

iShot[®] Imaging Model E Series Video Borescope

Operational Manual



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Introduction

Congratulations on your investment in the **iShot Imaging Model E Video Borescope** which features that are:

EASY – easy to see sharp object detail with 600 nit display

EFFICIENT – 1: 1 image display to best fit the human eye & use for documentation, flexible image/video data storage capabilities, wide focal ranges, quick boot-up and increased run times.

ENHANCEMENT enhance images incrementally with the push of a button to see details such as features, defects and foreign material.

EXPOSURE TIME– adjust exposure with the press of a button (standard exposure or double exposure)

PICTURE EFFECTS – Negative Image, Monochrome and Color, each with and without a XY grid overlay.

Cautions and Warnings

Safety Precautions

This manual covers the **iShot Imaging Model E Series Video Borescope**, its functions, and its use. To ensure safe operation read this manual before operating the equipment. By doing so, you will become familiar with the equipment's capabilities and better understand its functions. Save this manual for future reference. Follow all warnings and instructions marked in the manual and on the equipment.

Operational, General Safety Considerations and Precautions

Always observe the guidelines and precautions that follow.

There are no user-serviceable parts inside. Refer all services to InterTest Customer Service and Support Group.



IMPORTANT: To ensure operator's safety, read and understand this manual before using the system.

To avoid injury, read and understand the associated documentation of support components prior to operation. Direct any questions about equipment operation to InterTest Customer Service and Support Group at 908-496-8008 or via email to service@intertest.com.

Cautionary Symbols and Symbol Terminology

This describes the various symbols that are used in this manual and mounted on the equipment. The severity level of a potential hazard varies. Refer to for hazard level descriptions.

Symbols	Definitions
	WARNING/CAUTION: Risk of electric shock.
	WARNING/CAUTION: Refer to the instruction manual.
	WARNING/CAUTION: Avoid exposure to water and liquids.
	WARNING/CAUTION: Avoid eye and skin exposure to UVA Light.

Table 1 Caution & Warning Symbols

Warnings



Stop operation immediately when any abnormality or defect occurs. Do Not Use during an abnormal condition; such as emitting smoke, burning odors, after damage from dropping, invasion of foreign objects, etc. may cause fire and/or electrical shock. Contact InterTest Inc for service.



Do not allow the conductive insertion tube system to come in direct contact with any voltage or current source. Prevent all contact with live electrical conductors or terminals. Damage to the equipment and/or electrical shock to the operator may result.



Do not use this system in explosive environments.

The following caution statements apply to the **Model E Video Borescope** device in general. Warning/Caution statements also appear elsewhere in this document.



Handle the Borescope carefully: Keep the insertion tube away from sharp objects that might penetrate its outer sheath. Keep the whole insertion tube as straight as possible during operation; loops or bends anywhere in the insertion tube decrease its ability to steer.



Avoid bending the insertion tube sharply.



Do not place the battery in fire or exceed the battery operating temperature, pierce, strike or otherwise subject it to strong impacts. Do not expose the battery to water or allow the battery to get wet (IP65). Do not disassemble or modify.

Feature Descriptions

Direct Button Control: Intuitive buttons for adjusting brightness, sharpness, exposure, effects, zoom, and rotation, eliminating the need to access menus for quick adjustments.

Ultra Bright Display: Boasting an impressive 600 nits (candela per m²) screen brightness, ensuring clear and vivid visuals in various environments, even in challenging lighting conditions.

Fast Startup and Probe Changing: Lightning-fast operation with a mere 5 seconds to power on and view the image and less than 10 seconds to release and install probes, maximizing efficiency and productivity.

Multiple Outputs / File Transfer Options: Versatile connectivity options, including USB camera to PC, HDMI to monitor, and SD card to PC, facilitating seamless data transfer and compatibility with various systems.

Rugged Borescope Shafts: Engineered with robust, resilient tungsten-braided sheathing materials, ensuring durability and reliability in demanding industrial applications.

Detachable Probes: Enhance customer value by providing the option for backup probes, simplifying the repair process, optimizing uptime, and reducing downtime.

Full Line of Articulating and Non-Articulating Detachable Probes: Offering a comprehensive range of probes with outer diameters ranging from 0.8 to 6.0 mm, catering to diverse inspection needs with precision and flexibility.

Long Lengths Available: Non-articulating probes are available in 5 to 10-meter lengths, enabling thorough inspections in extended-reach applications without compromising image quality or performance.

