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SOFTWARE MANUAL. MAN-063, REVISION E

OPENVISION™ DX.

OVDX-NDT-70 SOFTWARE MANUAL

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INTRODUCTION.

OpenVision™ DX is an easy to use, digital X-Ray system with live video output for real-time inspection and reporting. The OpenVision DX utilizes a patent-pending combination of a c-arm mounted 70 kV X-Ray source and a digital imager.

For NDT applications this allows the operator to observe external defects as small as 0.010-inch (250 µm) on insulated piping for NDT applications. OpenVision DX can be used on various insulation and cladding combinations, including mineral wool and calcium silicate with galvanized steel, stainless steel, and aluminum cladding up to 36 inches (91 cm) in total diameter. OpenVision DX enables the inspection of hundreds of feet (many tens of meters) of insulated piping to quickly identify indications of corrosion or corrosion precursors such as scaling, external wall loss, and wet insulation. Pictures and real-time videos are recorded and downloaded with the touch of a button for rapid review and reporting.

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EQUIPMENT SPECIFICATIONS.

Table 1 OpenVision™ DX Specifications			
Imaging Area (Field of View)	4 in. x 6 in. (10 cm x 15 cm)		
Dimensions **X-Ray Tube to Imager** **Throat Depth** **Imager Thickness** **X-Ray Tube Thickness**	 9.5 in. (24 cm) to 20.9 in. (53 cm) 21 in. (58 cm) 2.5 in. (6.4 cm) 3.4 in. (8.7 cm)		
Startup Time (est.)	30 seconds		
Shutdown Time (est.)	5 seconds		
X-Ray Energies **Low** **Medium** **High**	Voltage (kV) 40 55 70	Current (mA) 0.300 0.218 0.171	Dose @ 12 in (30.5 cm) from beam port 50 R/hr (0.5 Sv/hr) 80 R/hr (0.8 Sv/hr) 95 R/hr (0.95 Sv/hr)
Beam Collimation (Approximate)	18° Horizontal 10° Vertical		
Image Resolution	250 microns (0.01in)		
Battery Life **Continuous duty with 5 Ah battery** **Standby**	 3 hours 8 hours		
System Weight **C-arm** **Monitor w/ handle (optional)** **Packaged system (shipping weight)**	 15 lbs. (6.8 kg) 2 lbs. (.9 kg) 50 lbs. (23 kg)		
Operating Temperature	-20° F to 120° F (-29° C to 49° C)		
Storage Temperature	-20° F to 140° F (-29° C to 60° C)		
Display Options	HDMI Monitor: 7 in. LCD, 1920 x 1200 pixels WiFi Tablet: 10 in Touchscreen, 1400 x 900 PirateEye: 854 x 480 pixels Also compatible with any device that accepts an HDMI signals		
Recording (OpenVision DX) **Internal storage** **Resolution** **Image / video transfer**	 128 GB 1280 X 720 USB		
Recording (WiFi Tablet) **Internal storage** **Resolution** **Image / video transfer**	 4 GB with expandable 128 GB memory 1280 X 720 USB		
Shipping Dimensions	32 in. x 20.5 in. x 12.5 in (82 cm x 52 cm x 32 cm)		
FDA Accession #	1680071-000		

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The OVDX-NDT-70 is built in compliance with ISO 9001:2015 and meets the following standards when used as directed:

- ANSI/HPS N43.5 (2005)
- Ionizing Radiation Regulations (2017)
- ISTA 3A Over the Road vibration standard
- MIL-STD-810, Method 514, Annex C, Cat 4
- REACH/ROHS
- CE

Heads Up Display (HUD)

- ANSI Z87.1+, US Federal OSHA
- US Mil Spec MIL-PRF-31013
- CE EN 166 FTKN

Battery/Charger

California Energy Commission

Underwriters Laboratory for Canada and U.S.

Revision Record

Revision	Date	Description
A	06/2019	Production Release
B	03/2020	r3.0.0 Software updates, Tablet operation, Remote trigger configuration, Remote software update instructions
C	08/2020	OpenVision DX Specific changes, r3.1.0 Software updates: Remote Power Control, Video Stitching, Image Sync.
D	11/2021	OpenVision Software Version 3.3 Updates: Screen Saver, File Naming Sequence, Tablet Tethering.
E	02/2023	X-Ray Tube Manual Warm Up

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SAFETY PRECAUTIONS.

WARNING

Do not perform any unauthorized modifications to the OpenVision™ DX system or components of the system.

It is important that trained and qualified personnel perform or supervise a daily safety inspection of the OpenVision DX system for obvious defects before using the system. Do not compromise on safety. Always perform the daily inspection of the system prior to use.

Any foreign material (dirt, mud, ice, etc.) must be removed before using the system. Inspect, clean, and test the equipment as described in this manual to ensure long-term safety and reliability.

Do not use any component that is not approved for use with the OpenVision DX system or any after-market component as they may compromise the safety features designed into the system.

Defective equipment that is discovered during the daily inspection must be removed from service until repaired or replaced.

The user of this equipment must follow the operating instructions, in the order shown, to ensure safe operations and compliance with government regulations.

Personnel operating this equipment must be completely familiar with this manual and they must read and understand these important safety alerts before proceeding.

IMPORTANT SAFETY ALERTS

NOTICE: Can cause minor problems and reminders.

CAUTION: Can cause equipment damage or potential problems.

WARNING: Can cause serious or fatal injury.

WARNING: JOB SITE SAFETY PRECAUTIONS

Surveillance
Only trained and qualified individuals, or assistants working under their direct supervision, may operate the OpenVision DX system. The qualified individuals must be physically present at the site and able to control and limit access to the vicinity of the work.

Locking
Keep the OpenVision DX controller locked while assembling the system and when not being used to perform scanning. Locked is defined as the controller key switch in the Off position with the key removed. Store the key in a secure location.

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Operating Conditions

OpenVision™ DX is designed for applications where the equipment will not be exposed to harsh handling or environmental extremes. See Equipment Specifications for more information

X-Ray Training

It is required that OpenVision DX operators are properly trained and qualified to perform radiographic inspections. This manual does not address radiographic inspection techniques or procedures.

Precautions

The OpenVision DX system is designed for portability and is ruggedized for industrial environments. However, it does contain fragile components. Use care to avoid strong vibrations and shock conditions (e.g. equipment drops or transportation outside the approved case) to the main housing, imager housing, and display(s).

CAUTION

Do not attempt to open or modify the imager housing, main housing, or X-Ray tube. Opening any of these components will void the system warranty and may expose the operator to a high voltage shock hazard.

CAUTION

Do not allow liquids to come into contact with any part of the OpenVision™ DX system. The main and imager housings have been made water resistant, but they are not “Waterproof”. Appropriate care should be taken to protect all cabling and connectors to ensure reliable and safe operation of the OpenVision DX system.

WARNING: Class 2 Target Laser

Because the blink reflex (glare aversion response to bright lights) will limit the exposure to no more than 0.25 seconds, Class 2 laser pointers are considered to be safe. Furthermore, Class 2 lasers do not harm eyes unless a person deliberately stares into the beam, making laser protective eyewear not necessary. A Class 2 laser is not a skin or materials burn hazard. NEVER aim any laser towards an aircraft or vehicle in motion.

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OPENVISION™ DX SOFTWARE.

Power Cycling

Each OpenVision™ DX unit utilizes an embedded microprocessor to handle and coordinate all aspects of safety and normal operating functions. With such a system, it requires several seconds to initialize before starting normal operations. Following the Startup and Shutdown sequences below is critical for normal operation; (Figure 1) for key and indicator locations.

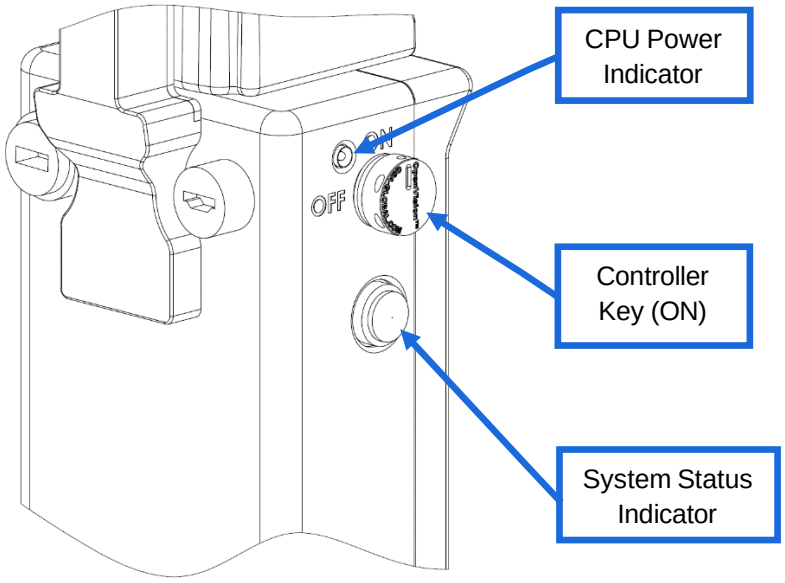

Figure 1 Indicators and Power Switch Details

Startup

When the Controller Key is turned to its ON position, the CPU indicator will immediately turn on (green). A boot up screen will be displayed during initialization, and the System Status Indicators will also illuminate. When these indicators turn green and the *Home Screen* (Figure 2) is displayed, system startup is complete and ready for normal operation.

Shutdown

Turning the Controller Key to its OFF position will begin the shutdown sequence. The Status Indicator Lights will turn off after one to three seconds, but the system will not be fully powered down until the CPU Power Indicator LED is turned off. Once off, remove the key, and place the unit in storage. No additional cool down is required.

CAUTION

Failure to allow the system to properly shutdown may corrupt internal memory, and unit may not be able to restart.

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Home Screen

The *Home Screen* (Figure 2) displays the output of the targeting camera (outlined in red) and the *Settings* menu across the bottom (outlined in yellow).

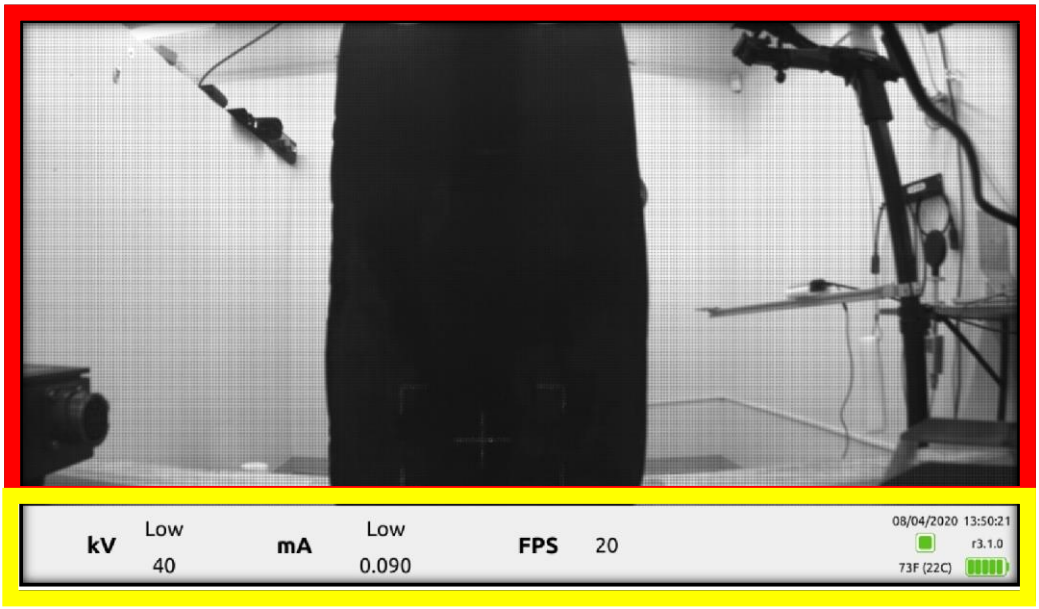

Figure 2 Home Screen

Settings Menu

The *Settings* menu will always be displayed when the *Home Screen* is active. On the *Home Screen*, the *Settings* menu is inactive (i.e. unable to change values) by default. The *Settings* menu can be activated from either the *Home Screen* or the *X-Ray Imaging Screen* by holding the hat switch down for three seconds (Figure 3).

