



Planetary Camera Manual

V1.1



Regular Hexagon

Scientific and technological, look luxurious and cool, highlighting the style of top players

Innovation

Focus on independent intellectual property rights and product innovation

Various Product line

Covers all aspects of astrophotography

High Quality

Use high quality electronic components



Planetary Camera Design

Planetary Camera is first product line we provided

DDR buffer

256MB DDR3 Buffer

It helps stabilize and secure data transmission, it effectively avoids frame dropping and greatly reduces readout noise.

DPS technology

Dead Pixel Suppression Dead pixels (including both hot pixels and cold pixels) of the image are swept away.

Sensor Tilt Plate

To obtain a flatter image field

When do solar imaging with prominence telescope, the Newton ring is annoying. Smoother solar image without Newton ring could be taken by adjusting the sensor tilt plate. Besides, when you use a planetary camera for DSO lucky imaging, if you found the stars in corner are not perfect, you can adjust the sensor tilt plate to obtain a flatter image field. get a much smaller field curvature of the telescope.

Overvoltage and overcurrent protection mechanism

Camera hardware protection

Player One ensures the safety of your camera and other equipment through overvoltage and overcurrent protection mechanisms.







How to setup your camera Driver and software installation and setup

02

How to get preview image Familiar with capture through a telescope

03

How to do real astrophotography Start from Lunar imaging



How to use ASCOM ASCOM platform and camera driver installation



How to setup your camera

Driver and software installation and setup

1.Driver and Software installation



Home » Service » Software

1. Open Player One website to download:

https://player-one-astronomy.com/service/software/

For planetary imaging, Sharpcap 3.3 and upper is supported. For DSO imaging, ASCOM 6.5 is supported.

Windows 7/8/10 is supported.

Linux and Mac OS will be supported soon.

2. Driver installation (Don't connect the camera before installation)

1) Double-click the driver installation package to enter the installation page

2) Click "Install" and wait for completion

Player_One_Ca mera_Drive_CN V1.0.12.28.exe



3)In first installation, your computer will show up Windows Security window, please click "Install".

4)Click "Install Finished" to finish installation.







Native Driver										
(Camera Driver	Windows users must install the native driver to use the camera.	V1.1.2.4	Released: 2021/02/04	🕑 Download					
	Camera SDK	SDK is provided for developers to do secondary development based on Player One cameras	V1.1.2.25	Released: 2021/02/25	🕑 Download					



5) After installation, connect the camera to the computer USB3.0 port through USB cable, and the camera will be automatically recognized.



6) View the camera status in Device Manager

🛃 计算机管理

文件(F) 操作(A) 查看(V) 帮助(H)





3. Install capture software

1) After the installation of the driver, you will need to install a capture software such as SharpCap.

2) Select the installation path (the default path is generally recommended).

3) After the installation is completed, open the software.

4) Open Camera: under the Cameras menu, go to Player One Cameras and select the available camera models.

R SharpCap (v3.3.7077, 64 bit) - C:\Users\Admin\Desktop\SharpCap Captures



5) Check FPS

FPS is a very important parameter, if FPS show a normal value such like 99.8fps, means the camera can transmit data to your computer normally.





6) Remove the camera cover



7) Check the preview. Adjust the exposure, watch the preview, you will see the change of brightness. That means the camera is working normally.

C SharpCa	ap (v3.3.7077, 64	bit) - Mars-C (I	MX462) - C:\User	s\Admin\Des	ktop\SharpCap Cap	otures							×
File Car	meras Capture	View To	ols Sequencer	Scripting	Help								
ive View	Start Capture	🖼 Quick Capt	ture 🔻 🖲 Stop C	apture 🕕 P	ause 🗑 Snapshot	Live Stack	Target Name :	Light Frames	• F)	K: None	• [•	>>
								Cam	era Contro	ol Panel			Ļ
								\odot	Capture H	rofiles			= ^
													~
									Load	Save	Save As	Manage.	
								\odot	Capture H	ormat and A	.ea		=
								Outpu	t Format	AVI files	(*. avi)	~ A	uto
								Captu	re Area	1944x1096			~
								Colou	r Space	RAWS			¥
								Debay		On			~
									Camera Co	ntrols			=
									sure 42			LX Me	
									1 1 1 1	1 1 1 1			
								(7)					
								Quie	k Picks			×	luto
								Analo	gue Gain				00
									Rate	Maximum			*
								Limit USB S					00
												1111	
									Image Cor				=
								Times Frame		Off			* ~
reviewing :	25847 frames (0	dropped) in (:04:22, 23.1 fps		Memory: 2 of 503	frames in use.							.::



Level 1 - How to get preview image 02

>>>

Familiar with capture through a telescope



At the beginning, it was very hard to handle planetary imaging. We can start with an object 20 meters away and practice using telescope and camera.

