EXTREME ENVIRONMENT EQUIPMENT TECHNOLOGY

DATA SHEET
DIGITAL STILLS SUBSEA CAMERA
RAYSTILLS_002 EOS

Mechanical Specifications

Outside Dimensions:	200mmØ
Length:	200mm excluding underwater connectors
Depth Rating:	1500msw
Veiwing port:	Water corrected CR30
Material:	6061-T6 Black Anodised Marine Grade Aluminium
Access:	Two stainless steel spring clips.
Test port:	7/16 UNF GAJON hex plug.

Electronic Interface Specifications

The interface electronics allows for the folllowing:

- Power supply for the camera set at 8.6Vdc.
- Composite video line driver relay video up 1500m COAX max. (Remote View Finder)
- Second video interface for twisted pair cable.
- Control of camera shooting “Half Press” and “Full Press”.
- Time interval shooting. From 0.5 TO 60 Seconds.
- Programmable power and sequence shooting for stand alone applications.
- 4 x usable programmable dry relay outputs.
- Interface between hot shoe and strobe.
- LANC or RS232 output interfaces.
- RS485 Communication up to 1500m twisted pair.
- Overvoltage protection and reset-able fuses on video and Communication lines.
- Firm and software can be configured for specialised or customer requirement.
- Networking of multiple units on single communication line up to 24 units.

A.B.N. 74 909 887 138
8B Sparks Road, Henderson
Western Australia 6166

Telephone: (08) 9437 3022
Facsimile: (08) 9437 3425
Email:raytech@raynertechnologies.com.au

Electrical Specifications

Underwater Connector:

Main:	MCBH-8-F/SS
SD Camera:	MCBH-8-M/SS
Strobe:	MCBH-5-F/SS

HDD Camera Pin Outs

1	-	Screen
2	-	Video
3	-	+ RS485
4	-	- RS485
5	-	0Vdc Supply
6	-	24Vdc Supply
7	-	Video +
8	-	Video –

Strobe Camera Pin Outs

1	-	Trigger
2	-	Detect
3	-	Ready
4	-	Quench
5	-	0Vdc

SDD Camera Pin Outs

1	-	Screen
2	-	Video
3	-	+RS485
4	-	-RS485
5	-	0Vdc Supply
6	-	24Vdc Supply
7.	-	Spare
8.	-	Spare

EOS 7D Technical Specifications

Digital, AF/AE single-lens reflex, camera

Recording Media:	CF Cards (Type I); Compatible with UDMA CF cards; SD, SDHC, and SDXC Memory Cards
Image Format:	Approx. 36 mm x 24mm (35mm Full-frame)
Compatible Lenses:	Canon EF Lenses (excluding EF-S Lenses)
Lens Mount :	Canon EF mount

Image Sensor

Type:	High-sensitivity, high-resolution, large single-plate CMOS sensor
Pixels Effective pixels:	Approx. 22.3 megapixels
Pixel Unit;	6.25 µm square
Total Pixels Total pixels:	23.4 megapixels
Aspect Ratio;	3:2 (Horizontal: Vertical)
Color Filter System:	RGB primary color filters
Low Pass Filter:	Fixed position in front of the image sensor

Dust Deletion Feature

1. Self Cleaning Sensor Unit ·Automatic Sensor Cleaning ·Removes dust adhering to the infrared- and ultraviolet-blocking glass. ·Self-cleaning executed automatically when power is turned on or off. Manual execution also possible. ·Low-pass filter has a fluorine coating.

2. Dust Delete Data acquisition and appending ·The coordinates of the dust adhering to the infrared- and ultraviolet-blocking glass are detected by a test shot and appended to subsequent images. The dust coordinate data appended to the image is used by the provided software to automatically erase the dust spots.

3. Manual cleaning

Recording System

Recording Format:	Design Rule for Camera File System 2.0 and EXIF 2.3
Image Format:	Still Image: JPEG, RAW (14-bit Canon Original), M-RAW, S-RAW, RAW+JPEG, M-RAW+JPEG, S-RAW+JPEG Video: MOV (Image data: H.264/MPEG-4 AVC; Audio: Linear PCM)
File Size:	1. Large: Approx. 22.10 Megapixels (5760 x 3840) 2. Medium: Approx. 9.80 Megapixels (3840 x 2560) 3. S1 (Small 1): Approx. 5.50 Megapixels (2880 x 1920) 4. S2 (Small 2): Approx. 2.50 Megapixels (1920 x 1280) 5. S3 (Small 3): Approx. 350,000 Pixels (720 x 480)

6. RAW: Approx. 22.10 Megapixels (5760 x 3840)
7. M-RAW: Approx. 10.50 Megapixels (3960 x 2640)
8. S-RAW: Approx. 5.50 Megapixels (2880 x 1920) Exact file sizes depend on the subject, ISO speed, Picture Style, etc.