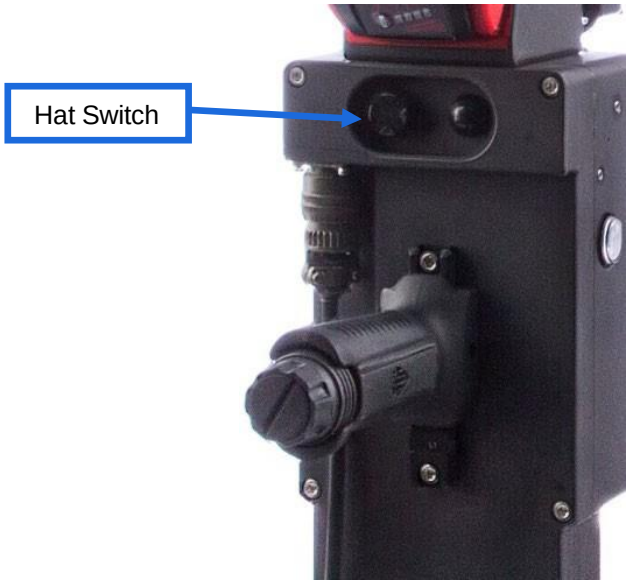

Figure 3 Hat Switch

When the X-Ray voltage becomes highlighted in yellow (Figure 4), the *Settings* menu is active, and can be navigated using the hat switch's left/right positions. Up/down positions change the value of the highlighted setting.

The *Settings* menu becomes disabled when the hat switch is in its neutral (center) position for 15 seconds.

Note: While the *Settings* menu is active, the hat switch cannot be used to navigate to another screen.

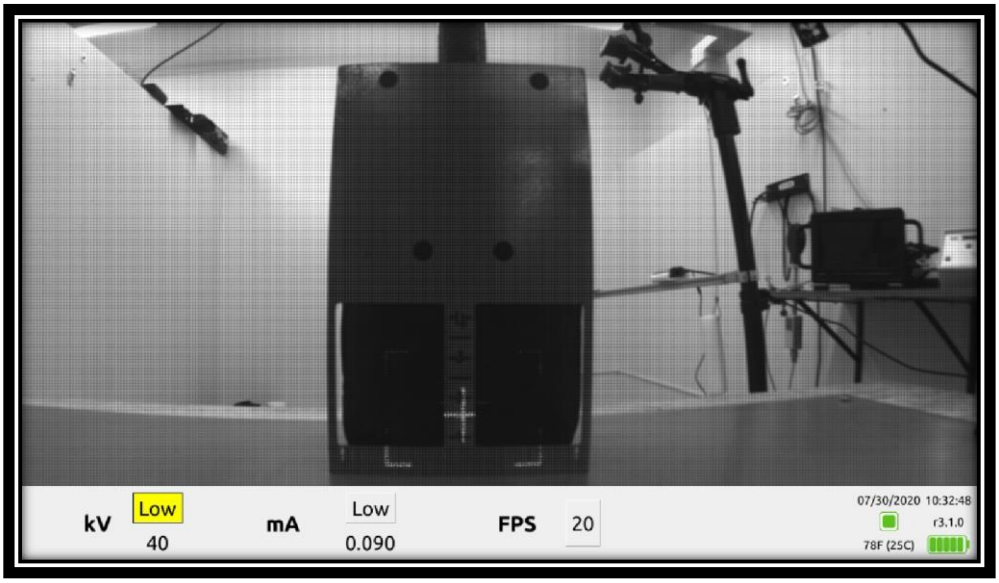

Figure 4 Active Settings Menu

Table 2 shows the settings and user adjustable values available in the *Settings* menu:

Table 2 - *Settings* Menu Parameters

Setting (Units)	Possible Values
X-Ray Voltage (kV)	Low, Medium, High (default Low)
X-Ray Current (mA)	Low, Medium, High (default Low)
Frames per Second (FPS)	5,10,15,20,25 (default 20)

The *Settings* menu also displays the following system information on the right-hand side:

- System date and time
- Software version
- Current battery level (OpenVision DX)
- X-Ray tube temperature
- OpenVision DX online status indicator

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X-Ray Tube Manual Warm Up

If your OpenVision DX System has not been run for an extended period of time (10 days or more), you need to perform a Manual Warm Up of the X-Ray Tube as follows in steps 1-6:

1. Install controller key and turn to ON and allow time for system to initialize. System status indicators (located on either side of main housing) will turn GREEN when system is ready.
2. Set the kV and mA to the LOW settings
3. Turn on x-rays for 30 seconds
4. Reset the kV and mA to the MEDIUM settings
5. Turn on x-rays for another 30 seconds
6. The unit is now ready to run on any setting – LOW, MEDIUM or HIGH for normal inspection

- Verify kV and mA settings on main status screen refer to OpenVision DX software manual (MAN-064).
- Safely perform test shot to verify X-ray functionality.

Firing X-Rays

Perform a manual x-ray tube warm up if needed – see section above

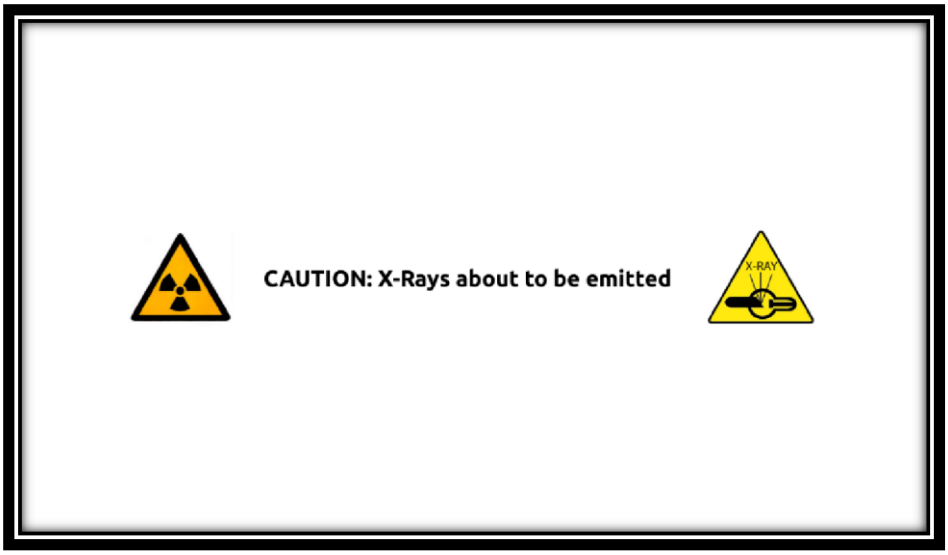
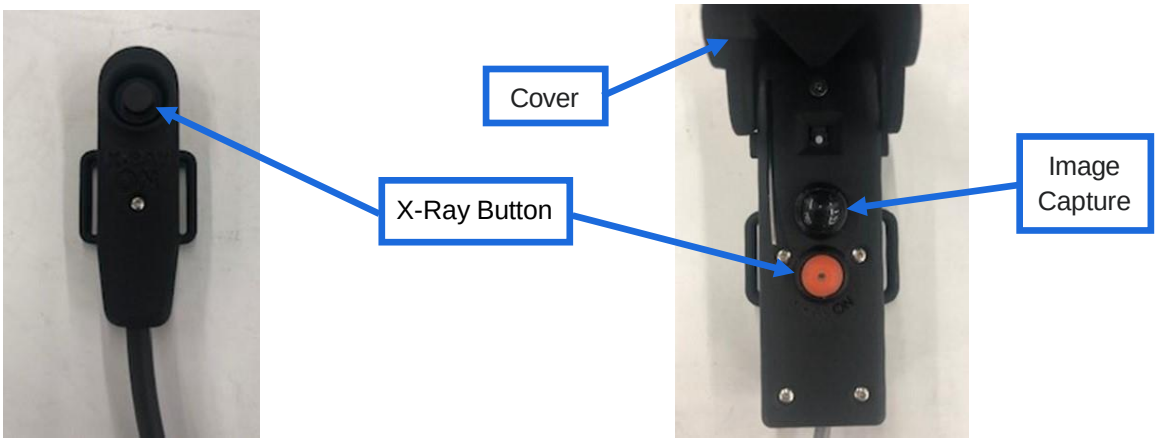


Figure 5 X-Ray Warning Screen

Two X-Ray trigger harnesses are available; both are shown in Figure 6:

- **Trigger Button Harness**: Press and hold the X-Ray button to start firing X-Rays. Firing will stop when button is released.
- **Remote Trigger Harness**: A latching button allows the operator to press and release the X-Ray button. Press and release the X-Ray button again to stop firing. The Image Capture button can then be pressed as needed while X-Rays continue to fire. You can take an Image by pressing and releasing the button or take a video by pressing for two seconds and then releasing. The video will continue to record until the button is pressed again. The cover is interlocked; if the operator's hand is removed from the harness, X-Rays will stop firing.

System will transition to the *X-Ray Warning Screen* (Figure 5) for five seconds, during which the buzzer will pulse at one-second intervals. The System Status Indicators (on either side of main housing) will also turn amber.



Trigger Button Harness **Remote Trigger Harness**

Figure 6 Trigger Switch Options

X-Ray Live Image Screen

Figure 7 X-Ray Live Image Screen

After five seconds, the system will emit X-Rays, and transition to the *X-Ray Live Image Screen* (Figure 7; *Settings* menu is hidden by default). System Status Indicators remain amber-colored, and the buzzer pulse rate changes to two-second intervals.

To change settings while emitting X-Rays (i.e., on-the-fly), hold down the hat switch for three seconds (Figure 3) to show and activate the *Settings* menu (Figure 8).