Feature Descriptions and Locations



Figure 1 Instrument Features

Label	Description
A	Mini HDMI Port: Connects the system to an external video monitor
B	USB C Port: Connecting the system to an external PC for data transfer / External Power
C	Micro SD Card Slot: Micro SD Card Slot for External Data Storage
D	Joystick: Manual Articulation
E	Probe: Distal Tip
F	Battery Compartment: (1) NCR18650GA 3300mAh Battery / Internal Charging – 2amp
G	Trigger: Short Press (photo) Long Press (Video)
H	Display Monitor: Screen size and type 1:1 screen ratio 720 x 720 resolution / IPS true color with off-angle clarity
I	Probe Release Slide Switch: Slide Both Switches up to Unlock and Uncouple the Probe from Handle

Table 2 Menu Buttons

Instrument Controls



Figure 2 - Instrument

	Description
	Power: <i>Long Press</i> to Power On/ Off <i>Short Press</i> to Freeze Image
	Brightness: <i>Long Press</i> Cycles between these two options:
	Display Brightness: (short press to cycle) backlighting of the display
	1 - 150 nit
	2 - 300 nit
	3 - 600 nit
	Image Brightness: (short press to cycle)- camera brightness (6 Levels)
	"E" Button: Long Press E cycles between these 3 options:
	Display or Image Effects: (short press to cycle)
	Negative
	Monochrome
	Color
	Grids
	Image Enhancements: (short press to cycle)
	400 x 400 - 3 levels
	720 x 720 - 4 levels
	Exposure: (short press to cycle)
	Standard exposure
	Double exposure
	LED Control: LED Brightness 5 - levels (short press to cycle). Switch front/side lights in dual (long press)
	SD Card Library: Long Press to switch out of SD Card library
	Menu: OK
	Menu Navigation Down & Image Rotation <i>Short Press:</i> Rotates Image
	Long Press: Switch between Forward & Side views
	Menu Navigation Up & Zoom

Table 3 Button Functions

A. Power: Long Press to Power On/Off | Short Press to Freeze Image

B. Brightness: Long Press to cycle between these two options:

Display Brightness: Short Press to cycle the backlighting of the display

- 1 - 150 nit
- 2 - 300 nit
- 3 - 600 nit

Image Brightness: Short Press to cycle the camera brightness
4 Levels

C. E Button: Long Press E cycles between these 3 options:

Image or Display Effects: Short Press to cycle between

- Negative
- Monochrome
- Color
- Grids

Image Enhancements: (short press to cycle)

- 400 x 400 - 3 levels
- 720 x 720 - 4 levels

Exposure: (short press to cycle)

- Standard exposure
- Double exposure

D. LED Illumination: Short Press to cycle the probe LED brightness
5 levels

E. SD Card Library: Long Press to switch out of SD Card library
Use to "Exit" when in "Menus"

F. Menu: "OK" Note, use "UP" & "Down" arrows to navigate ("G" & "H" Buttons)

G. Image Rotation (Down Arrow): Short Press to rotate image 90 degrees.
Long Press to switch between Forward & Side views.
"Down" when in Menu mode

H. Zoom (Up Arrow): "Up" when in Menu mode

I. Trigger: Short Press ergonomic trigger on back side of monitor for quick photo and video capture.

Status Bar Icons & Operation



Figure 3 Menu Buttons & Indicators

Icons	Indicator Name	Related Button	Quick Guide & Usage Tips
	Camera DOV Indicator: Front/Side View		Down / Rotate / Switch Button Long Press to switch between front & side camera (if applicable). Resets single-camera devices.
	Rotation Indicator		Down / Rotate / Switch Button Short Press to rotate the live preview image by 90-deg per press, cycling through 0, 90, 180, & 270-deg
	Display Brightness Indicator: 1/2/3		Brightness Button Short Press to adjust Display Brightness. Long Press to switch between Display Brightness and Image Brightness
	Image Brightness Indicator (Default): 1/2/3/4/5/6		Brightness Button Short Press to adjust Image Brightness. Long Press to switch between Display Brightness and Image Brightness
	Exposure/Gain Indicator: 1/2		E Button Short Press to adjust max exposure level. Long Press to switch between Exposure, Enhancement, & Effects.
	Enhancement Indicator (Default): 1/2/3/4		E Button Short Press to adjust enhancement level. Long Press to switch between Exposure, Enhancement, & Effects.
	Effects Indicator: Color / Negative / Monochrome		E Button Short Press to switch between Color, Negative, Monochrome.
	Lock Indicator		Power / Lock Button Short Press to lock the live image. Long Press ~3 secs to power on/off.
	SD Card Indicator		
	Light Indicator: 1/2/3/4/5		Light Button Short Press to adjust levels. Default level is Lv5. Long Press to switch between channels 1-front, 2-side, and dual light outputs.
	Digital Zoom Indicator: 1x/2x/3x/4x		UP / Zoom Button When in live video mode, Short Press to zoom x1/x2/x3/x4
	Battery Indicator		