Recording Functions:

1. Standard * Records to either the CF card or SD card.
2. Auto switch card * When the current card becomes full, the camera switches to the other card automatically.
3. Record separately * The CF card and SD card record the same image at a different image recording quality (L, M, S1, S2, S3, RAW, M-RAW, S-RAW)
4. Record to multiple * Both the CF card and SD card record the same image at the same image recording quality. (Also applies to RAW+JPEG, M+JPEG, and SRAW+JPEG)

Backup Recording: Images recorded in a card can be copied to the other card

File Numbering:

1. Continuous numbering * The continuous numbering of captured images will continue even after you replace the camera's card. (The numbering continues even when the folder changes.)
2. Auto reset * When you replace the camera's card, the numbering will be reset to start from 0001. If the new card already contains images, the numbering will continue from the last recorded image in the card.
3. Manual reset * Resets the file number to 0001, and creates a new folder automatically.

RAW + JPEG Simultaneous Recording: The image-recording quality can be selected in any combination of the three RAW and eight JPEG recording quality settings.

Colour Space: Selectable between sRGB and Adobe RGB

Picture Style: Auto, Standard, Portrait, Landscape, Neutral, Faithful, Monochrome, User Defined 1-3 * Scene Intelligent Auto will set [Auto] automatically. * [Standard] is the default setting for [User Def. 1-3]

White Balance

Settings :

1. Auto (AWB)
2. Daylight
3. Shade
4. Cloudy
5. Tungsten light
6. White fluorescent light
7. Flash
8. Custom (Custom WB)

9. Colour temperature * With an EX-series Speedlite having the colour temperature information transmission feature, the colour temperature setting changes to match the colour temperature when the flash is fired. Set to approx. 6000K if the flash unit does not have the colour temperature communication feature.

Auto White Balance:	Auto white balance with the image sensor.
Colour Temperature Compensation:	Blue/amber bias: ±9 levels · Magenta/green bias: ±9 levels * Corrected in reference to the current WB mode's color temperature.

Viewfinder

Type;	Eye-level pentaprism
Coverage;	Approx. 100% vertically and horizontally (At approx. 21mm eyepoint)
Magnification:	Approx. 0.71x / Angle of view 34.1° (with 50mm lens at infinity, -1 m-1 (dpt))
Eye Point:	Approx. 21mm (At -1m-1 from the eyepiece lens center)
Dioptric Adj.:	-3.0 to +1.0m-1 (diopter)
Focusing:	Screen Fixed
Mirror:	Quick-return half mirror (transmission: reflectance ratio of 40:60)

Viewfinder Information:

- AF information AF point, focus confirmation, AF status indicator
- Exposure information Shutter speed, aperture, ISO speed (always displayed), AE lock, exposure level, exposure warning
- Flash information Flash ready, flash exposure compensation, high-speed sync, FE lock, red-eye reduction light
- Image information Highlight tone priority (D+), maximum burst (2-digit display), card information
- Battery check
- Composition information Grid, electronic level
- Warning symbol Displayed if any of the following is set: Monochrome, white balance correction, One-touch recording quality switch, expanded ISO speed, or spot metering.

Depth Of Field Preview: Enabled with Depth-of-field preview button

Autofocus

Type:	TTL secondary image - registration, phase detection
AF Points:	61-point (up to 41 cross-type points) * One to five cross-type AF points at f/2.8, 10 to 20 cross-type AF points at f/4, and 15 to 21 cross-type AF points at f/5.6. (The number of cross-type AF points will differ depending on the lens.)