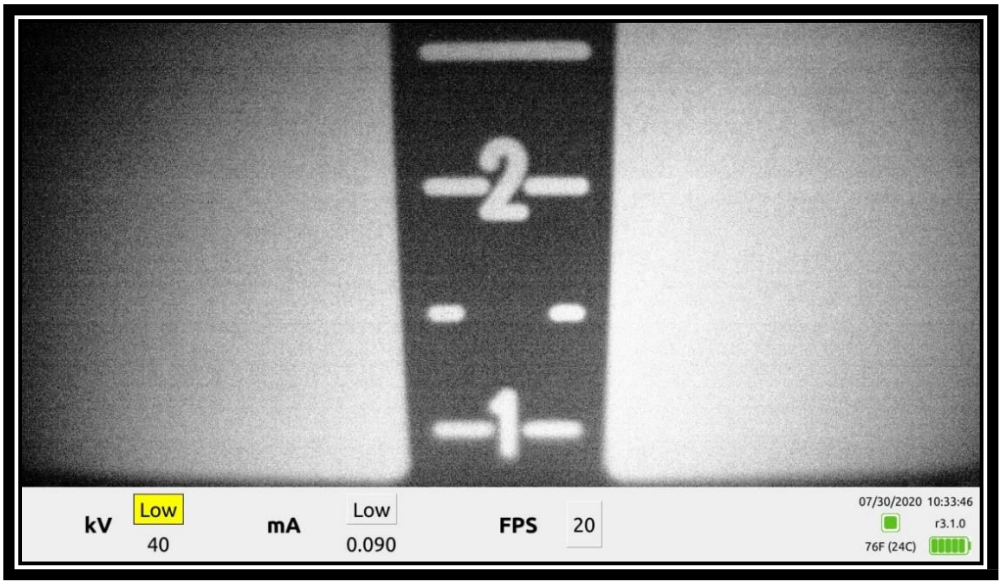


Figure 8 Settings menu re-activated

The *X-Ray Live Image Screen* remains active until the red trigger button is released, or 90 seconds has elapsed. When either occurs, the following will happen:

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- System stops emitting X-Rays
- Buzzer turns off
- System Status Indicators turn green
- *Home Screen* is displayed

Image Capture

An image (or snapshot) can be captured from either the *Home Screen* (targeting camera image) or the *X-Ray Live Image Screen* (X-Ray image). Snapshots are taken by pressing and releasing the round Image Capture button (Figure 9).

Image Capture Remote **Image Capture**

Figure 9 Image Capture Button Options

The system will display the snapshot in the upper left-hand corner (Picture-in-Picture) of the current screen for five seconds (**Figure** 10) and is automatically saved to internal storage in PNG image format.

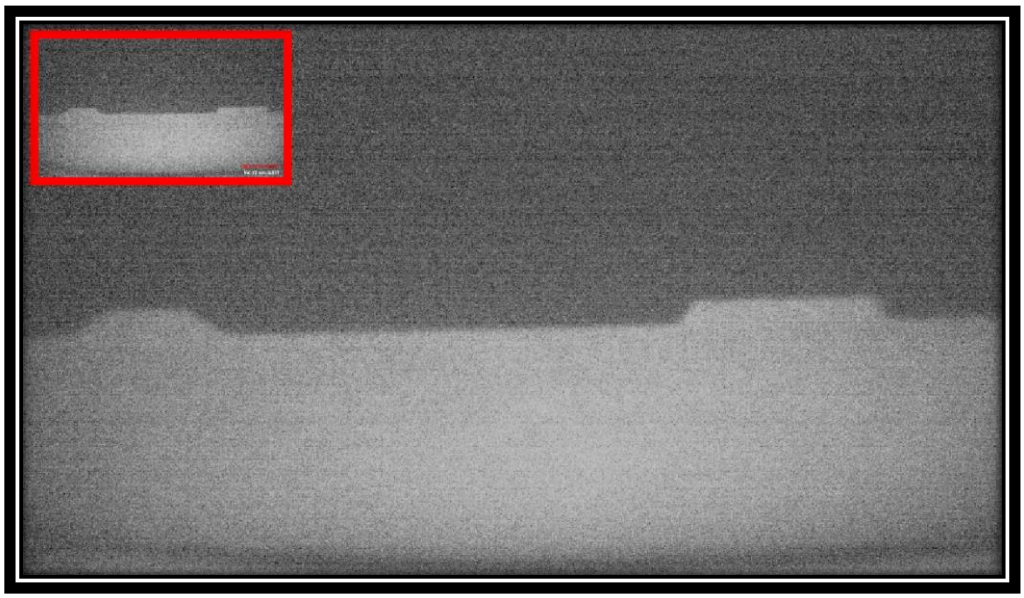

Figure 10 Image Capture retained (upper left corner)

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Video Capture

Like snapshots, videos can be recorded from either the *Home Screen* (targeting camera image) or the *X-Ray Live Image Screen* (X-Ray image). Videos are taken by pressing and holding the capture button for at least two seconds. Within one second, the system will commence recording video, indicated by a notification 'Recording in progress...' appearing in the upper right-hand corner of the display (Figure 11). After two seconds, the operator can release the capture button. When the button is pressed again, the recording stops and is automatically saved to internal storage in MPEG4 video format.

Figure 11 X-Ray Video Recording in Progress

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Custom Naming Media Files

Media Files (Video and Snapshots) can be given a name of choice to act as an identifier that will display within the image. A filename can be set before recording images, and videos. The name will increment numerically as more images are captured. (Ex: “Image1”, “Image2”, Etc…). This allows for the creation a collection of image captures in an alpha-numerical sequence to identify a select body of work.

To set a Custom Naming sequence, press right on the toggle switch for 5 seconds. A keyboard menu will appear on the monitor (Figure 12). Use the toggle switch to navigate to the desired letter/number. Press the Snapshot button to select each character. When finished, select “Apply”. The monitor will then return to the main screen. The system is now ready to record Images/Videos with the custom name. When the system is shutdown the filename sequence will return to its default value.

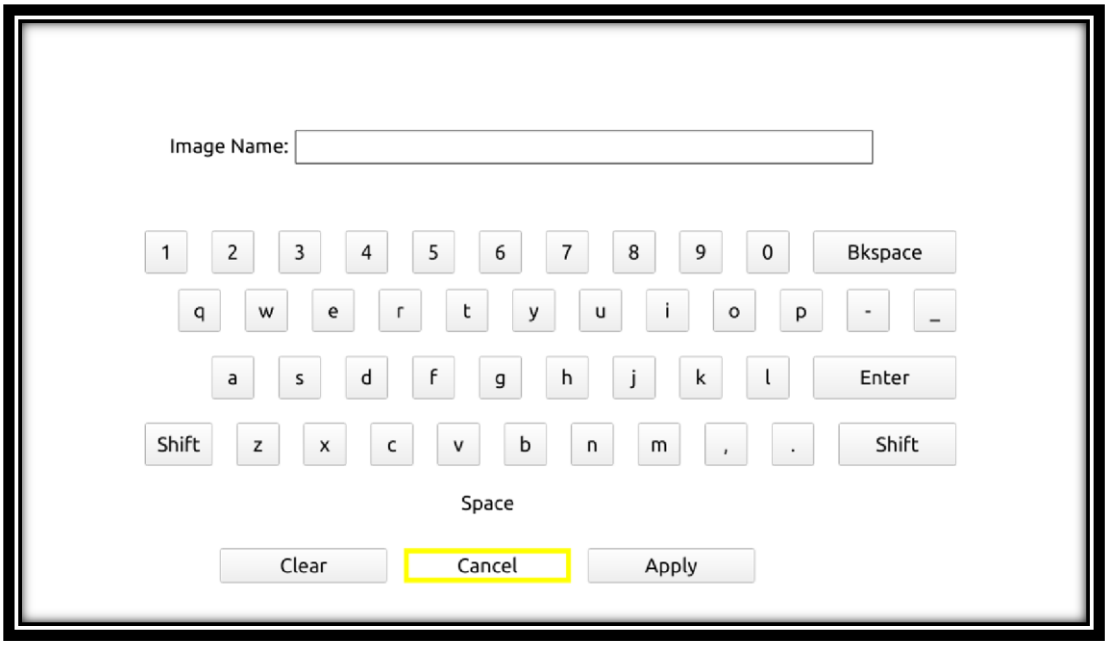

Figure 12 File Naming Sequence Selection Screen

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System Information

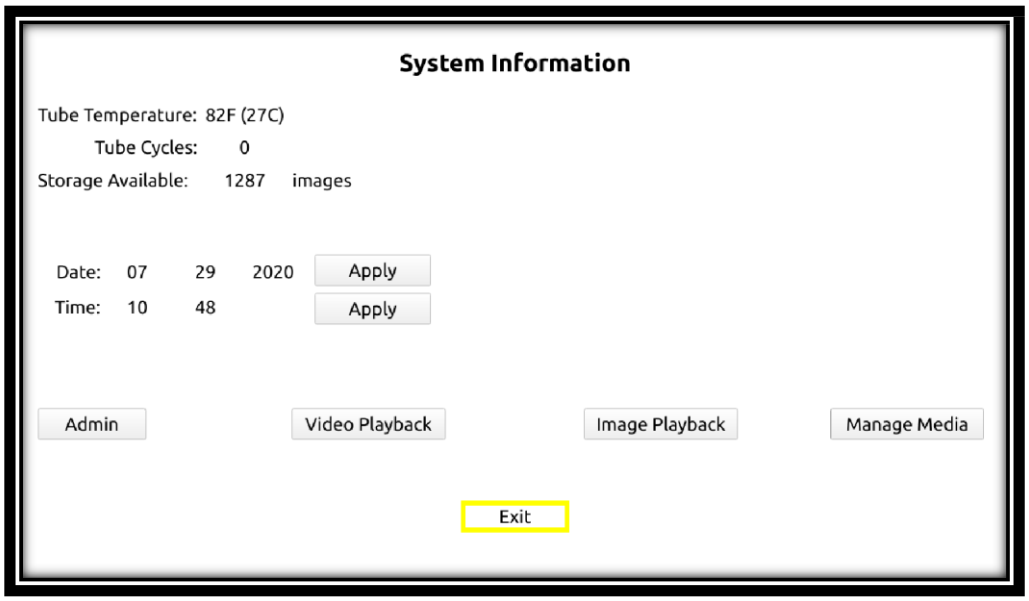

Figure 13 System Info Screen

The *System Info Screen* (Figure 13) is accessible from the *Home Screen* (and with the *Settings* menu inactive) by holding the hat switch in the left position for three seconds. The *System Info Screen* includes:

- X-Ray tube temperature
- X-Ray tube cycle count
- Approximate number of images system's internal storage can hold (*Storage Available*)
- Current system date and time (can be modified)
- Access to *Admin Screen*
- Image, Video Playback
- Manage Media

This menu is navigated by the hat switch's left/right positions. Up/down positions change the value of the highlighted setting. On-screen buttons (e.g., ***Apply***) are actuated with the Image Capture button (Figure 9). ***Exit*** transitions back to the *Home Screen*.