Figure 4 On Screen Icons

- 1) Refer to **Figure 4** for labeled buttons for feature activation and **Figure 5** for icon key
- 2) Refer to **Figure 5** for menu operation

Menu Buttons	Functional Description	Menu Buttons	Functional Description
A: Power / Lock Button (Default) 	<ul style="list-style-type: none"> • Short Press: To freeze the live image. • Long Press: <ul style="list-style-type: none"> ◦ Power On: When off, hold ~3 secs until screen activates. ◦ Power Off: When on, hold ~3 secs until screen shuts down. 	D: Light Button (Default) 	<ul style="list-style-type: none"> • Short Press: Cycles through brightness levels in descending order: Lv5 (Max) → Lv4 → Lv3 → Lv2 → Lv1 → loops back to Lv5. <ul style="list-style-type: none"> ◦ Default starts at Lv5 (maximum brightness) • Long Press: Switches channel 1-front, channel 2-side and dual light output (only in dual light probes)
B: Display / Image Brightness Button (Default) 	<ul style="list-style-type: none"> • Short Press: Adjusts the brightness of the currently selected mode (display or image brightness) • Long Press: Switches between display brightness (screen brightness) or image brightness (camera exposure/processing) • Usage Tips: <ul style="list-style-type: none"> ◦ Surface Reflections: Reduce image brightness to enhance clarity when reflections obscure details. ◦ Low-Light Focus: Increase image brightness if the target area appears too dark during operation. ◦ Distant Views: Increase image brightness to improve visibility of farther tip-to-target distances. 	E: Back/Media Button 	<ul style="list-style-type: none"> • Short Press (Live Video Mode): <ul style="list-style-type: none"> ◦ The 1st short press enters the Photo Viewer Mode and the 2nd short press enters the Video Viewer Mode. • Long Press (Media Viewer Mode): <ul style="list-style-type: none"> ◦ Exits media viewer and returns to Live Video Mode. • Short Press (Settings Mode): <ul style="list-style-type: none"> ◦ Exits settings and return to Live Video Mode.
C: E Button - Exposure / Effects / Enhancement (Default) 	<ul style="list-style-type: none"> • Long Press: Switches active adjustment mode between Exposure, Enhancement, and Effects. • Short Press: <ul style="list-style-type: none"> ◦ In Exposure Mode: Cycles through exposure levels in ascending order: 33ms → 66ms → loops back to 33ms ◦ In Enhancement Mode: Adjusts enhancement levels: 1 → 2 → 3 → 4 (only on 720 x 720 sensors) → loops back to 1 <ul style="list-style-type: none"> ▪ Increase for sharper detail ▪ Higher levels prioritize clarity over brightness ◦ In Effects Mode: Cycles through Color, Negative, and Monochrome Modes. Effects can be selected in Menu/Effects also. • Usage Tips: <ul style="list-style-type: none"> ◦ Detail Enhancement: Adjust the Enhancement Level to reveal textures, patterns, or subtle surface details (e.g. scratches, engravings) ◦ Large-Space Operation: In expansive areas, compensate by <ul style="list-style-type: none"> ▪ increasing the Image Brightness (short-term fix) ▪ adjusting the Exposure (long-term fix for balanced visibility.) ◦ NOTE: Increasing Enhancement may darken the image due to sensor processing limits. In this situation, adjusting Exposure can be very effective. 	F: OK/Setting Button Functions 	<ul style="list-style-type: none"> • Live Video Mode <ul style="list-style-type: none"> ◦ Short Press: Enter Settings menu. ◦ Long Press: No function • Media Viewer Mode <ul style="list-style-type: none"> ◦ Short Press: Exit media viewer/return to previous screen. ◦ Long Press: Trigger delete function for current media item (followed by deletion confirmation dialog). • All Other Modes (e.g. Settings Menu, Playback, Photo Mode) <ul style="list-style-type: none"> ◦ Short Press: <ul style="list-style-type: none"> ▪ Contextual Action: Confirm selections (e.g. save changes in dialogs) ▪ Navigation: Return to previous screen/back button. ◦ Long Press: No function
		G: Down / Rotate / Switch Button (Default) 	<ul style="list-style-type: none"> • Short Press: Rotates the live preview image by 90 deg per press cycling through 0-deg → 90-deg → 180-deg → 270-deg • Long Press: Switches between front and side cameras (if available). No action on single-camera devices. • In Menu & Media Viewer Mode, functions as the Down button.
		H: Up / Zoom Button (Live Video Mode) 	<ul style="list-style-type: none"> • Short Press: Cycles through zoom levels in ascending order: x1 → x2 → x3 → x4 (max) → loops back to x1. • In Menu & Media Viewer Mode, functions as the Up button.

