

What's a "FiOPS?"

Our *Fiber Optic POV System* is a complete micro camera and fiber-optic transmission solution. The system includes a Marshall CV502-WPMB Camera with an Umbilical Cable, Transmitter, and Receiver. It also includes a Tablet Controller to control the camera from the truck or other remote location. The user simply adds power and one strand of single-mode ST fiber to complete the transmission path. The system supports up to 3G 1080p/59.94 signals and the camera's native signal is HD/3G-SDI.

How do I set it up?

- 1) Mount the Camera with the included Magic Arm. Use the Velcro strap on the Magic Arm to strain-relieve the camera cable.
- 2) Connect the Umbilical Cable to the Camera and plug it into the Transmitter box.
- 3) Power up the Transmitter. A single supply powers the Transmitter and Camera. An LED shows power.
- 4) Confirm it's working. "Power" and "Camera OK" LEDs should be lit. The "Fiber Error" LED remains lit until the Receiver is connected. An HD/3G-SDI output is provided for local monitoring.
- 5) Connect your fiber (ST single-mode) to the Transmitter.
- 6) Power up the Receiver and connect the other end of your fiber to it. Confirm it's working. The "Fiber Error" LEDs on the Transmitter and Receiver should now be OFF.
- 7) Connect a 3-pin XLR audio cable to the Receiver and extend it to the video pit (or wherever your control location is). Plug the other end of the cable into the USB Control Cable included with the Tablet Controller and power up the Tablet.
- 8) Use additional 3-pin XLR cables to daisy chain any additional Receivers.
- 9) Connect the BNC output from the Receiver to the truck or a monitor and enjoy the picture!

How do I use it?

- 1) Once you have established the signal path and can see a picture from the camera, you can control the camera.
- 2) Open the "Admiral Video FiOPS Controller" Program on the Tablet Controller and Open a Port. Detailed instructions for setting up the Tablet Controller are available in the separate included manual.
- 3) It is a good idea to default the camera before use by doing a **Camera Reset**. This will reset any options that may have been set by a previous user and places the camera in a full automatic mode. A camera reset can be performed by pressing the [CAMERA RESET] button.
- 4) After a camera reset, the output will look pretty good by itself. If you wish to take manual control of camera settings, please see the section titled "Basic Camera Control."

Is it waterproof?

All configurations of the Marshall CV502-WPMB camera are "weatherproof," meaning they can be used in wet conditions without a rain cover. Additionally, most lens configurations are IP67-rated and can be fully immersed in water up to a depth of 1m / 3'3". However, *some lens configurations are NOT submersible*. Please check with us to verify that your camera configuration is fully waterproof if you intend to use it underwater. In all configurations, the connection between the Camera Breakout Cable and the Umbilical is not waterproof, so care should be taken to protect this connection and the rest of the system from the elements.

Does it record?

No, the Marshall camera does not record. Save the GoPro cameras for those jobs.

Does it have a microphone?

The Marshall CV502-WPMB camera does not have a microphone. If you need audio from the camera, you can deploy an audio embedder at the input to the Transmitter.

What's in the box?

All cases are marked with labels and serial numbers. The system consists of:

- 1) Large blue Pelican-style Case
- 2) Magic Arm with Super Clamp and Mount
- 3) Umbilical Cable to connect the Camera to the Transmitter
- 4) ZIPPER CASE - Tablet Computer with Folio Cover, Power Supply, Mouse, and USB Control Cable
- 5) CAMERA - Pelican case with the Marshall CV502-WPMB Camera and Breakout Cable
- 6) TRANSMITTER - Pelican case with the Transmitter and Power Supply
- 7) RECEIVER - Pelican case with the Receiver and Power Supply
- 8) SPARE PARTS - Pelican case with the BACKUP IR Remote Control or Servicing Breakout Cable and SPARE Power Supply

Basic Camera Control

The FiOPS Controller Program provides access to common video functions without the need to open OSD Menus:

Iris Control - The Marshall camera replicates iris control by using a variable CCD iris function.

- 1) Use the [BRIGHT -] or [BRIGHT +] buttons to decrease or increase the BRIGHTNESS.
- 2) Use the [BRIGHT RESET] button to reset the brightness as needed.
- 3) The BRIGHTNESS control acts as a complement to the AUTO SHUTTER function.
- 4) In AUTO XP mode, these buttons function identically to the brightness setting under [MAIN MENU] > [AE CONTROL] > [BRIGHTNESS]. Overall exposure is adjusted, but the camera will still make slight auto adjustments in response to changing lighting conditions.
- 5) In MANUAL XP mode, these buttons control overall exposure and the camera will not make any additional auto adjustments.