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Video Playback

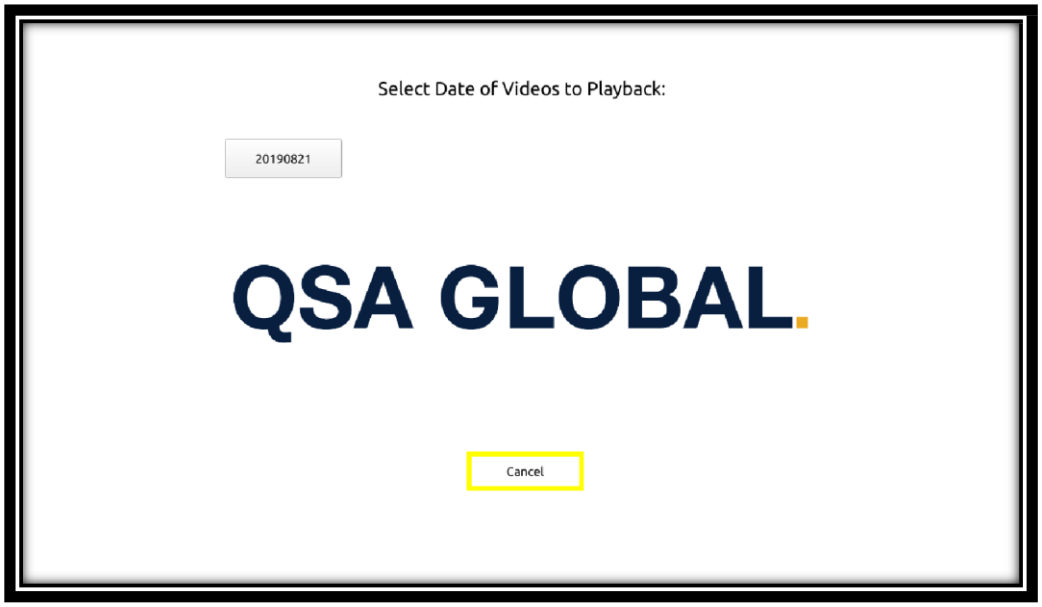

Figure 14 ***Playback Selection Screen***

Image Playback (*System Info Screen*, Figure 13) brings up the *Playback Selection Screen* (Figure 13). Image directories (if any) are shown on this screen, labeled by date. Newest directories are displayed first. Selecting the ***Oldest*** on-screen button shows additional folders (if any). Select desired folder to view playback videos or images. As always, the Image Capture button (Figure 9) actuates on-screen buttons/folders.

Left/right hat switch positions navigate between images/videos within an image folder. The hat switch's down position exits image playback mode.

The organization of images on the OpenVision™ DX is by directories that are named with a date stamp of the format 'YYYYMMDD'. If the directory does not exist at the point the first snapshot for the day is taken, the directory will be automatically created. Images within the directory are named in the format 'YYYYMMDD-HHMMSS.png' to ensure that unique names are created for each image taken.

USB Drive Configuration for Media Transfer

USB drives must be configured before images/videos can be transferred from the OpenVision™ DX system. A properly configured USB drive includes an 'ovdx' directory at the drive's top-level, and an 'images' directory within the 'ovdx' directory (see Figure 15). Unless these directories are on the USB drive as indicated, the software will not transfer images/videos.

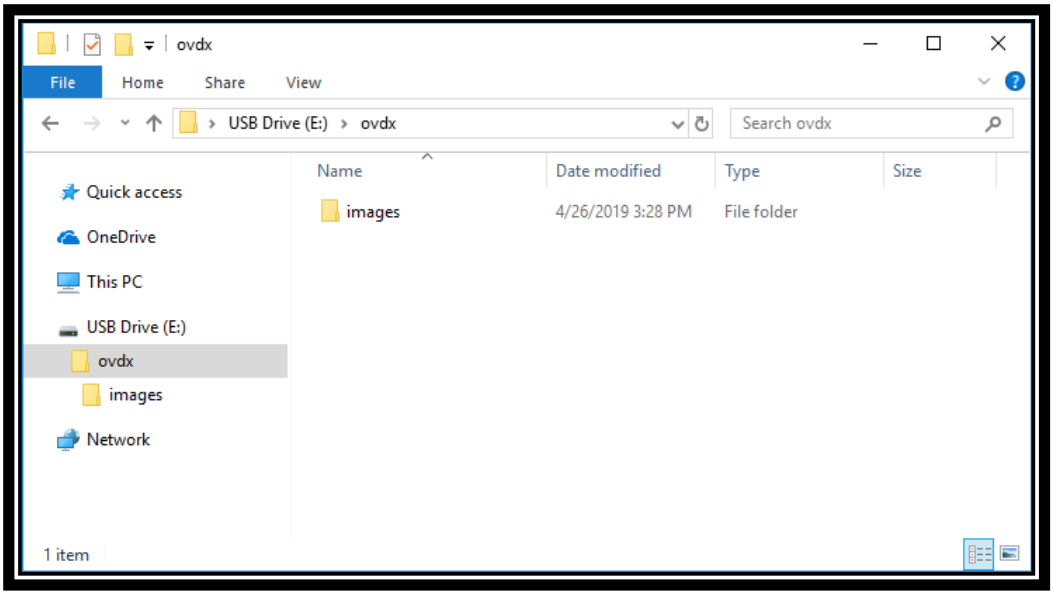

Figure 15 USB Drive Folder Format

CAUTION

To ensure that the USB drive does not become corrupted, always wait until the system transitions back to the *Home Screen* (Figure 2) before removing the USB drive from OpenVision DX.

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Image Transfer

Inserting a properly configured (Figure 15) USB drive in the external USB port (Figure 16) of the OpenVision™ DX transitions to the *Media Transfer Screen* (Figure 17). Navigate to desired folder to copy, then press and release the Image Capture button (Figure 9) to initiate file transfer.

Figure 16 - USB Port

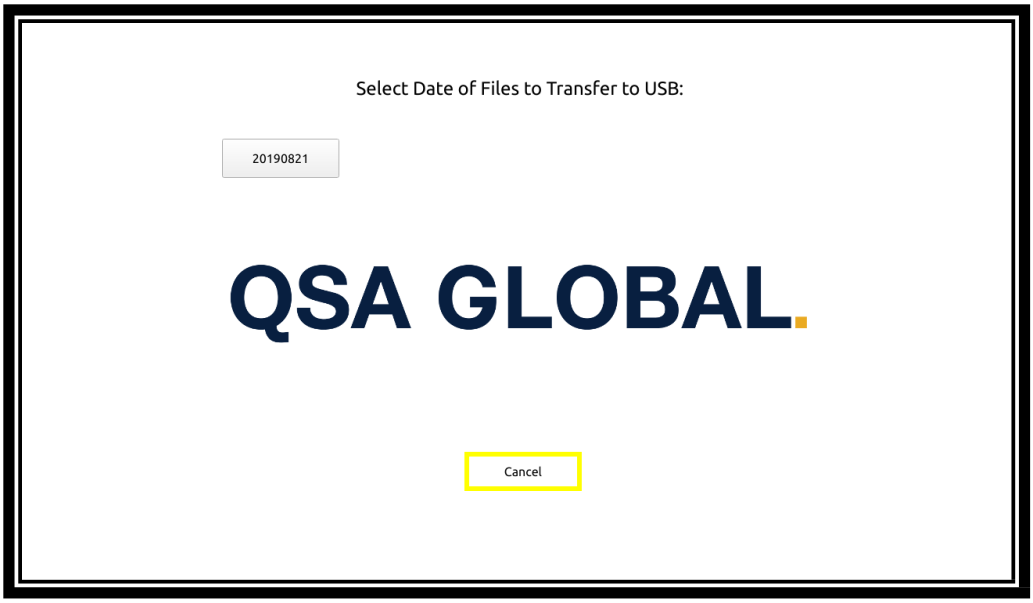

Figure 17 Media Transfer Screen

When no image directories are found on the OpenVision DX, the message “No Images to transfer” message (Figure 18) will be displayed. Selecting [Cancel] will transition to the *Home Screen* and the USB drive can then be safely removed.

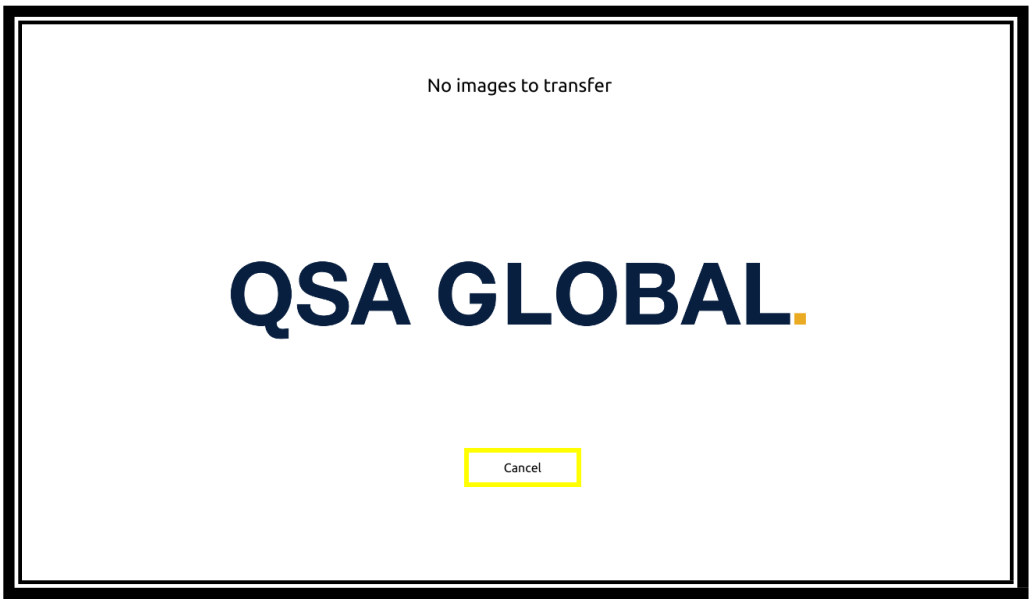

Figure 18 No Images Present

When one or more image directories are found, the *Media Transfer Screen* (Figure 17) will appear displaying up to four buttons at one time with names of the directories that exist on the OpenVision DX. To select a directory for transfer, navigate to the desired date stamp button and select the button. This will transition the user to the *Image Transfer Confirmation Screen* (Figure 19).

NOTICE: only one directory of images will be transferred to the USB drive per insertion. Following the last step of a transfer the screen will transition to the home screen. To initiate another transfer, remove the USB drive from the OpenVision DX and reinsert.

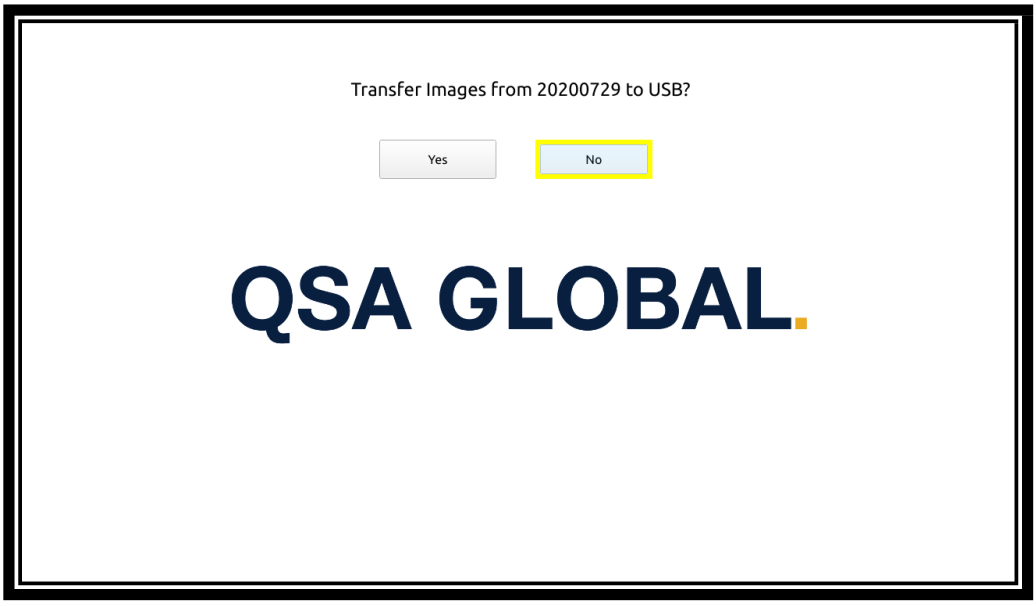

Figure 19 Image Transfer Confirmation

This screen presents the user with **Yes** and **No** to confirm the image transfer. Selecting **No** will transition to the *Home Screen* and the USB drive may be safely removed. Selecting **Yes** will transition to the *Transfer in Progress Screen* (Figure 19). No user action is required. The amount of time this screen is displayed is determined by the number of images in the image directory. At the completion of the transfer, the system will transition to the *Image Deletion Confirmation Screen* (Figure 21).