AF Working Range: EV -2 - 18 (at 73°F/23°C and ISO 100)

Focusing Modes:

1. Autofocus

- One-Shot AF ·Predictive AI Servo AF
- For automatic AF point selection, the AF point to start the AI Servo AF operation can be selected.
- For automatic AF point selection, the active AF point can be displayed. ·AI Focus AF -(Switches between One-Shot AF and AI SERVO AF automatically)
    - Automatically set in A+ Auto Mode

2. Manual focus (MF)

-AF Point Selection
1. Single-point AF (Manual selection)
2. Auto selection 61-Point AF
3. Single-point Spot AF (Manual selection)
4. AF point expansion (Manual selection, 4 points: Up, down, left, and right)
5. AF point expansion (Manual selection, surrounding 8 points)
6. Zone AF (Manual zone selection)

Selected AF Point Display: Displayed in viewfinder with transparent LCD and on LCD panel

Active AF Point Indicator: AF area used in horizontal/vertical (grip up or down) shooting and the manually-selected AF point position can be set separately

AF Assist Beam:
1. Enable With an EOS-dedicated Speedlite, AF-assist beam is emitted automatically when necessary.
2. Disable
3. IR AF assist beam only * No AF-assist beam with flash bursts.

Exposure Control

Metering Modes:
Max. Aperture TTL metering with 63-zone SPC with the following selectable modes:

1. Evaluative metering (linked to all AF points)
2. Partial metering (center, approx. 7.2% of viewfinder)
3. Spot metering (center, approx. 1.5% of viewfinder) ·AF point-linked spot metering not provided.
4. Center-weighted average metering a. The selectable metering modes can be limited with a Custom Function.

Metering Range: EV 1-20 (at 73°F / 23°C with 50mm f/1.4 lens at ISO 100)
Exposure Control Systems

1. Scene Intelligent Auto
2. Program AE (shiftable)
3. Shutter-priority AE (Safety shift possible)
4. Aperture-priority AE (Safety shift possible)
5. Manual exposure * The metering mode can be specified with a Custom Function.
6. Bulb (7) E-TTL II autoflash program AE * Evaluative metering, Averaged metering

ISO Speed Range For Stills:
- ISO 100-25600 (in 1/3-stop or whole-stop increments)
- ISO speed expansion possible to ISO 50, 51200, and 102400.
- For [Highlight tone priority], the settable ISO speed range will be 200-25600.
- SO speed safety shift possible with Custom Function.

Auto Setting	
Shooting Mode	**ISO Settings**
A+	100-12800
P/Tv/Av/M	100-25600
B	ISO 400 fixed
With Flash	ISO 400 fixed*

*If fill flash will result in overexposure, minimum ISO 100 is set.
*For bounce flash, ISO 400-1600 is set automatically depending on the light level.

ISO Speed upper and lower limits:

1. Manual setting range
   * ISO speed expansion is set with this option.
2. Auto ISO range
   * ISO speed expansion not settable.

Shutter speed and automatic ISO speed control in P and Av Modes:

In the P and Av shooting modes with Auto ISO set, the ISO speed is set automatically so that a shutter speed slower than the one set with [Minimum shutter speed] (1/250, 1/125, 1/60, 1/30, 1/15, 1/8, 1/4, 0"5, 1") is not set.

Exposure Compensation:

Manual: ±5 stops in 1/3 or 1/2-stop increments AEB: ±3 stops in 1/3 or 1/2-stop increments * Indicated up to ±3 stops on the LCD panel and in the viewfinder.

AE Lock:

1. Auto AE lock ·In the One-Shot AF mode with evaluative metering, AE lock takes effect when focus is achieved.
2. Manual AE lock ·With AE lock button.
   (AE lock is updated each time you press the button.) Enabled in all metering modes.

Shutter

Type:	Vertical-travel, mechanical, focal-plane shutter with all speeds electronically-controlled Shutter Speeds: 1/8000 to 30 sec., bulb (Total shutter speed range. Available range varies by shooting mode.) X-sync at 1/200 sec.
Shutter Release:	Soft-touch electromagnetic release
Self Timer:	10-sec. or 2-sec. delay

Shutter Lag Time:

1. During SW-1 ON, time lag between SW-2 ON and start of exposure: - Approx. 0.059 sec. (With the shutter-release time lag is shortened with the Custom Function, it will be approx. 0.036 sec.)
2. Time lag between simultaneous SW-1/SW-2 ON and start of exposure: Approx. 0.2 sec. - Time lag with the aperture stopped down by 3 stops or less. Excludes AF operation time.