White Balance

- 1) Tap the [MAN WB] button.
- 2) Use the [RED -] or [RED +] buttons to adjust RED GAIN and the [BLUE -] or [BLUE +] buttons to adjust BLUE GAIN.
- 3) Use the [RED RESET] and [BLUE RESET] buttons to reset red or blue gain as needed.

Saturation

- 1) Use the [SAT -] or [SAT +] buttons or the input box to change COLOR GAIN.
- 2) The range is from 0 to 20 and the default value is 15.
- 3) At value 0, full B/W mode is activated.

Hue

- 1) Use the [HUE -] or [HUE +] buttons or the input box to change HUE.
- 2) The range is from -7 to 7 and the default value is 0.

Picture Flip - Used when mounting the camera upside down.

- 1) Tap the [ROTATE ON] button.
- 2) This setting is equivalent to setting both the [MIRROR] and [FLIP] settings under [MAIN MENU] > [IMAGE CONTROL] to [ON].

Gamma

- 1) Tap [STANDARD γ], [STRAIGHT γ], [LOW γ], [MIDDLE γ], or [HIGH γ] to select GAMMA.
- 2) The default value is Standard Gamma.

Advanced Camera Control – Using OSD Menus

The following advanced functions can be accessed using the Camera's On-Screen Menu. Some of these menus can get you into trouble!

Menu Navigation

- 1) Press the [MENU] button to bring up the display. Navigate using the [▲] or [▼] buttons.
- 2) Menus have two options - you can change a value with the [◀] or [▶] buttons or press [ENTER] to enter a sub-menu. The [↵] icon indicates that a sub-menu is available.
- 3) To clear the menu, navigate to [EXIT] and press [ENTER], or press the [EXIT] button in the FiOPS Controller software.

Wide-Angle Lenses - When using a wide-angle lens, the Lens Shading Compensation function can be used to brighten the corners of the image.

- 1) Navigate to [MAIN MENU] > [IMAGE CONTROL] > [SHADING] and use [◀] or [▶] to select [ON ↵].

Output Format

The system is capable of 1080p/29.97, 720p/29.97, 1080i/59.94, 720p/59.94, and 3G 1080p/59.94. Each camera is shipped with the requested output format pre-selected. It is not recommended that the output format be changed in the field because the possibility exists that you will cycle through a menu that puts the camera in a mode that some piece of gear in your signal path does not support. If you make a change that causes your monitor to blank out, you may be able to simply cycle through options (using the [◀] or [▶] button) until the picture comes back. If that does not work, a monitor that supports all possible camera outputs is required.

- 1) Connect the monitor directly to the BNC output of the Transmitter or Receiver. The rest of the system must remain connected. This will enable you to view the camera output directly on the monitor while maintaining the data connection to operate the menu.
- 2) Using the FiOPS Tablet Controller connected to the Receiver, navigate to [MAIN MENU] > [IMAGE CONTROL] > [FRAME RATE] and use [◀] or [▶] to select the desired output format.

ID Address

Each camera is shipped with a pre-set ID Address which is marked on the outside of the camera. It is not recommended that the camera ID Address be changed in the field - because the Tablet Controller can only send commands to cameras with IDs 1-6, if the ID is changed to a value outside of this range you must temporarily connect the backup IR Remote Control system (which can send commands to cameras with IDs 0-255) in place of the Tablet Controller, or temporarily connect the Servicing Breakout Cable and use the joystick (to access the OSD Menu locally), in order to set the ID back in the 1-6 range.

Should it be necessary to change a camera's ID Address:

- 1) Navigate to [MAIN MENU] > [DISPLAY CONTROL] > [CAM ID].
- 2) Use [◀] or [▶] to select the desired ID number. The selection will be applied immediately and you must immediately switch the controller to match the new camera ID to continue controlling the camera.
- 3) This setting does not reset with a Camera Reset!
- 4) If you daisy chain more than one camera with the same ID number, all cameras with the same ID will be controlled simultaneously.

Troubleshooting Tips

We have tried to keep the design of this system simple and reliable with quick deployment being the prime consideration. The individual connectors are not labeled because there is really only one way to hook the system up.