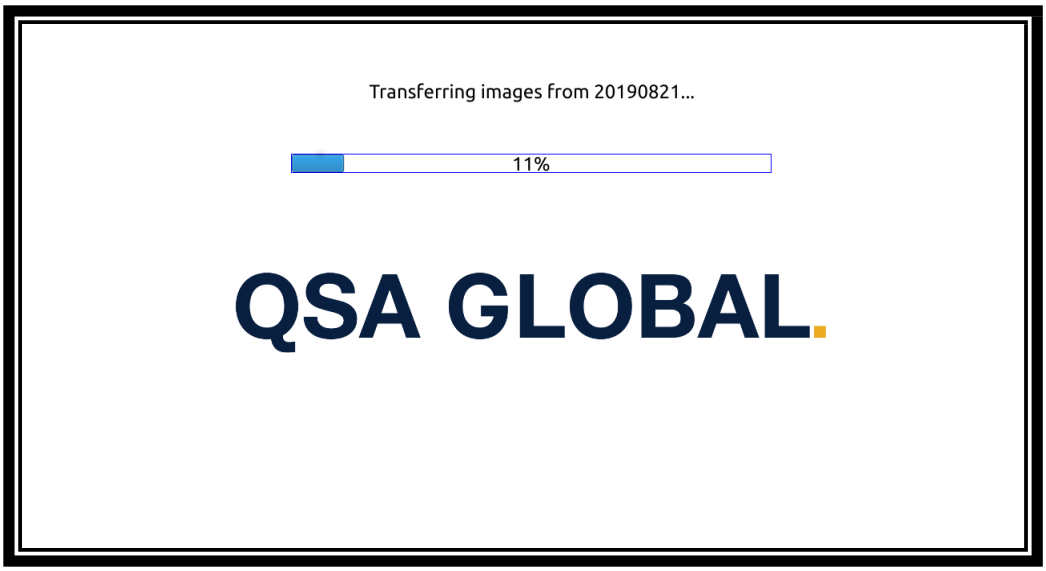

Figure 20 Transfer in Progress

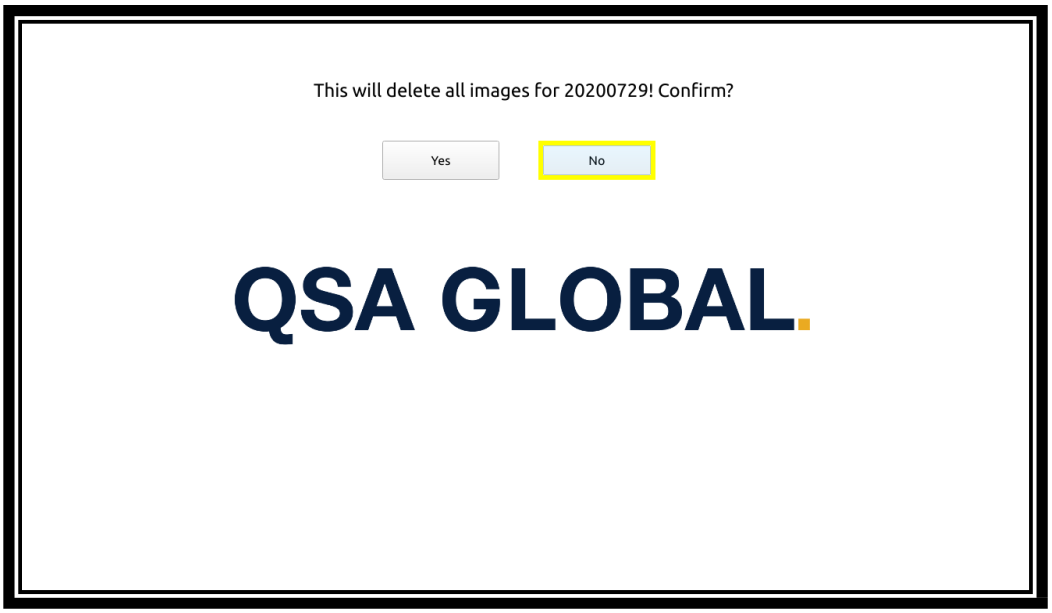

Figure 21 Image Deletion Confirmation

This screen presents the user with **Yes** and **No** to confirm the image deletion for the selected date. Selecting **No** will transition to the *Home Screen* and the USB drive may be safely removed (no images will be deleted from the OpenVision DX). Selecting **Yes** will cause the images in that specified folder to be deleted from the OpenVision DX and then the system will transition to the *Home Screen*.

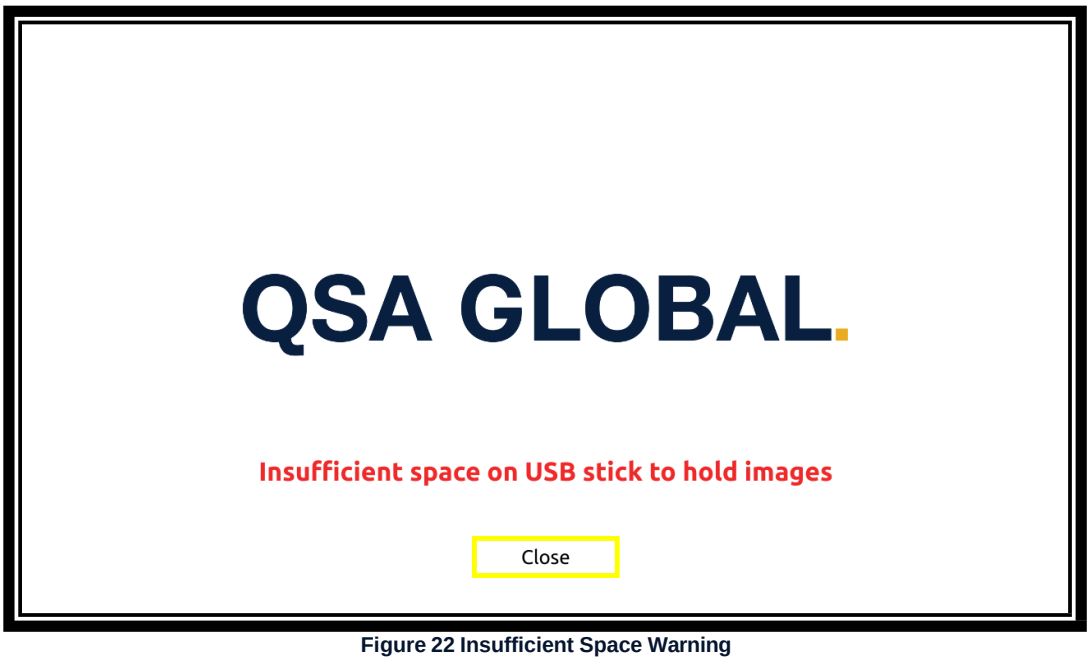

Figure 22 Insufficient Space Warning

When the user has confirmed the image transfer, the software performs a check to determine if there is enough space on the USB drive to hold all the images contained in the selected folder. If there is insufficient space, this screen will be displayed (Figure 22). Selecting the ***Close*** button will cause the system to transition to the *Home Screen* and the USB drive can be safely removed.

Admin Password Screen

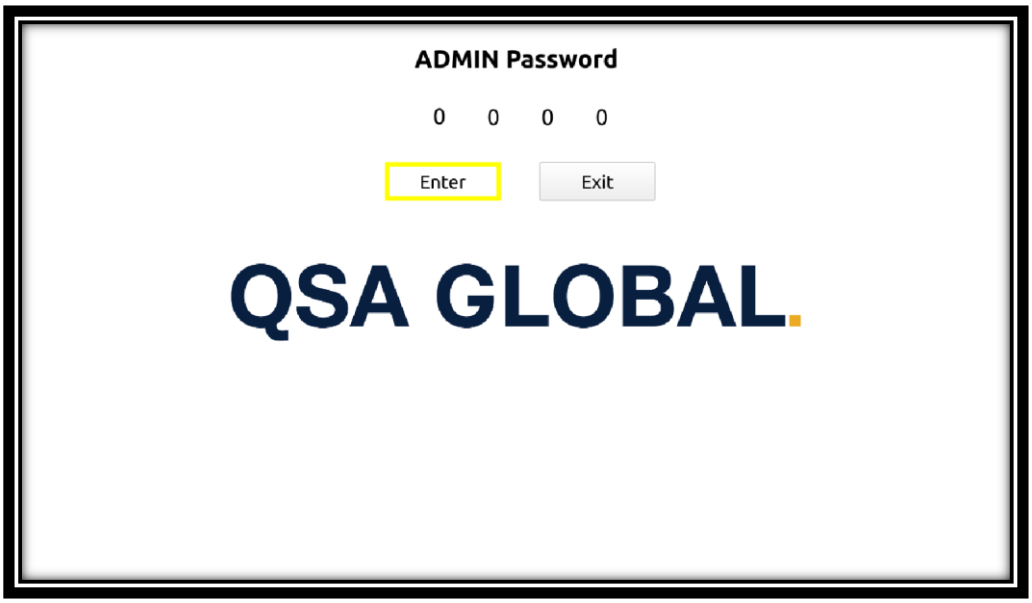

Figure 23 Admin Password Screen

Selecting the ***Admin*** in the *System Info Screen* (Figure 13) transitions to the *Admin Password Screen* (Figure 23). The hat switch's left/right positions navigate between ***Enter***, ***Exit*** and the password digits. Pressing ***Exit*** will transition back to the *Home Screen*. If the correct password has been entered, selecting ***Enter*** transitions to the *Admin Screen*.

