USB connector of the RCU-2.
8. Apply power to the RCU-2.

RESULT: The Remote Control Unit performs its power up routine using the new firmware stored in on the USB memory stick. The 'Home' menu screen should now be displayed on the Remote Control Unit. During the upgrade process the RCU-2 LED will light yellow. When the process is complete, it will return to cyan.

9. Verify that firmware update has been successful. Navigate to the Firmware Display Screen, by gently tapping on the Setup>Tools>Firmware buttons.


TECH
TIPS

7 Technical Tips

This chapter is intended to provide Step-by-Step Procedures of various tasks that may not be as intuitive to perform.

Determining a Valid Maximum Variable Value

To determine a valid maximum value of any variable entered via the Numerical Keypad quickly simply; enter all nines in the Numerical Key pad, the press the enter button.

RESULT: The Remote Control Unit will select the nearest valid parameter value and display the corrected entry in red indicating that the end-user has entered an invalid variable.

Place a Camera Back Into Preview Mode

To place a camera back into the Preview mode from the:

- Capture (Recording) Mode - press the hardware ' button to re-open the Capture menu, then press on the Preview button.
- Cine Stored or Playback Mode - navigate to the Capture menu and press the Close button in the 'Cine(s) are recorded in volatile memory of the camera. Select 'Record' to delete the Cine(s) & start a new recording. Select 'Stop' to stop capturing and wait for pre-trigger, retaining the Cine(s) dialogue window, then press the Rec(ord) button. Press the hardware Menu button to re-open the Home menu. Press the Capture button, then press on the Stop button.

Selecting a Cine File to Review

From the Play menu press the down-arrow to the right of the Source field, then select the appropriate source, (Camera, attached Phantom CineMag or Phantom CineFlash). Press on the - or + buttons to search for the desired Cine partition, when more than one Cine as been stored in the Cine source, then select the appropriate Cine segment to be reviewed, edited, and/or saved.

Perform a Quick Search

Performing a Quick Search will greatly reduce post-production time when editing a Cine file.

To perform a Quick Search to reduce post-production time when editing a Cine file

Press the Editor Bar two times, then rotate the Jog/Scroll dial, or drag the 'Image Location Identifier' (up arrow below Edit Bar) to the right (forward) or left (backward) to the desired location in the Cine file.

The present image number will be displayed above the Cine Editor Bar.

Edit the Cine

Advance the Cine to the first image to be saved in the clip and press the 'Mark-In' (A) button, then locate the end point image using the 'Playback' buttons and press the 'Mark-Out' (B) button.

Save Cine to Phantom CineMag

Press the 'Save' button.

Individual MultiCine file deletion is not possible using the RCU-2. Before performing the Delete MultiCine process be sure to save any MultiCine file you wish to retain.

Delete MultiCine File

Once all the MultiCine files have been recorded and stored into each of the memory partitions navigate back to the Capture menu. Press the Close button in the 'Cine(s) are recorded in volatile memory of the camera. Select 'Record' to delete the Cine(s) & start a new recording. Select 'Stop' to stop capturing and wait for pre-trigger, retaining the Cine(s) dialogue window and press the Rec(ord) button.

RESULT: The camera or attached Phantom CineMag deletes all the recorded Cine files, and the camera is placed back into the Capture mode.

Placing a MultiCine Enabled Camera Back into Preview Mode

The following describes the various steps when the camera has:

- Been placed into the capture, or recording, mode but has not yet saved a Cine file into any of the MultiCine partitions.

  With the camera already in the recording mode press the hardware Menu button.

RESULT: The Remote Control Unit will display the Capture Display Screen.

In the Capture menu press the Preview button.

RESULT: Camera is placed into Preview mode.

- Recorded to one or more of the MultiCine partitions but not all.

  With the camera already in the recording mode press the hardware Menu button.

RESULT: The Remote Control Unit will display the Capture Display Screen.

In the Capture menu press the Preview button.

RESULT: Camera had been placed into the Preview mode.