2-1 Connect camera to telescope

1. First find a target through the eyepiece.

2. Remove the eyepiece and Diagonal of the telescope and install the camera(A refractor may need an extender to reach focus point better.)

3. Connect camera and PC through USB3.0 cable.





2-2 Preview on your screen



1. Adjust exposure

Open SharpCap and adjust the exposure to make the image bright but not totally white.

2. Refocus

Turn the focusing wheel of the telescope to focus again until get sharp previews.





2-3 Detailed explanation of camera shooting parameters



1. Capture Format

1) Capture Area (Resolution): There are several preset options and you can also customize the resolution. For the first use, it is recommended to shoot at the default highest resolution. The lower resolution means that only part of the area is read out (ROI mode), and the field of view becomes narrower.

2) Color Space : RAW8, RGB24, RAW16, etc. RAW8 and RAW16 output raw black and white data (need to be converted to color via Debayer later), RGB24 can directly output color data, but the amount of data will be three times than RAW8.

3) Debayer Preview: Set "On", you can see the color preview on the left side.





2. Camera Control

- Exposure: the exposure time of a single frame of the camera can be controlled (32us-2000s).Exposure for planetary photography is usually around 10-50ms.
- 2) Gain: similar to ISO of DSLR, the lower the gain, the more delicate the image looks and the larger the dynamic range; The higher the gain, the more snow spots the image looks, the lower the signal-to-noise ratio, but the lower the readout noise.



2-4 Camera indoor testing (use Mars-C as example)

SharpCap (v3.3.7077, 64 bit) - Mars-C (IMX462) - C:\Users\Admin\Desktop\SharpCap Captures	- • × 1.8	Setup
File Cameras Capture View Tools Sequencer Scripting Help		1
Live View 📾 Start Capture 📾 Quick Capture 💌 Stop Capture 🕕 Pause 🔊 Snapshot 🕞 Live Stack Target Name :	• Light Frames • FX : None • 📷 🔜 •) The c
	Camera Control Panel	,
	Capture Profiles ≡ ^ 2) Selec
and the second sec	Load Save Save As Manage 3) Color
	🔿 Capture Format and Area 📃	
	Output Format AVI files (*. avi) * Auto) Set th
	2 Capture Area 1944x1096 *	
	Colour Space RGE24 v	can be
A Die Die Contraction	Camera Controls	orightne
and the second of the second s	Exposure 25.0 ms	-
	•	i) Gain
	Quick Picks V Auto	oon ho
1 Bullion Contraction	Analogue Gain	can be
a contract set the set	Frame Rate Limit Maximum v	orightne
	USE Speed	
	⊘ Image Controls	
	Timestamp Off v	
٢	> Preprocessing = V	
Previewing : 13379 frames (0 dropped) in 0:04:56, 40.3 fps Memory: 2 of 167 frames in use.		

suitable parameters

utput is set to AVI video

the maximum resolution of 1944*1096

video shooting in RGB24 mode

e exposure to 25ms

appropriately reduced according to the image

ss)

set to 270

appropriately reduced according to the image

ss)

2. Level 1 How to get preview image



2-4 Camera indoor testing (use Mars-C as example)

2. Start capture a video

- Find the shooting button in the top bar of SharpCap and click the "Start Capture" button to pop up the dialog box.
- 2) Set the number of frames or the capture time limit.
- 3) Click to "Start" to capture a video.

4) The video will be saved on your computer after shooting





Level 2 - How to do real astrophotography Start from Lunar imaging

3-1 Aim at the moon

Install astronomical equipment and aim at the moon

Player One

- 1) I believe you have some experience in astronomical observation, now the first step is to install the telescope according to your habits, aim it at the moon, and turn on the automatic tracking function.
- 2) 2) Use the eyepiece to observe and focus your telescope to get a sharp view of the moon.



3-2 Shooting the moon

The basic process of lunar photography

1) Connect the camera to your PC, open the Sharpcap and start to get the preview.

2) Adjust the exposure and do coarse focusing. Only requires a rough view of the lunar surface.





3) Accurate focusing: You can choose the light and shadow boundary, or the edge of the moon, to do accurate focusing, where the details are more contrasted and easier to determine the focus.



4) Adjustment of Exposure and Gain: it needs to be determined according to the brightness of the moon surface, and is not constant. The moon's brightness depends on its phase, the altitude of the moon, the focal ratio of the telescope, and the haze. As a rule of thumb, on main focus point, exposures are around 5ms-10ms, or even shorter, with a gain of 100.

After a barlow lens, exposure and gain can be properly bigger, exposure is recommended not over 20ms, gain could be set a higher value until you can see bright lunar surface. Pay attention to the bright area of lunar surface, do not overexposure.