System Administration

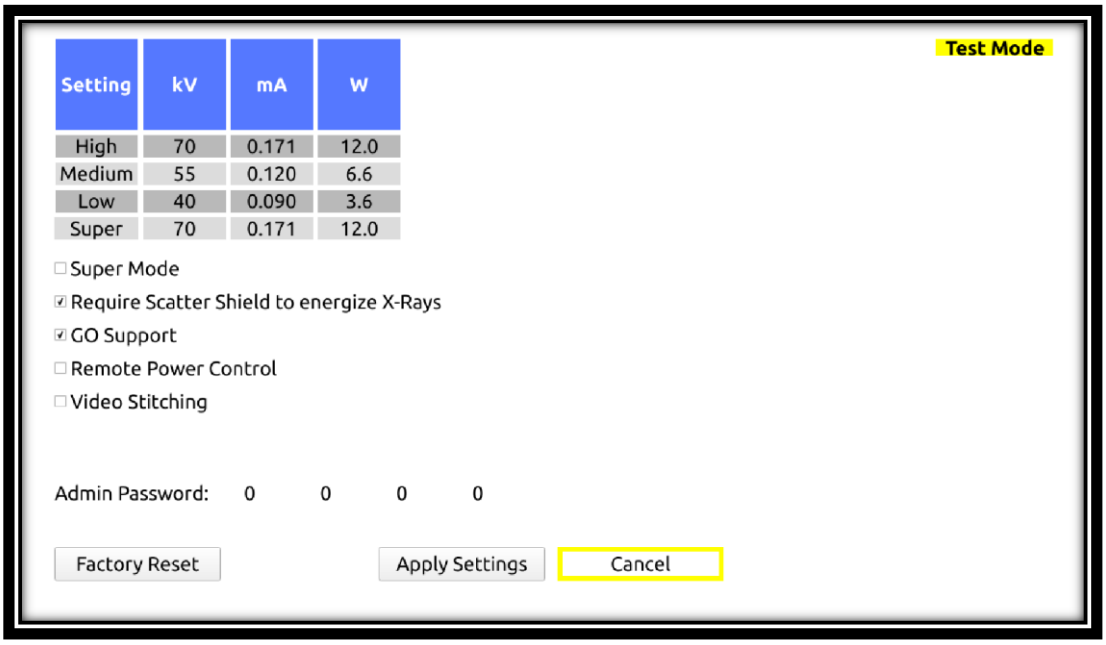

Figure 24 Admin Screen

In the *Admin Screen*, the hat switch's left/right positions navigate between settings, and the up/down positions changes the highlighted setting. Settings that can be changed and their value ranges are shown in Table 3.

Table 3 - Admin Screen Settings

Admin Screen Setting	Possible values*
Voltage, Low (kV)	40 - 70 kV
Voltage, Medium (kV)	40 kV to 70 kV
Voltage, High (kV)	40 kV to 70 kV
Voltage, Super (kV)	40 kV to 70 kV
Current, Low	0.090 mA to 0.300 mA
Current, Medium	0.090 mA to 0.300 mA
Current, High	0.090 mA to 0.300 mA
Current, Super	0.090 mA to 0.300 mA
Super Mode	Enable/Disable
Require Scatter Shield	Enable/Disable
Admin Password	0000-9999
Factory Reset	Resets OpenVision DX to factory settings
GO Support	Enable/Disable
Remote Power Control	Enable/Disable
Video Stitching	Enable/Disable

***Power is limited to 12 W (kV x mA) max. (e.g., 70 kV @ .171 mA = 12 W, 40 kV @ .300 mA = 12 W)**

Select ***Apply Settings*** to save any changes. Otherwise, select ***Cancel***. Either action will transition back to the *Home Screen*.

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Super Mode

Super Mode provides the ability for fine control of voltage and current settings while on the *Home Screen* and during operation of the OpenVision™ DX. With Super Mode enabled the operator can adjust (through the settings menu) voltage in 1 kV increments and current in .001 mA increments.

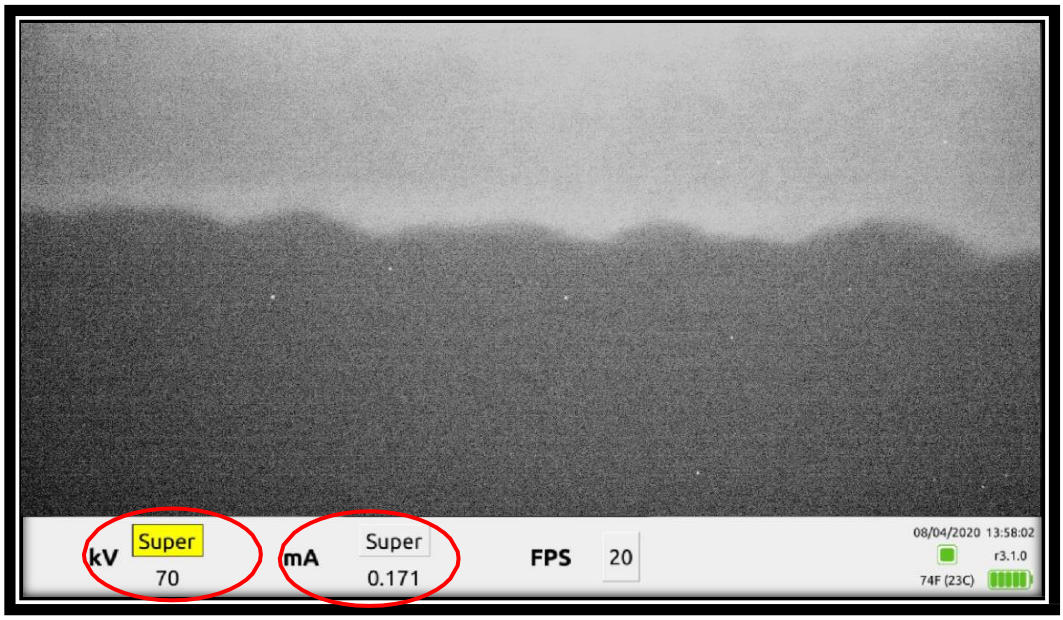

Figure 25 Home Screen with Super Mode enabled.

The *Admin Screen's* Super Mode (Figure 24) must be checked. Once the user selects the ***Apply Settings*** on-screen button the user interface will return to the *Home Screen* and both kV and mA in the settings menu will indicate Super (Figure 25). Activate the *Settings* menu (see **Settings Menu** section on page 10) and navigate to either the kV or mA setting. Pressing the up/down hat switch will change the value highlighted.

Figure 26 OpenVision DX Wi-Fi Tablet

Startup and Power Down of Tablet

The OpenVision™ DX tablet is a touch screen tablet. To power up, press the power button on the tablet's upper-left corner. The OpenVision DX APP will automatically launch on power up. To power down the tablet, press the *Home Screen's* power button (Figure 27). Press the *Okay* button to verify shutdown.

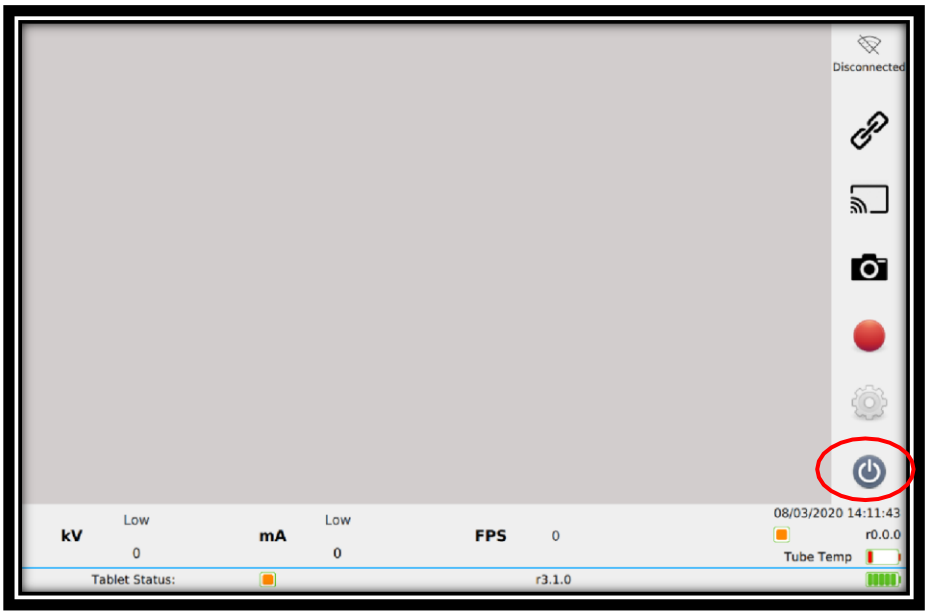

Figure 27 Software Power Button

Home Screen

The home screen is divided into three main sections: Viewing window (center), Settings menu (bottom, outlined in yellow), and Control Panel which can be user-selected to appear on the left or right side (shown on right, outlined in red).

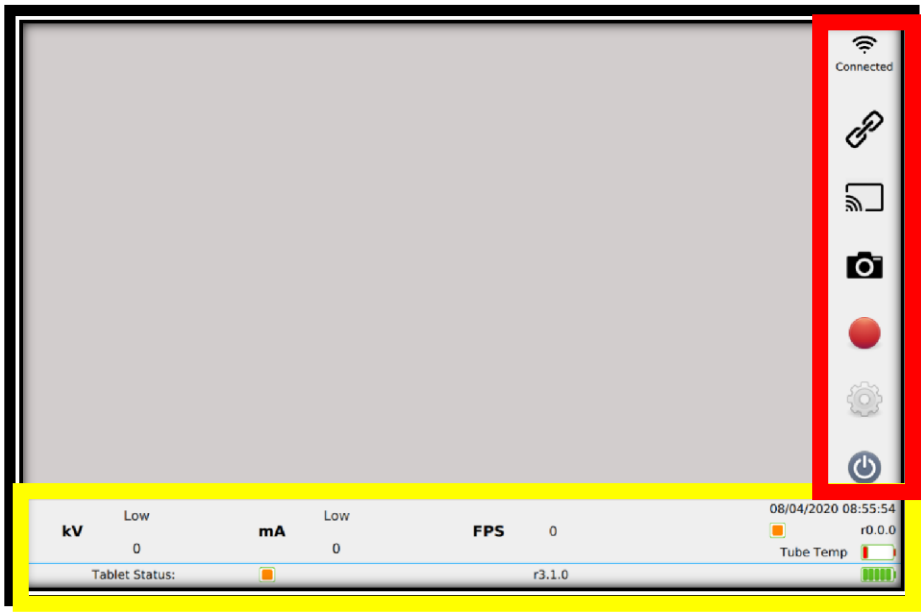

Figure 28 OpenVision DX APP Home Screen

Establishing Wi-Fi Connection, Link, and Streaming

Tablet will automatically connect to Wi-Fi direct when the APP launches, which may take a few seconds. The Wi-Fi symbol will show “Connected” when a Wi-Fi connection has been established (Figure 29).