Figure 5 Menu Buttons

Image Brightness

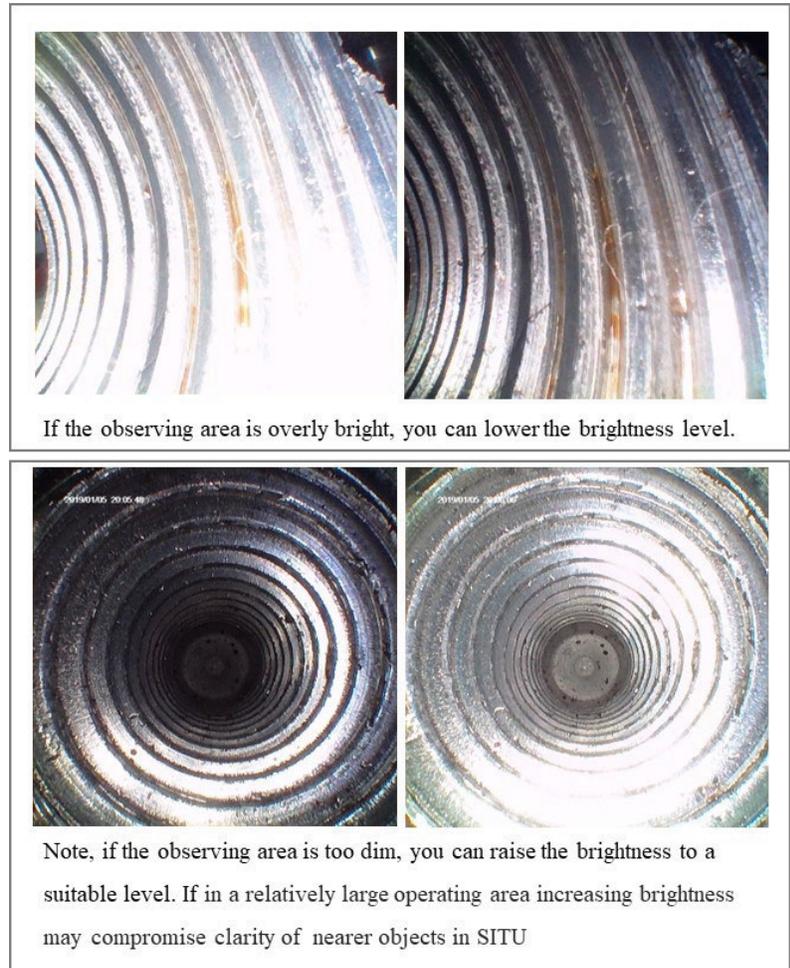
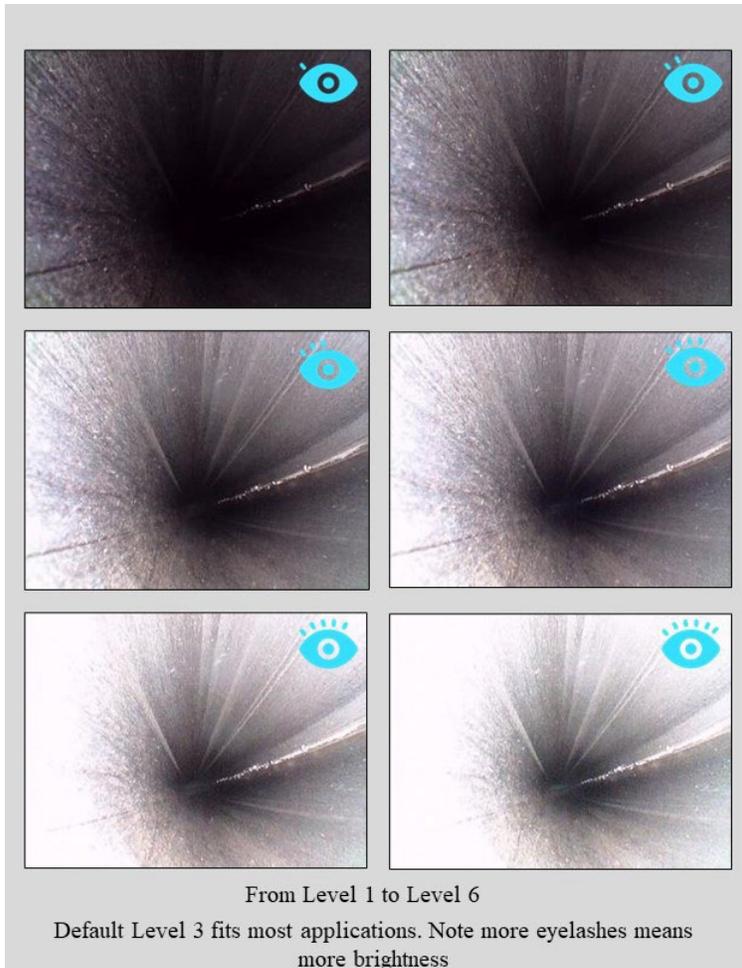
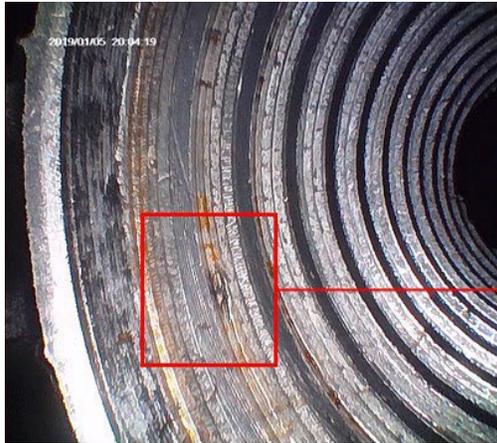