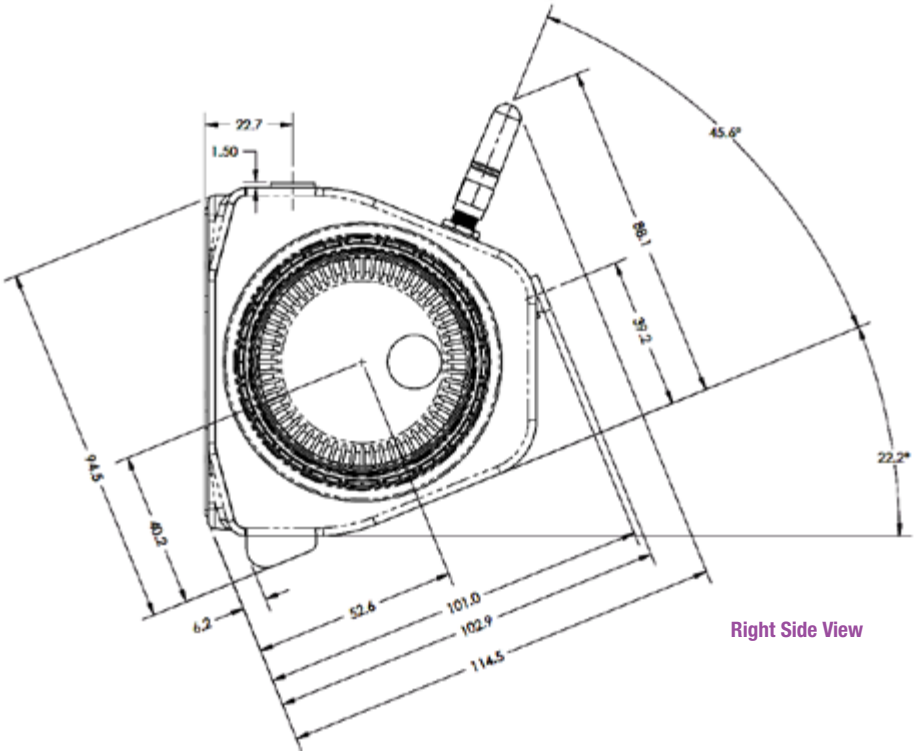
The camera will automatically record to the next available MultiCine partition, retaining all previously recorded MultiCines when the camera is placed back into the recording mode.

- Completed the recoding, reviewing, editing, and saving process of all MultiCine files, (All MultiCine Segments Fill).

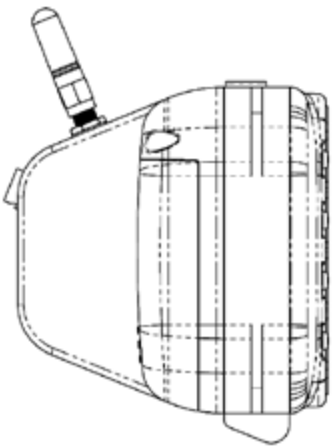
  Navigate to the Capture Screen and press on the Rec(ord) button, then press on the Close button in the 'Cine(s) are recorded in volatile memory of the camera. Select 'Record' to delete the Cine(s) & start a new recording. Select 'Stop' to stop capturing and wait for pre-trigger, retaining the Cine(s).' dialogue window and press the Rec(ord) button.

  Press the hardware Menu button to re-open the Home menu and press the Capture button. In the Capture menu press the Preview button.