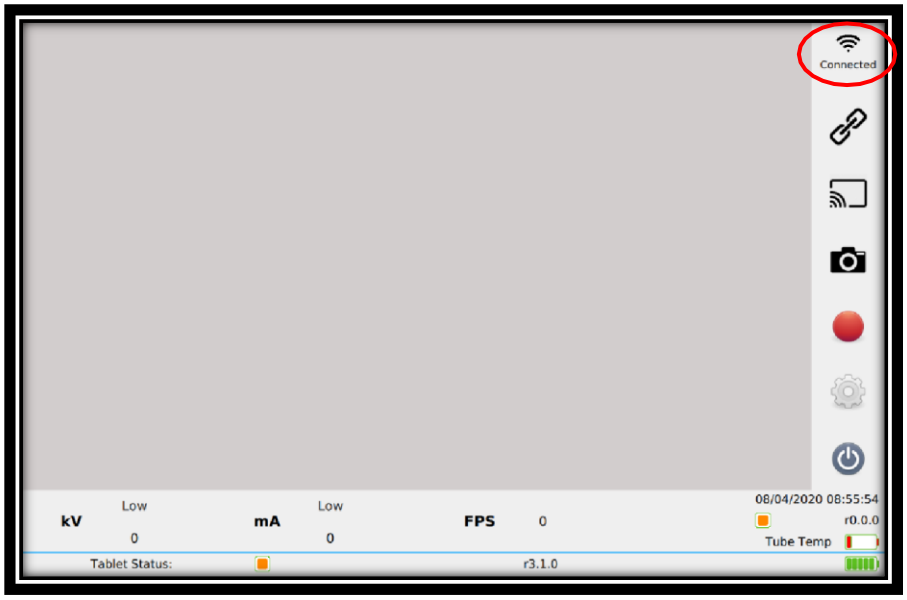

Figure 29 Wi-Fi Connected to OpenVision DX

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Once connected to Wi-Fi, the tablet can then be linked to the OpenVision™ DX by pressing the link icon ( ). Once the link is established ( ), the settings from the OpenVision DX will update (along bottom of screen, as shown in Figure 30).

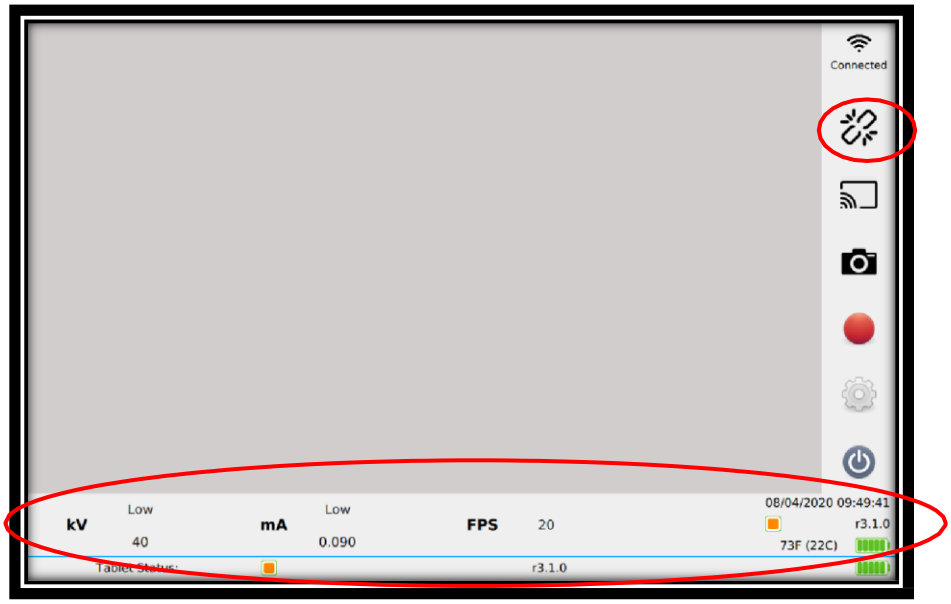

Figure 30 Wi-Fi LINK to OpenVision DX

With the tablet linked to the OpenVision DX, you can stream image data by pressing the streaming icon (, Figure 30). To stop streaming, press the stop button (, Figure 31).

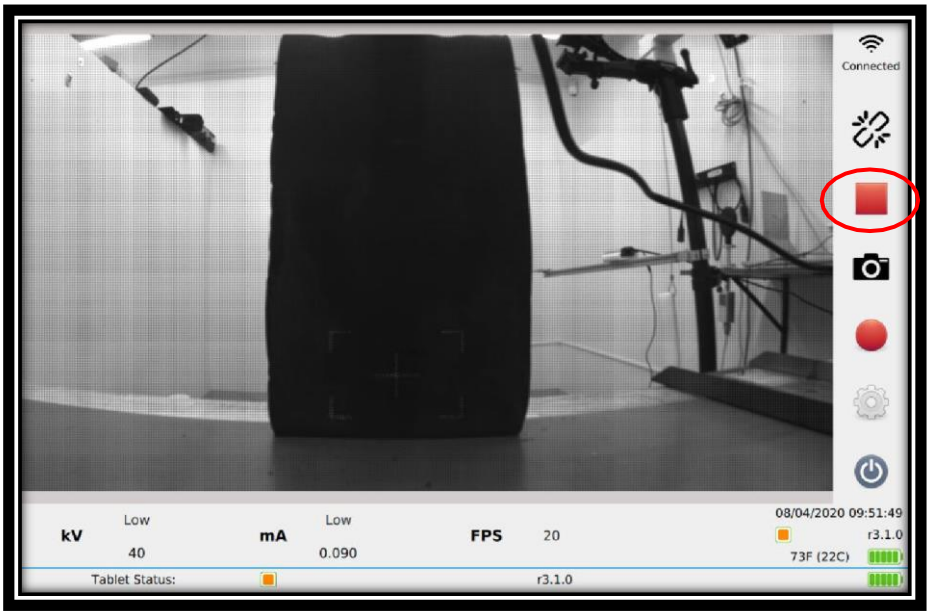

Figure 31 Streaming Image Data to Tablet

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Image and Video Capture

Pressing the camera icon (, Figure 32) takes a snapshot. Once pressed, a picture-in-picture will appear in the upper-left corner (Figure 32). Snapshots work for both targeting and X-Ray images.

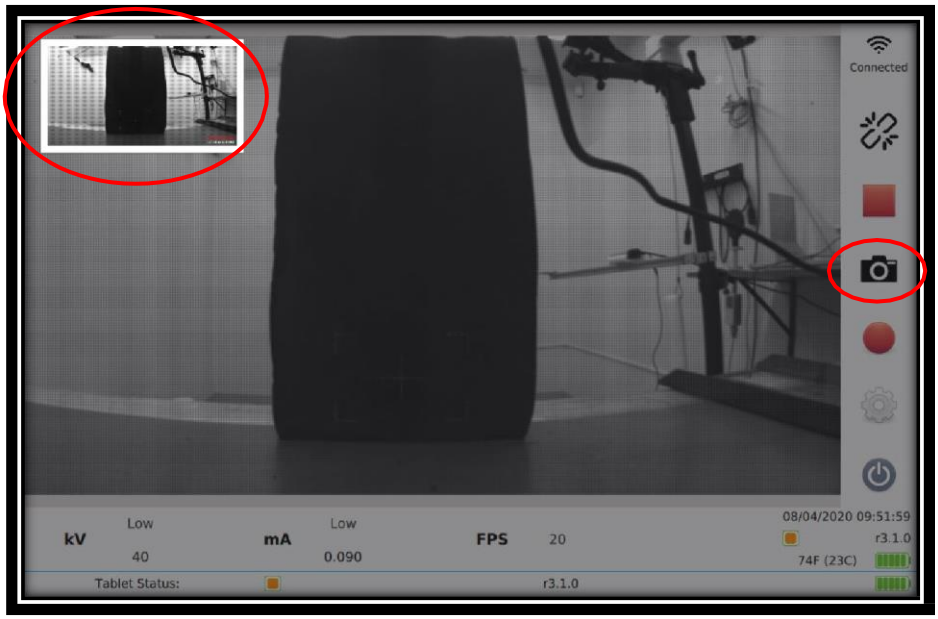

Figure 32 Image Snapshot Picture-in-Picture

Pressing the video record icon (Figure 33) starts a recording. The icon will change (, Figure 33) to indicate video recording in progress. Press this button again to stop recording. The tablet can perform seamless targeting to X-Ray videos.

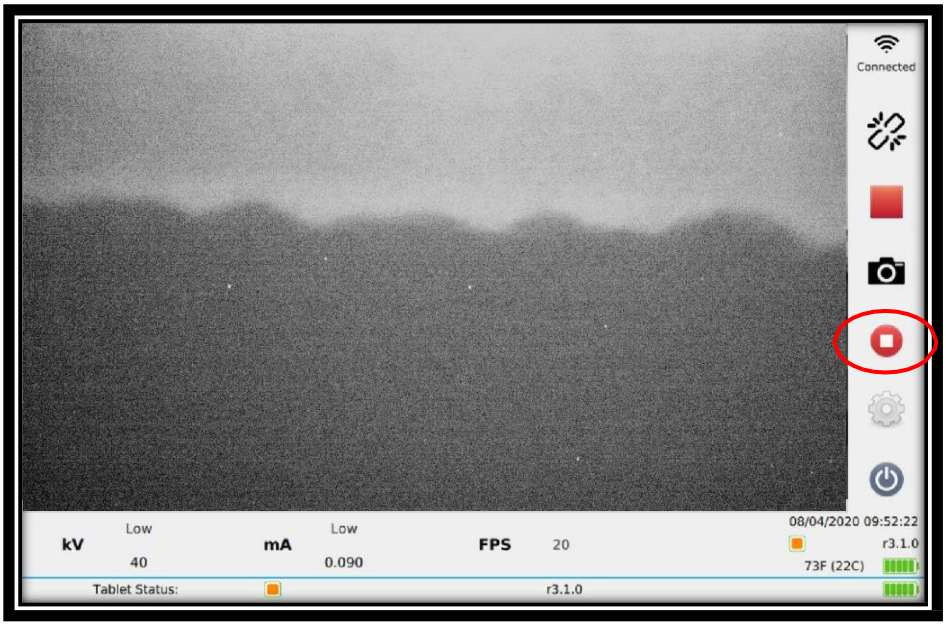

Figure 33 Video Capture

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OpenVision™ DX Screen Displays

In addition to the live image streaming, the tablet will display most OpenVision DX data and information screens. The status bar (Figure 34) includes: kV, mA and Frame Rate (FPS) adjustments, the on-line connection status of the OpenVision DX and tablet ( ), the current date and time, the software revision installed on the system and tablet, the X-Ray tube temperature and the battery level of the tablet and the OpenVision DX.