Transmitter

In addition to performing electrical-to-optical conversion and transmitting light down the fiber, the Transmitter also powers the Camera and receives the data that controls the Camera. The indicator lights show Power, Fiber Error (no optical connection with the Receiver is detected), and Camera OK (SDI Signal from the camera is detected). Power is via a standard 4-pin XLR.

Receiver

The Receiver does the optical-to-electrical conversion and also transmits the data to the Camera. The indicator lights show Power and Fiber Error (no optical connection with the Transmitter is detected). Power is via a standard 4-pin XLR. The data goes in on the female 3-pin XLR and loops to other Receivers using the male 3-pin XLR.

Fiber Optic System

The fiber system consists of a Transmitter and a Receiver. The system is capable of transmitting an HD video signal plus data over up to 20 km of single-mode fiber. The system uses Wavelength Division Multiplexing to get the two signals over one strand of fiber. In addition to receiving the fiber optic signal, the RECEIVER is also a DATA TRANSMITTER. This can help in troubleshooting fiber-related problems, as you can expect to receive some light at the Transmitter position when a Receiver is connected.

Remote Control

The Tablet Controller, which is the primary means of controlling the Camera, sends commands to the camera using a USB cable with an integrated serial converter. The USB Control Cable has indicator lights for both transmitting and receiving data. The Tablet Controller sends commands at 9600 baud. 9600 baud is also the default setting for the Marshall camera.

Servicing Cable

The Servicing Cable can be temporarily connected in place of the standard Breakout Cable. The Servicing Cable provides a CVBS video output and a joystick for local control of the Camera's OSD Menu system. It is not recommended for normal use, since the cable is not as durable as the standard Breakout Cable.

Backup Remote Control without DIP Switches

During normal operation, the LED display should show "A" followed by a number which indicates the ID address of the camera you are trying to control. If the IR Receiver does not show the camera's ID, enter the ID and press [CAM]. To enter an ID greater than 9, press [-/--] and enter the desired ID as a three-digit number (with leading zeroes, if necessary). To check the protocol and baud rate setting of the IR Receiver, press and hold the red [SETUP] button on the Remote. The display should show "d=96" - if it does not, press [◀] or [▶] to change the number and [▲] or [▼] to change the letter and then press [ENTER] on the Remote.

Backup Remote Control with DIP Switches

Normal DIP switch setting is [UP-UP-DOWN-UP] on the IR Receiver. The LED display on the IR Receiver must display the ID address of the camera you are trying to control. If the IR Receiver does not show the camera's ID, enter the ID and press [CAM]. We have seen on rare occasions the LED display change while using the menus - if this happens, simply enter the camera ID number followed by [CAM] on the Remote.