mechanical drawings

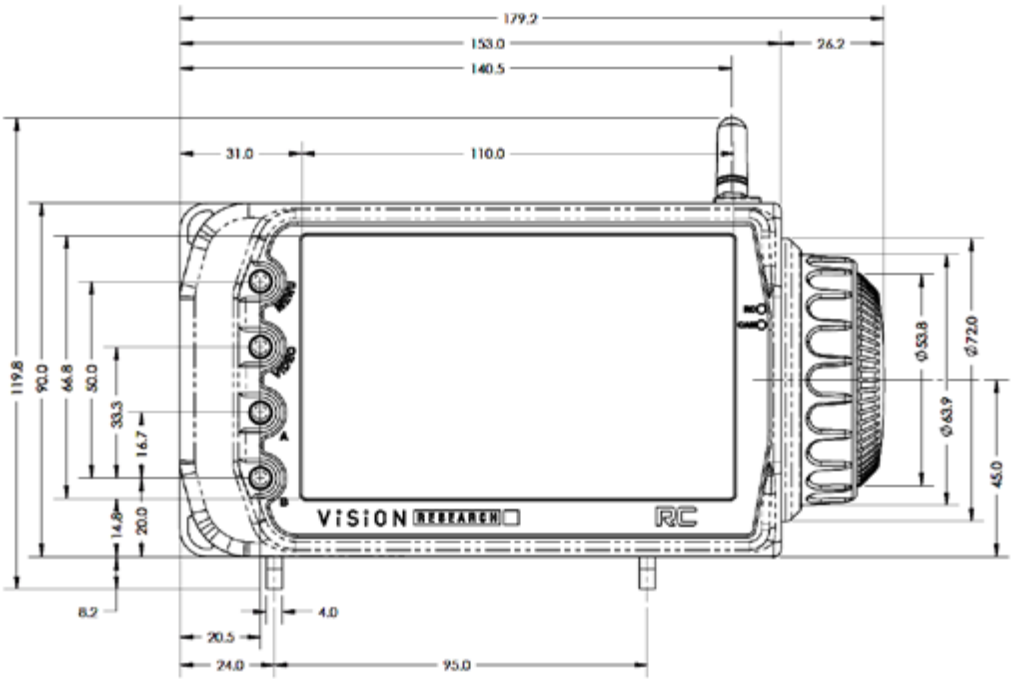


Right Side View

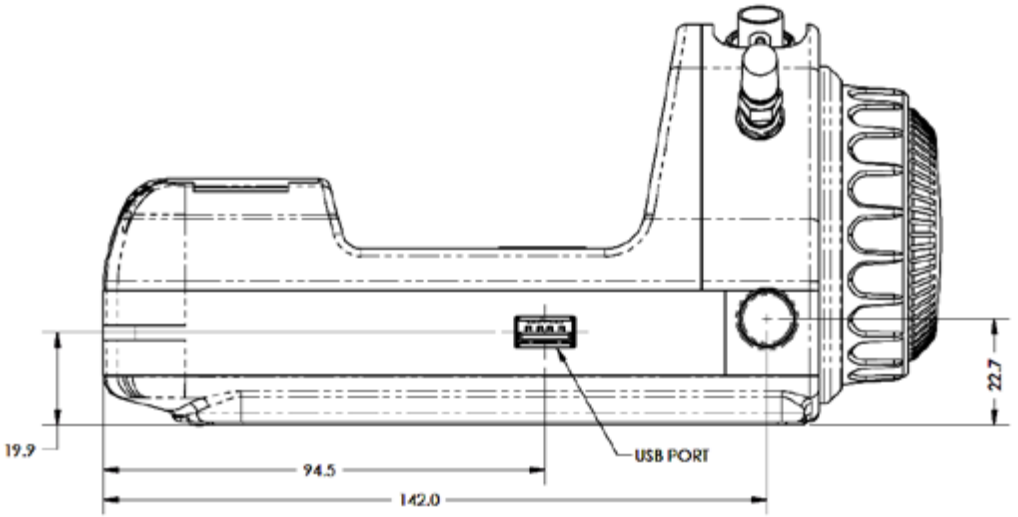


Left Side View

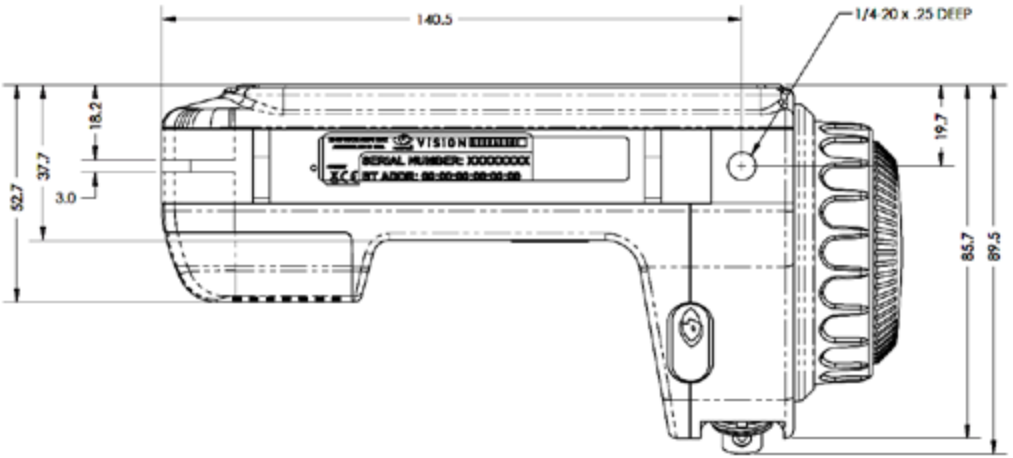
8 Support



Front View



Top View



Bottom View

specifications

	Key Specifications
Weight	26 oz. (740 gm.)
Size (W x H x D) Maximum	7" x 4" x 3.5" (17.75 cm x10.2 cm x 8.9 cm)
Display	5" (diagonal), 800 x 480 active TFT touchscreen
Voltage	12-36 VDC
Power	Approximately 7 watt. 12.6 maximum when charging
Battery Life w/Full Charge	Screen backlight at 70%: 1.85 hrs.
Battery Charge Time (Maximum)	2.63 hrs.
Temperature Range	Operational: -10° C to 40° C Storage: -20° C to 50° C
Humidity	85/85 non-condensing
Shock	Non-operational: 33g, 11msec half-sine, 10 shocks all axis Operational 5.5g, 11msec half-sine, 10 shocks all axis
Vibration	Non-operational: 1.2g, 5-500 Hz., 1.0 Octive/minute, 10 sweeps Operational 0.25g, 5-500 Hz., 1.0 Octive/minute, 10 sweeps
Natural Frequencies	No natural frequencies between 5 and 200 Hz.
EMI	Pass Class A

indicators

The RCU-2 LED indicators provide a visual representation of the camera's communication status, for the various operational states of the camera, see the table below.

Camera Operational State	LED Indicators	
	RC (Remote Control)	Cam(era)
Power Up Diagnostics	White (approx 10sec); flashes Red/Green (approx 13s); Cyan (approx 25s)	Off
Live/Preview (Waiting for pretrigger)	Cyan	Dark Blue