5) Capture: Record a 2000 frames video in RAW8 format



6) Post-processing: Use AS!3 open the video to generate a single image with high signal-to-noise ratio, and Registax6 was used for sharpening and other processing.



AS!3 and Registax6 download page : https://player-one-astronomy.com/service/software/

A detailed tutorial about stacking and sharpening can be found here: https://player-one-astronomy.com/explore/post-processing/







How to use ASCOM

ASCOM platform and camera driver installation



Many DSO imaging softwares (such as SGP and Maxim dl) require ASCOM platform and camera ASCOM driver to control the camera for DSO imaging. The ASCOM driver of Player One camera is developed based on ASCOM 6.5, so you need to download the latest ASCOM6.5 platform and camera ASCOM driver from the official website to control the camera normally.

https://player-one-astronomy.com/service/software/

ASCOM Driver The ASCOM platform is an astronomical standard protocol set running on the windows system. Many astronomy software need Official Download to be installed after the ASCOM platform can be used. You can ASCOM platform V6.5 Released: 2020/5/20 ASCOM6.5 Download log on to the ASCOM platform official website for more information. Software using ASCOM interface, need to be installed to control Camera ASCOM Driver Released: 2021 Download V6.5.1.0225 (base on ASCOM6.5) the camera. ASCOM6.5 platform is required.

4-1. Download ASCOM platform and camera driver

Click the download button to download the driver. And wait for the download to complete.

4. Camera ASCOM driver installation



4-2. install ASCOM platform

- 1) Double-click the driver installation package to enter the installation page
- 2) Automatically detect necessary files and click "Next" to continue.
- 3) Click "Install" to Install the platform
- 4) Installation completed







4-3. install camera ASCOM driver

- 1) Double-click the driver installation package to enter the installation page.
- 2) Select the language, it is recommended to choose Chinese, and then click "OK" button.
- 3) Select "I Accept the Agreement" and click the "Next" button.
- 4) Click the "Install" button to Install and wait for completion.
- 5) Click "Finish" to complete the installation.



4-4. Download and install capture and guiding softwares

There are many software that support ASCOM platform, you can choose the software you are familiar with to shoot and guide the star,

all the commonly used software download links are as follows:

https://player-one-astronomy.com/service/software/

4-5. ASCOM setup window

1. ASCOM window introduction



2. Detailed explanation of Gain preset values

Zero Gain: Maximum dynamic range can be obtained, suitable for long exposures.
 Low Gain (Open HCG Mode) : it is the lowest trigger gain to start the HCG mode of camera, and can obtain high dynamic and low readout noise.

3) Standard Gain: 1e /ADU can be obtained and minimize quantization error.

4) Highest Analog Gain: obtain the lowest readout noise, suitable for short exposures.5) Manually: Manual setting of gain and offset.

		Camera:	SN:	CAMP	C2137C	9061009000	
Ô		Mars-C			•	Custom ID	
I	Player One	Bit Depth:					
\sim		RAW16			-		
Connection: US	383.0 Temp: 23.	1	tion: 194	4*1096	Bayer	Pattern: RGGE	в
	383.0 Temp: 23.	1	tion: 194	4*1096	Bayer	Pattern: RGGE	в
Connection: US Settings Presettings:	B3.0 Temp: 23.	1	tion: 194	4*1096	Bayer	Pattern: RGGE	В
Settings Presettings:	Zero Gain Zero Gain	.6 C Resolu	tion: 194	4*1096	Bayer		В
Settings	Zero Gain	.6 C Resolu	tion: 194		Bayer	0	В
Settings Presettings:	Zero Gain Zero Gain Low Gain(Oper	16 C Resolu	tion: 194			0	в

OK

Cancel

4-6 Setup in SGP

Open the SGP Shooting Plan window and go to the Camera section. Select Player One Camera from the dropdown list.

🥪 Untitled				×
	Sequence Data		Equipment	
🗹 🚺 Target 1	Running: None		Camera:	No Camera 🗸 🌽
	Directory:	Browse	Filter Wheel:	No Camera Camera V2 simulator
	% File Name: [%ft\%tn_?	%el_%bi_%su_%04 🎤 📼	🗳 Focuser:	Canon EOS FLI USB Camera Nikon
	🕑 User Profile: None	~	💉 Telescope:	Player One Camera
	Target 1 Total events complete: 0	0/0 🛞 Remaining time: 00:00:0	Delay and Orderin Delay:	QSI CCD Camera SBIG Camera Simulator
	Total frames complete: (Delay first:	0 Rotate through events
+ ↑ ± ⊙ × ≤-		0%	Z Delay between	
Event 🔢 🌶 🛐 🤍 Rur	n Type Filter	Suffix Exposure	Bin Repeat	Progress
×¢‡1 II 🖋 🗄 📿 🗆	Light V None V		x1 ∨ 1 🚔	0/1
¥¢‡2 ∥°°°°⊂ ⊂	Light V None V		x1 ∨ 1 ≑	0/1
≍¢ ‡3 ïi ँ ँ ⊂ □	Light ~ None ~		x1 ∨ 1 ≑	0/1
×¢‡4 ÎÎ ँँ ँ≧ ୣ □	Light ~ None ~		x1 ∨ 1 🖨	0/1
×¢‡5 II ° E ♀	Light ~ None ~		x1 ∨ 1 ≑	0/1
Add New Event 👻	O:00:00		Remaining: 00:	00:00 Run Sequence