Figure 6 Image Brightness

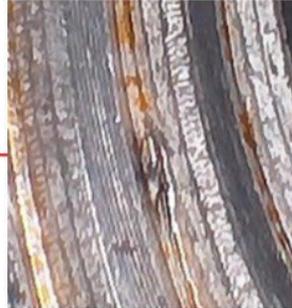
NOTE: The startup default LED level can be adjusted in firmware 20250427 and beyond. Select "Default Light Level" from the Setup Menu and select between Off, Level 1, Level 2, Level 3, Level 4, or Level 5.

Image Enhancement



E_1

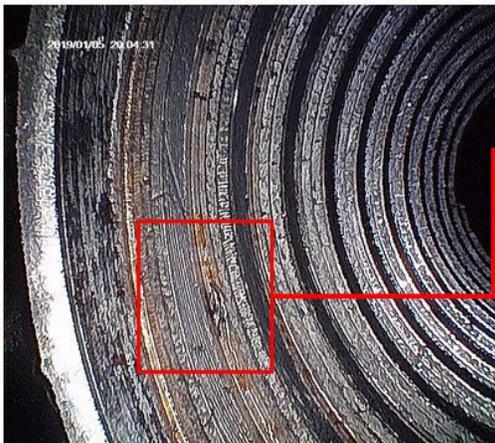
From
Level 1
to
Level 4



1. The default E_1 level enhancement fits most applications, balancing noise, brightness, light and sharpness.

2. To view more details of the object, you can adjust to a higher level of the enhancement.

3. A higher level of enhancement might decrease the image brightness by auto SNR factor.



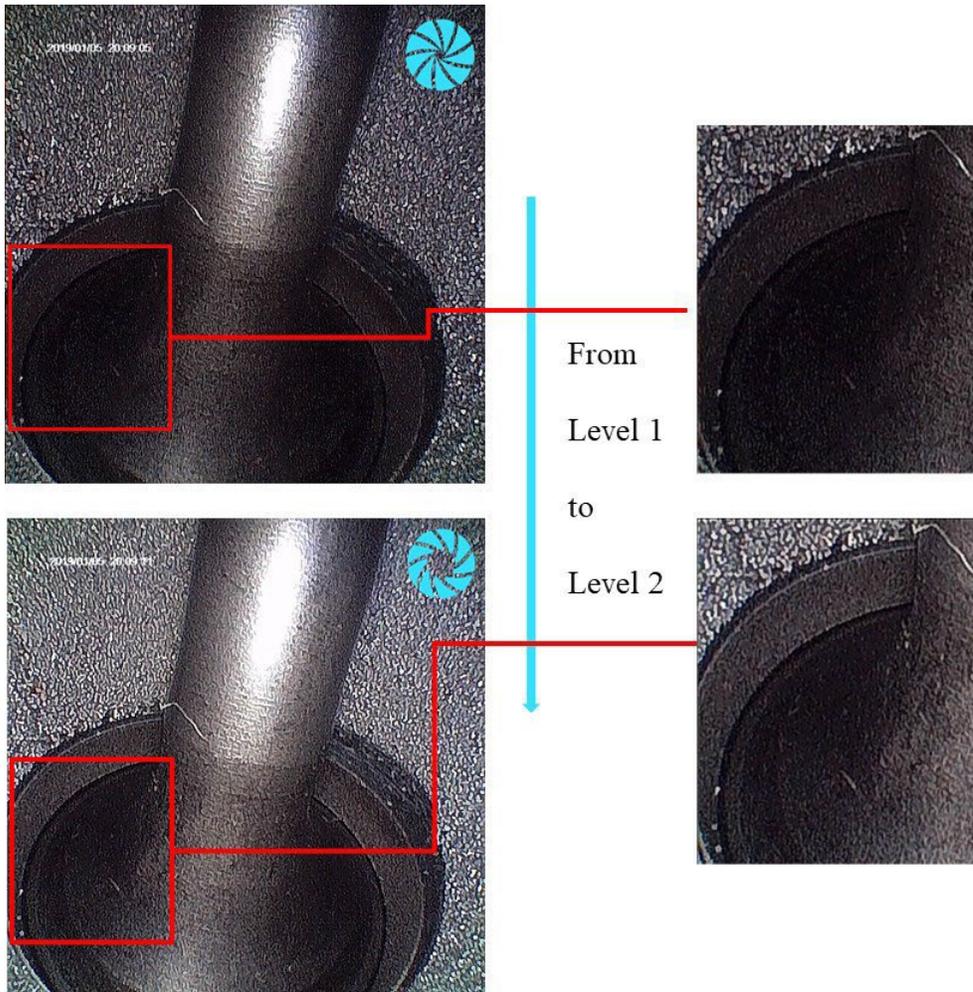
E_4



Note: 400×400 resolution is applied using a 3-level algorithm.

Figure 7 Image Enhancement

Exposure Enhancement



Exposure Adjustment can be used to:

1. To see further into a cavity
2. Improve an image when the limits of the image brightness adjustment are reached.
3. Brighter image when a high enhancement level makes the image to dark.

Figure 8 Exposure Enhancement

Display & Image Effects



Figure 9 Display & Image Effects

Both 'Display Effects' and 'Image Effects' show effects (Negative, Monochrome, and Color) to users.

'Display Effects' only apply to the display screen, while 'Image Effects' apply to the camera video feed.

Image Effects (choose Negative, Monochrome, or Color) must be active while recording image videos for the effect to appear in the SD Card library.

NOTE: 400 x 400 probes do not support 'Image Effect' features

Viewing Media

When entering the SD Card library, the system will show the last file recorded. Press Up or Down to enter a 9-file folder view. Select a file with Up or Down and short press OK to view full screen.

Long press the Media/Back Button to exit either the full-screen or 9-file folder view to return to live image.