Live/Preview/Recording (Waiting for trigger)	Cyan	Red
Live/Preview/Recording (Camera triggered)	Cyan	Yellow/Green
Live/Preview (Cine stored)	Cyan	Green

Use these schematics to build custom cables at your own risk. Mis-wired cables can cause serious damage to the RCU-2, which is not covered under warranty. Vision Research recommends only using cables supplied by Vision Research.

These pin-out diagrams refer to the connector on the RCU-2 body. Part numbers indicated are for the cable's connector.

RCU-2 Type A USB Receptacle

Firmware upgrade port

PIN	NOMENCLATURE / FUNCTION
1	VBUS / +5 VDC
2	Data- / Data Negative
3	Data+ / Data Positive
4	GND / Ground

RCU-2 HD-SDI Video In Connector

Serial Digital Interface Input Signal port

BNC

NOMENCLATURE / FUNCTION	
SDI-IN	Serial Digital Interface-In / The serial digital interface coaxial cable with BNC connector has a nominal impedance of 75 ohms. This is the same type of cable used in analog video setups, which potentially makes for easier upgrades (though higher-quality cables may be necessary for long runs at the higher bit rates). The specified signal amplitude of the source is 800 mV (±10%) peak-to-peak for lower voltages may be measured in the receiver owing to attenuation. Using equalization at the receiver, it is possible to send 270 Mbit/s SDI over 300 meters without the use of repeaters, but shorter lengths are preferred. The HD bit rates have a shorter maximum run length, typically 100 meters.