4-7 Setup in NINA

- 1) Open the Equipment Bar
- 2) Open the Camera bar
- 3) Select Player One Camera(ASCOM) on the right.

 \mathbf{Q}_{a}^{a}

Options

Guider





4. Camera ASCOM driver installation

4-8 Setup in MDL

- 1) Open the Camera Control Window.
- 2) Select Camera1 or Camera2 as required and click Setup Camera.
- 3) Select the ASCOM option in Camera Model.
- 4) Click Advanced..Pop up the Ascom Camera Chooser.
- 5) Select Player One Camera from the dropdown list.
- 6) Click Properties to set ASCOM camera parameters

📡 MaxIm DL Pro 5

<u>F</u> ile	<u>E</u> dit	<u>V</u> ie	w <u>A</u> nalyze	Process	Filter	<u>C</u> olor	Pl <u>ug</u> -in	<u>W</u> indow	<u>H</u> elp
2	ภ 	6. 6.	<u>Z</u> oom Zoom I <u>n</u> Zoom <u>O</u> ut				gUp		
			F <u>u</u> ll Screen						
		Þ	Camera Cor	ntrol Windo	w	Ctrl	+W		
		B	Observa <u>t</u> ory	Control V	vindow	Ctr	HT		
		<u>.</u>	Screen Stre	tc <u>h</u> Windo	w	Ctr	I+H		
		⇔	-	nformation Window					
			Zoom Wind			Ctrl			
			<u>P</u> an Window	1		Ctr	l+R		
		P	FITS Heade				l+F		
			Log Window				1+L		
			<u>G</u> raph Wind				l+G		
		F	Batch Proce	ss Windov	v	Ctr	+Q		
			Virtual <u>K</u> eyp Night <u>V</u> ision	ad		Ctr	l+K		
			Toolbar <u>s</u>				•		
		~	Status Ba <u>r</u>						
		賺	<u>A</u> nimate				- 11		
		멾	<u>E</u> qualize Scr	een Streto	h				
			Layout				•		

Expose Guide Setup		
Camera 1	Camera 2	Connect
Setup Camera Cooler	Setup Camera Cooler	
No Camera	No Camera	Disconnect
Options Dual	Options	Coolers
Setup Filter Mod	e Setup Filter	On Off Warm Up
No Filters	No Filters	
,	,	Less -
30(1)		uider Information o Camera



Setup ASCOM	?	×
ASCOM Plug-in Version 5.22 Copyright ? 2009-2012 Diffraction Limited Support: www.cyanogen.com	Ok	
Camera Model	Advand	ced
Min. Exposure (s)		





4. Camera ASCOM driver installation

4-9 Setup in PHD2

- 1) Click the 🎾 button to open the page of connected device.
- 2) Select "Player One Camera(ASCOM)" from the Camera dropdown list.
- 3) Click the 🔣 button to set ASCOM parameters of the camera.
- 4) Click the "Connect" button to turn on the camera.



PHD2 Guiding 2.6	.9 - Sean				_		\times	
文件 导星 工具 查看	青暗场 标记	帮助						
连接设备						×		
	谈	备配置文件 Sean ~	管理配置文件	•				
		选择你的设备,点击"道 或者点击"断开所有设备 您也可以连接或断开	备"进行断开连接					
相机	Player One C	Camera (ASCOM)	~	3 🔣	🎽 连	接	4	
赤道仪	Atik Gen3, m Camera V2 s CCD Labs Q-	imulator (ASCOM)	^	\mathbf{x}	🕺 断	Л		
Aux赤道仪	Fishcamp Sta i-Nova PLC-N	arfish ∕I		×	🗾 连	接		
更多设备	INDI Camera iOptron iGui	der						
		ire LXUSB webcam	4	闭				
		ure Parallel webcam ure Serial webcam						
	MagZero MZ							
🖉 🔯 🛧 🕒	Meade DSI I, Omegon Pro			🧇 📝	2			
	OpenCV web					暗	校 🔵	
	OpenCV web Orion StarSh							
2		amera (ASCOM)						



Choose Player One, to be Player One!

Company website: <u>https://player-one-astronomy.com/</u> Share your work and feedback <u>https://www.facebook.com/PlayerOneAstronomy</u>