Connectivity

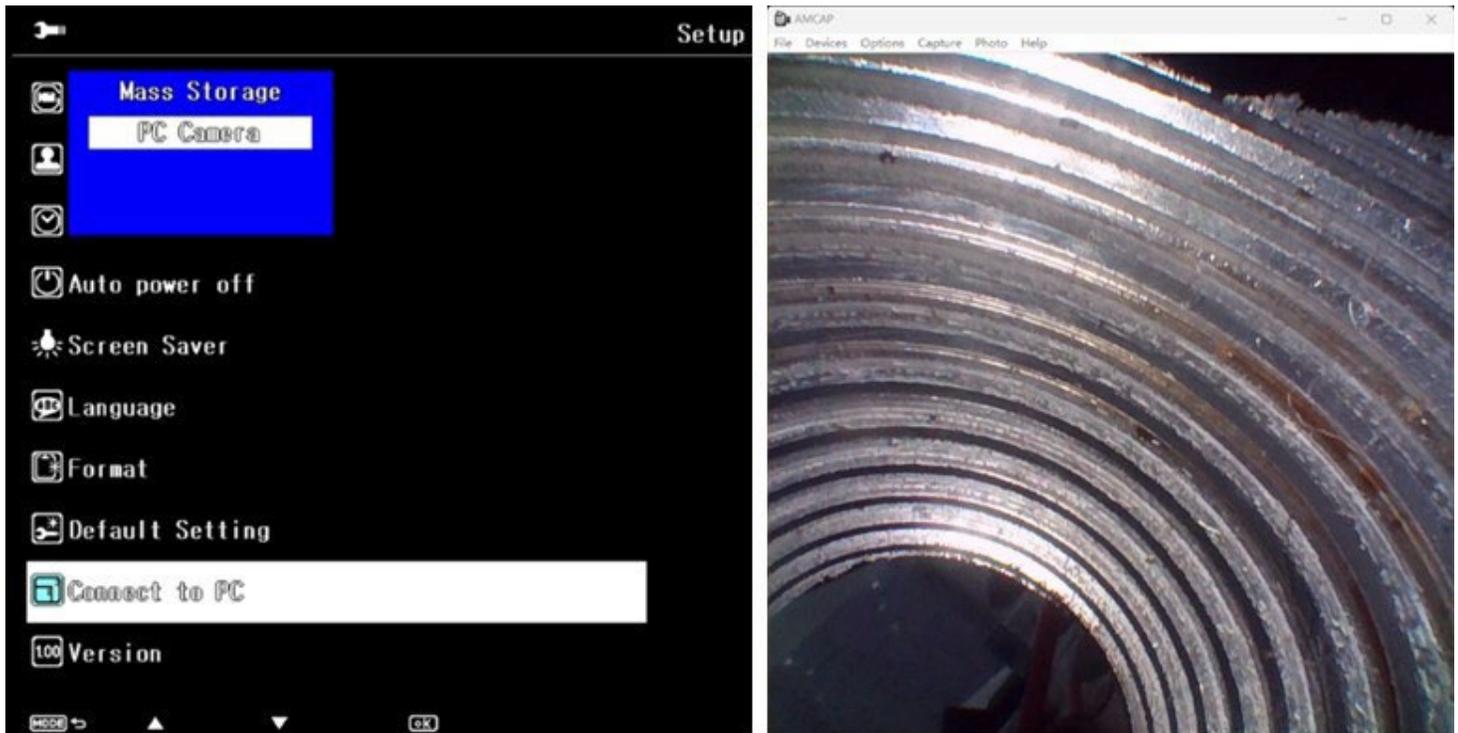


Figure 10 PC Connection

2 options of data management:

1. **Manage the SD card files through a USB connection** – connect the Model E Monitor to a PC via the USB cable. Select “Connect to PC” via the menu screen, and select “SD Card” (This is the default selection.) The PC File Explorer will open showing the SD card files.
2. **Record image and video files directly to a PC** - Connect the Model E Monitor to a PC via the USB cable. Select “Connect to PC” via the menu screen, and select “PC Camera.” Record files directly on PC hard drive.
Connect USB cable to the PC shared monitor for a full benchtop inspection setup with live video and the ability to record directly to the PC hard drive.

When using the PC camera mode, you can perform color adjustments and firmware updates¹. While in this mode, the Model E Monitor’s physical buttons related to image functions will remain operational.

¹ 400 x 400 camera is not able to do color adjustment and updates in this way.

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Returns for Repair or Service

In the event the product needs repair, an **RMA # (Return Material Authorization #)** must be issued prior to the unit being returned. **Call InterTest, Inc. at +1 908 496-8008 to obtain an RMA Number from InterTest Customer Service.** Provide the product number, serial number and a brief description of the problem or damage when obtaining an RMA number.

Follow verbal instructions over the phone and send the authorized repair to the primary InterTest facility in Columbia, NJ. Shipments returned without an RMA will have an administrative fee applied to the transaction.