External Speedlite

EOS Dedicated Speedlite:	E-TTL II autoflash with all EX Series Speedlites
Zooming to Match Focal Length:	Provided
Flash Exposure Compensation:	±3 stops in 1/3- or 1/2-stop increments
FE Lock:	Provided

External Flash Settings:
The camera can set the following with Speedlite 600EX-RT, 580EX II, 430EX II, 320EX, 270EX II, or 270EX:

1. External flash control * Flash mode, sync setting, FEB (not possible with 270EX II/270EX), flash exposure compensation, E-TTL II, zoom, wireless master flash (not possible with 430EX II/ 270EX), and clear settings. * With the Speedlite 600EX-RT, radio wireless control is possible.
2. Flash Custom Function setting.

PC Terminal: Provided (no polarity)

Drive System

Drive Modes:	Single, High-speed continuous, Low-speed continuous, Silent Single Shooting and Self-timer (10 sec. self-timer/remote control, or 2-sec. self-timer/remote control)
Continuous Shooting Speed:	High-speed: Maximum approx. 6 shots/sec. Low-speed: Maximum approx. 3 shots/sec. Silent continuous shooting: Maximum approx. 3 shots/sec.
Maximum Burst:	·JPEG Large/Fine: Approx. 65 shots (approx. 16270 shots) ·RAW: Approx. 13 shots (approx. 18 shots) ·RAW+JPEG Large/Fine: Approx. 7 shots (approx. 7 shots) *Figures are based on Canon's testing standards (ISO 100 and Standard Picture Style) and a 8 GB card. *Figures in parentheses apply to an UDMA mode 7, 128 GB card based on Canon's testing standards.

Live View Functions

Shooting Modes: Still photo and video recording
Focusing:
1. Autofocus: (One-Shot AF) ·Live mode ·One-point, contrast AF. Switching to another AF point possible. ·Face detection Live mode ·Face detection, contrast AF. Face selectable. ·Quick mode 61-point, phase-difference AF, same as normal shooting.
2. Manual focus: * Magnify the image by 5x or 10x and focus manually.

Metering Modes: Real-time Evaluative metering with the image sensor
Metering Range: Real-time evaluative metering with image sensor: ·Metering range: EV 0 - EV 20 (At 73°F/23°C, 50mm f/1.4 lens, ISO 100) ·AE lock possible ·The active metering time can be changed.
Grid Display; Three grid display provided
Exposure: Simulation Provided
Silent Shooting: Provided (Mode 1 and 2)

Video Shooting

File Format: MPEG-4 AVC / H.264 Variable (averaged) bit rate
File Size: Recording Sizes: 1920 x 1080 (Full HD), 1280 x 720 and 640 x 480
Frame Rates: [1920 x 1080]: 30 fps / 25 fps / 24 fps [1280 x 720]: 60 fps / 50 fps [640 x 480]: 30 fps / 25 fps

Continuous Shooting Time:

Based on 8GB Card:
[1920 x 1080] 30 fps ALL-I: 11 min. (685 MB/min.) / IPB: 32 min (235 MB/min.) 25 fps ALL-I: 11 min (685 MB/min.) / IPB: 32 min. (235 MB/min.) 24 fps ALL-I: 11 min. (685 MB/min.) / IPB: 32 min. (235 MB/min.) [1280 x 720] 60 fps ALL-I: 12 min. (610 MB/min.) / IPB: 37 min. (205 MB/min.) 50 fps ALL-I: 12 min. (610 MB/min.) / IPB: 37 min. (205 MB/min.) [640 x 480] 30 fps IPB: 97 min. (78 MB/min.) 25 fps IPB: 97 min. (78 MB/min.)
* If the recording time reaches 29 min. 59 sec., the movie shooting stops automatically.
* Movie shooting does not stop when the file size reaches 4GB.

Focusing: *Same as focusing with Live View shooting
- During movie shooting or if movie cropping has been set, the image cannot be magnified for manual focusing.

Range ISO Range:

- P, Av, and Bulb: Automatically set within ISO 100 - 12800, expandable to H (equivalent to ISO 25600)
- A+ and Tv: Automatically set within ISO 100 - 12800 ·M: Auto ISO (automatically set within ISO 100 - 12800), ISO 100 - 12800 set manually (in 1/3- or whole-stop increments), expandable to H (equivalent to ISO 16000/20000/25600)
  - If Highlight tone priority is set to enable, the settable ISO speed range will be ISO 200 - 12800.