RCU-2 Power, Control, Analog Video Connector

Remote port

8-pin Fischer part # S103.Z058

PIN	NOMENCLATURE / FUNCTION
1	VCC / +24VDC; the Remote Control Unit uses DC, (Direct Current), power. The nominal power supply voltage is +24VDC. The acceptable power supply range is +12VDC to +36VDC. Power supply inputs are protected against polarity reversal, (with a shunt diode fused by a 1.25A PTC resetable fuse). The power-supply input terminals are isolated from the case and system ground. This is usually achieved by using a properly isolated power supply.
2	GND / Ground
3	AVGND / Analog Video Ground
4	TX1 / RS-232 Transmit Data -1
5	RX1 / RS-232 Recieve Data - 1
6	GND / Ground
7	TX2 / RS-232 Transmit Data - 2; for Vision Research engineering use only.
8	RX2 / RS-232 Recieve Data - 2; for Vision Research engineering use only.

other hardware

RCU-2 Touchscreen Display (A)

Touchscreen Display - The 5" diagonal, 800 x 480; active Touchscreen TFT LCD (Thin Film Transistor-Liquid Crystal Display) allows the end-user to control a Phantom camera.

RCU-2 Optional Bluetooth (B)

The Optional Industrial Bluetooth provides wireless control of a user-specified camera.

RCU-2 Battery Compartment (C)

The Battery Compartment contains a BP-511 battery, providing up to two hours of battery operation, and doubles as the hand grip for the RCU-2.

faqs

Are there two types of Bluetooth dongles? What are the differences?

Prior to introduction of the Flex4K in 2014, the Bluetooth dongle was larger and had an external antenna. The current version of the Bluetooth dongle is smaller, fits on all Phantom products with the 'Remote' port, and has an internal antenna. Both dongles work the same; however, the older one does not physically connect to the Flex4K.

How do I connect my RCU to an older v-Series camera that does not have a Remote port?

Older v-Series cameras such as the v7.3, v9.1 and v10 are compatible with the RCU by using a Phantom Break-out Box (BOB) with RCU connector and appropriate cable. The BOB-RCU connects to the camera with the 19-pin Amphenol capture connector. There is also a Bluetooth version of the BOB for wireless control.

How do I connect the RCU to Miro cameras?

The RCU receives power and signal through the power port on Miro M, R, LC, LAB and C camera models. A Miro-RCU kit is available that provides a place to connect the AC adapter and the RCU cable. The part number is: VRI-RCU-KIT-MIRO-M

When the camera is powered with battery power, the camera will not power the RCU which must use its own battery. When the camera is powered by the AC adapter and the appropriate cabling is used, the RCU is powered by the camera's AC adapter.

Miro 110, 310, 120 and 320 models all have NTSC/PAL video transmitted through the Miro Cable. When using 320S models and C210 cameras, SDI video must be connected separately using the BNC connectors on both devices. Miro LAB cameras and 140 and 340 models do not have any video signal (video is displayed through Ethernet using PCC), so the RCU must be used for control only.

How far can the Phantom Bluetooth Module tranmit data?

The transmission range of the Bluetooth dongle varies a lot depending upon the environment. When used in a straight line without many obstructions or other wireless interference the Bluetooth range can be over 100 meters, or 300 feet. However, in an environment with electronic interference and physical obstructions, the range will be less, but usually still at least up to 30 meters.

Is there a way to use the wireless RCU with a Miro?

Phantom Miro cameras have no Remote port, and as such the Bluetooth-Dongle is not directly compatible or supported. However, a third-party solution exists – it is manufactured by Abel Cine. This involves the Abel Cine Miro-BOB, a top and bottom mounting plate and an additional power source.

www.phantomhighspeed.com

Vision Research - Corporate Headquarters
100 Dey Road
Wayne, New Jersey 07470
USA
Ph: +1.973.696.4500
Toll Free: 800.737.6588
Fax: +1.973.696.0560

Vision Research Ltd. - UK
Suite F8, Bedford i-lab
Priory Business Park
Stannard Way, Bedford
MK44 3RZ, United Kingdom
Ph: +44 1234 834 850
Fax: +44 1234 834 851

PN: ZDOC-64063-MA-0001 Rev 6.0