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Menu Structure

SETUP	SUB MENU	SUB MENU	DESCRIPTION	
LENS	ESC		Select if a fixed iris lens is installed. Shutter controls exposure automatically if shutter is set as auto.	
	DC IRIS		Select if a lens with an adjustable iris is installed. Controls exposure automatically.	
WB CONTROL	AUTO		Color temperature is automatically adjusted from 3,000° K - 8,000° K	
	ATW		Continually adjusts camera color balance in accordance with any change in color temperature. Compensates for color temperature changes within the range of 1,900° K to 11,000° K.	
	PUSH		Color temperature will be manually adjusted when the OSD button is pushed. Place a white card in front of the camera and press the OSD button. Adjusts within the range of 1,900° K to 11,000° K.	
	MANUAL	COLOR TEMPERATURE		Select color temperature. [LOW, MIDDLE, HIGH]
RED GAIN			Adjust the Red tone level manually. [0-63]	
BLUE GAIN			Adjust the Blue tone level manually. [0-63]	
AE CONTROL (EXPOSURE)	BRIGHTNESS	0-20	Adjust the screen brightness. The brightness control function adjusts gain and iris.	
	AGC LIMIT	0-20	Controls the amplification/gain process automatically if the illumination falls under the usable level. Camera raises up gain to selected gain limit in dark conditions.	
	SHUTTER	AUTO		Shutter controls exposure automatically when IRIS is manual. Shutter control has the exposure control priority.
		MANUAL		Shutter speed is fixed. The exposure control priority is given to other resources.
		FLICKERLESS		Use this function when you experience picture flicker. This happens when there is a conflict with the installed lighting frequency.
DSS (SENS-UP)	OFF, x2-x64	When luminance condition is low, DSS can adjust the picture quality by maintaining the light level. Minimum slow shutter limit is down to x64.		
BACK LIGHT	BACK LIGHT	WDR	Enable user to view both object and background more clearly when background is too bright. [LOW, MIDDLE, HIGH]	
		BLC	Enable the backlight compensation feature.	
		SPOT	Enables a user to select a desired area of the picture and view that area more clearly when background is too bright.	
	ACE	LOW, MIDDLE, HIGH	Brightness correction of dark image areas.	
ECLIPSE	LEVEL		Highlight the bright area with a masking box with a selected color. Adjust the masking level from 0-20.	
	COLOR		Select the color for masking. [GRN, MAG, RED, BLUE, BLK, WHT, YEL, CYN]	
DAY/NIGHT	AUTO	ANTI-SAT.	Adjust the anti-saturation level manually. This feature will reduce the saturation phenomenon caused by the camera receiving IR light or light in Night mode.	
		AGC LEVEL	The camera will stay in Day in a normal environment, but switch to Night when ambient illumination becomes this preset level. This level is the threshold for switching Day to Night. It is the same as the exposure gain level.	
		AGC MARGIN	Set the margin between Day to Night switching level and vice versa.	
		DWELL TIME	Select the checking time of light condition to confirm the change from Day Mode to Night Mode and vice versa.	
	COLOR		The camera keeps Color mode constantly.	
NIGHT		The camera keeps black/white mode constantly.		
IMAGE STABILIZER	RANGE	10%, 20%, 30%	This function will reduce image blurriness due to vibrations caused by hand shake or pan/tilt operation. The image will be digitally zoomed in to compensate for the shifted pixels. Set the digital zoom level for image stabilizing. [Maximum 30% = 1.4x Digital Zoom]	
	FILTER	LOW, MIDDLE, HIGH	Select the level of stabilizer correction hold for the worst case of image shake. HIGH: Less image correction. LOW: More image correction.	
	AUTO C	OFF, HALF, FULL	OFF: Disable the auto centering function. FULL: The camera will correct the blurriness due to vibrations caused by hand shake or pan/tilt operation. HALF: The camera will correct the blurriness due to vibrations caused by hand shake.	
IMAGE CONTROL	COLOR LEVEL	0-20	Adjust the color level value.	
	SHARPNESS	0-20	Adjust the sharpness (aperture) of the image. As you increase this value, the picture outline becomes stronger and clearer.	
	MIRROR		Video output is rotated horizontally.	
	FLIP		Video output is rotated vertically.	
	D-ZOOM	1.0x-16.0x	Enlarge digitally the video output up to 16x.	
	DEFOG	AUTO		This feature will help increase visibility in extreme weather conditions, such as fog, rain, or in very strong luminous intensity.
		MANUAL		Set the level of the defogging functionality. [LOW, MIDDLE, HIGH]
	DNR	OFF, LOW, MIDDLE, HIGH	Digital Noise Reduction. This feature will reduce the video noise in low light conditions.	
	MOTION		This feature will observe movement in the image by motion zone and sensitivity that are preset with sub menu.	
	SHADING	WEIGHT	This feature will correct for inconsistent brightness level in the image, e.g. when using a wide angle lens. [0% - 100%]	
GAMMA		This feature will adjust video output brightness curves. [STANDARD, STRAIGHT, LOW, MIDDLE, HIGH]		
FRAME RATE		Change video output format. [1080I59, 720P59, 1080P59 3G, 720P29, 1080P29]		
DISPLAY CONTROL	CAM VERSION		Displays the firmware version of the camera.	
	CAM TITLE		The camera title can be entered and it will appear over the video output.	
	PRIVACY		Mask an area you want to hide on the screen.	
	CAM ID	0-255	Select the camera ID address number for RS-485 communication. [0-255]	
	BAUDRATE		Set the baud rate of RS-485 communication. [2400, 4800, 9600, 19200, 38400, 57600, 115200]	
	LANGUAGE		Select the menu language.	
DEFECT DET		Correct for stuck pixels.		
RESET			Reset the camera settings to the defaults.	
EXIT			Exit the menu.	

Packing the Case



The four Pelican cases fit in the bottom layer.



The foam divider and remaining parts are placed on top.

System Diagram