Exposure Control :

1. Program AE for movie shooting * For shooting modes other than manual exposure and bulb. * Shutter speed (1/30 - 1/4000 sec., signal accumulation time), aperture, and ISO speed automatically set.
2. Manual exposure * For manual exposure. * Shutter speed (signal accumulation time), aperture, and ISO speed (auto/manual) manually set. The shutter speed (signal accumulation time) is limited to 1/4000 sec. at the maximum and to 1/30 sec. at the minimum for 24/25/30 fps or 1/60 sec. or higher for 50/60 fps.

Exposure Compensation:

* Up to ±3 stops in 1/3-stop increments
* For movies, even if exposure compensation has been set beyond ±3 stops, exposure compensation up to only ±3 stops will be applied.
* For still photos, exposure compensation up to ±5 stops can be applied.

LCD Monitor

Type:	TFT color, liquid-crystal monitor
Monitor Size:	3.2-inches
Pixels:	Approx. 1.04 million dots
Coverage:	Approx. 100% Approx. 170° vertically and horizontally
Brightness Control:	Auto: Brightness adjusted automatically by the light sensor * Adjustable to one of three levels: Darker, Standard, Brighter Manual: Adjustable to one of seven brightness levels
Coating:	Clear View LCD II

- Glass surface has an anti-reflective AR coating.

Playback

Display Format:

Single image, Single image + Image-recording quality/shooting information, histogram, 4- or 9-image index, magnified view (approx. 1.5x-10x), rotated image (auto/manual), image jump (by 10/100 images, index screen, by shooting date, by folder), two-image comparative display, slide show (all images/selected by date/folder), star rating. Highlight Alert With single-image display (Info.) and single-image display, overexposed highlight areas will blink.

Quick Control Function

The following functions can be set:

- Shutter speed, aperture
- ISO speed, exposure compensation
- AEB, flash exposure compensation

- AF point selection (including AF area selection modes)
- Picture Style
- White Balance, WB Correction, metering mode
- Auto Lighting Optimizer, recording function switching
- Image-recording quality,
- AF mode, drive mode, and Custom Controls (camera controls/buttons customization).

Image Protection and Erase

Protection: Erase protection can be applied or canceled for a single image, all images in a folder or all images in the card
Erase: Erase a single image, selected images, all images in a folder, all images in a card or erase only unprotected images.

Direct Printing

Compatible Printers: PictBridge-compatible printers
Printable Images: RAW and JPEG images complying to Design rule for Camera File System ·Movies cannot be printed

Direct Image Transfer compatible Images: JPEG and RAW images and movie For RAW+JPEG, only the RAW or JPEG image or both images can be transferred

Customization

Custom Functions: 13 Custom Functions settable with the camera
Custom Controls: The following camera controls can be customized by assigning the desired function: Shutter button halfway pressing, AF-ON button, AE lock button, Depth-of-field preview button, lens AF Stop button, Multifunction button, SET button, Main Dial, Quick Control Dial, and Multicontroller
Camera User Settings: Current camera settings can be registered to C1, C2 and C3 on the Mode Dial (Automatic registration update is possible)
My Menu Registration: Up to six top-tier menu options and Custom Function settings can be registered

Interface

USB Terminal: For personal computer communication and direct printing (USB 2.0 Hi-Speed)
Video Out Terminal: 1. Video OUT terminal: NTSC/PAL selectable
2. mini-HDMI OUT terminal
Extension System Terminal: For connection to WFT-E7A (WFT) and GP-E2 (GPS)
Gigabit-Ethernet: The RJ-45 jack is not built-in and is only available via the Wireless File Transmitter WFT-E7A

Power Source
Battery: One Battery Pack LP-E6 AC power can be supplied with the AC Adapter Kit ACK-E6.

Battery Life:

1-Camera body only:

Shooting Method	Temperature	Possible Shots
Viewfinder Shooting	At 73°F/ 23°C	Approx. 950
	At 32°F/ 0°C	Approx. 850
Live View shooting	At 73°F/23°C	Approx. 200
	At 32°FF/ 0°C	Approx. 180

Battery Check:

- Automatic battery check when the power switch is turned on.
- Displayed in 6 levels: ·
- Battery level displayed on LCD panel and in viewfinder. ·Battery information can be checked with the [Battery info.] menu ·
- If Battery Grip BG-E11 is used with size AA/LR6 batteries; the battery level is displayed in four levels instead.

Power Saving:

- Power turns off after the set time (1, 2, 4, 8, 15 or 30 minutes) of non-operation elapses.

Date/Time Battery:

- CR1616 lithium battery