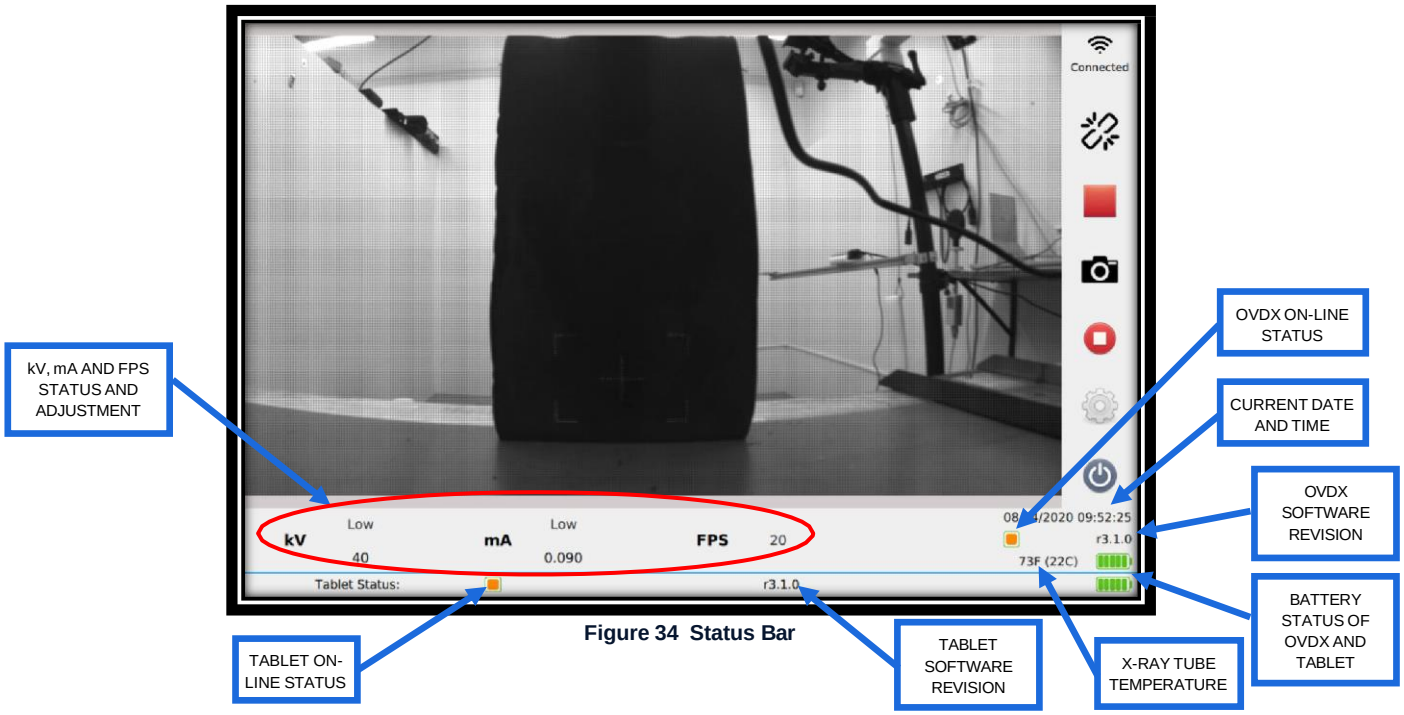

Figure 34 Status Bar

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Other screens include the *X-Ray Caution Screen* (Figure 35), error screens (example shown in Figure 36), *ADMIN Screen*, etc.

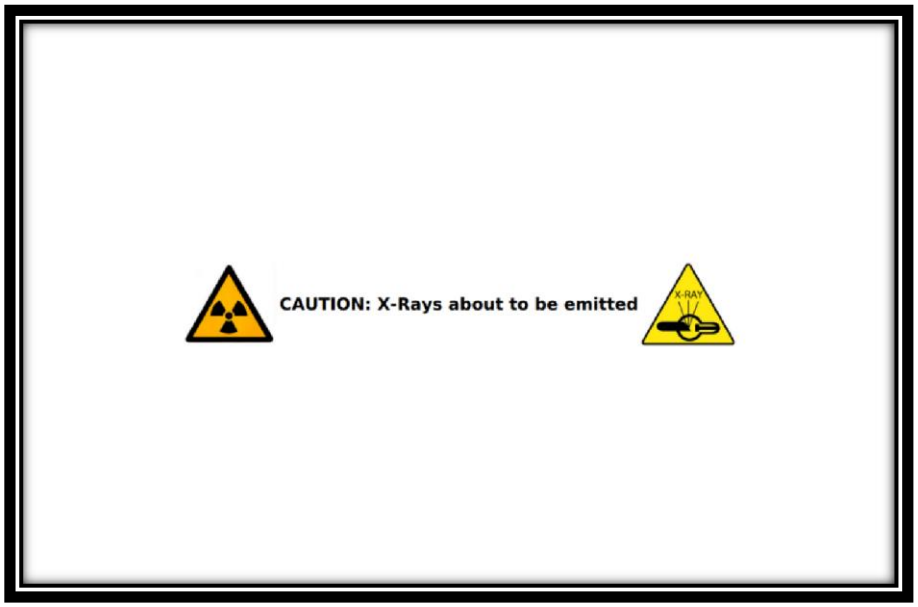

Figure 35 Caution Screen

Figure 36 Error Screen Example

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Local Settings Screen

Screensaver Enable/Disable

The Tablet screen will time out and enter power saver mode after the default set time of 5 minutes. The Screen will go blank to save battery space. The screensaver can be disabled by entering the Local settings screen and De-selecting the Screensaver checkbox as shown in (Figure 37). Be aware that disabling the screensaver will drain the tablet battery more rapid than with the screensaver enabled.

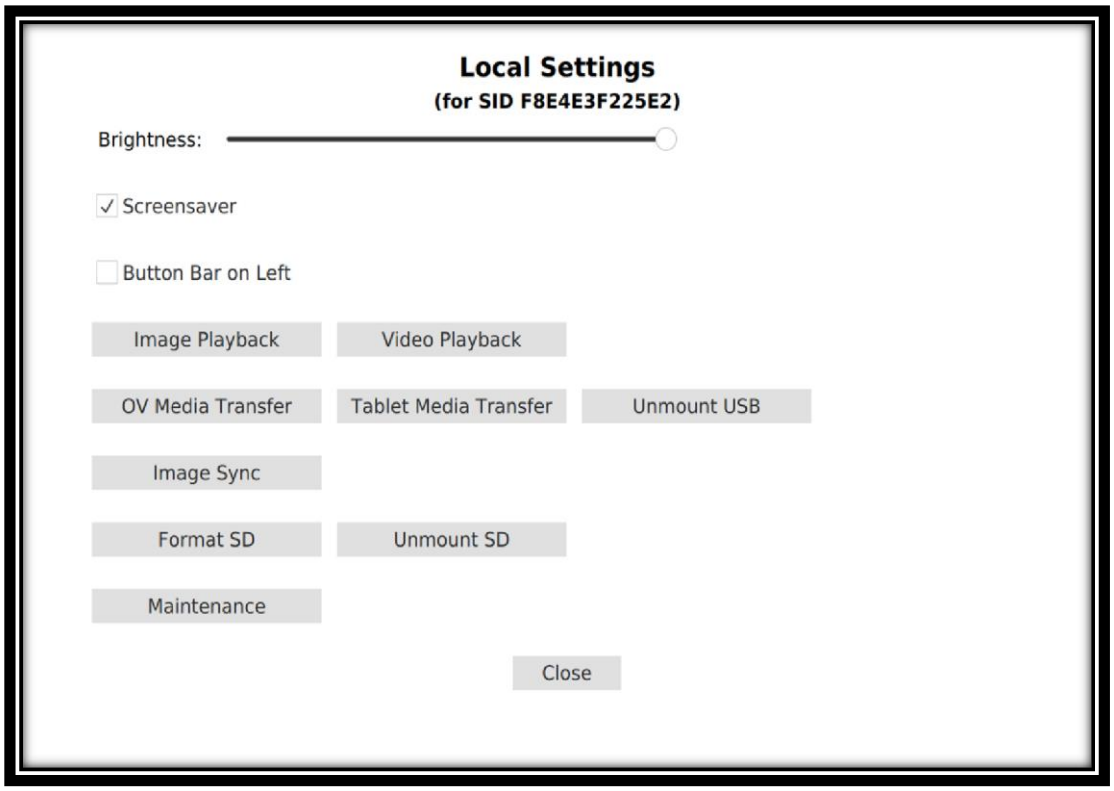

Figure 37 Screensaver Enable/Disable selector

Media Transfer

Images and videos can be downloaded to a USB drive. Plug an appropriate size USB drive into the USB port located on the right side of the tablet using the provided adapter (Figure 38).

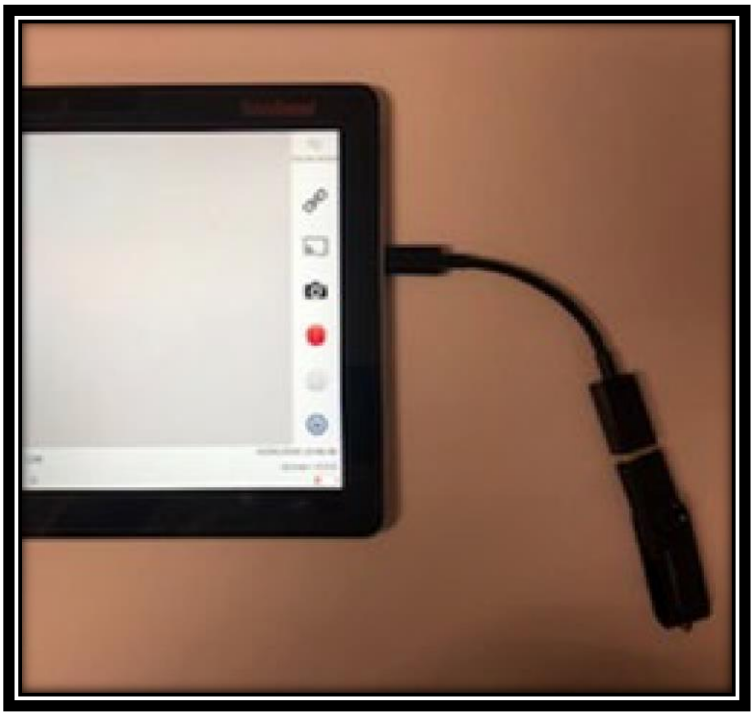

Figure 38 USB Adapter and Drive Connected to Tablet

Press the Local Settings button (,) to go to the *Local Settings Screen* (Figure 39).

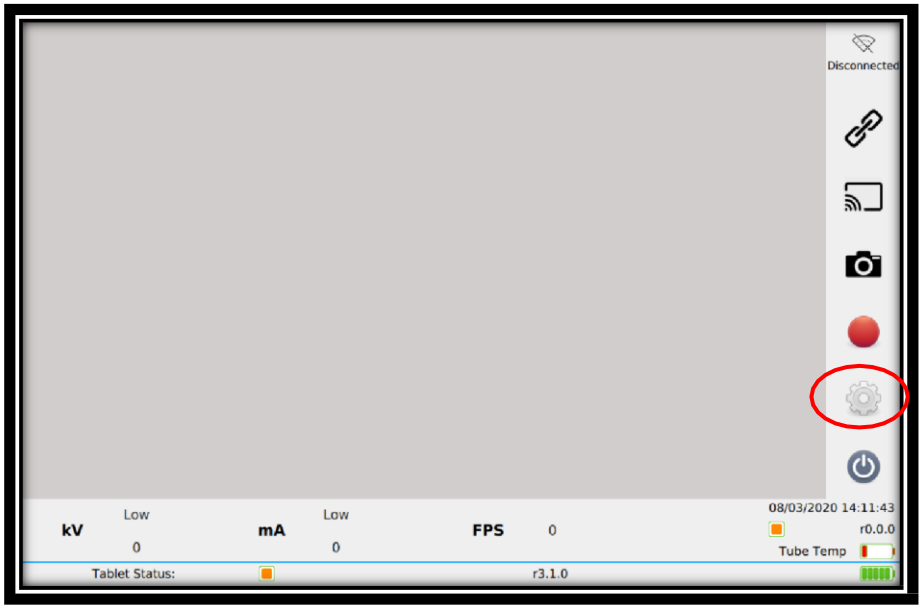

Figure 39 Local Settings Button

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Pressing the **OV Media Transfer** button (Figure 40) will transition to the *OV Media Transfer Screen*, from where files stored on the OpenVision™ DX can be transferred. Pressing the **Tablet Media Transfer** button will transition to the *Tablet Media Transfer Screen*, from where files stored on the tablet can be transferred.

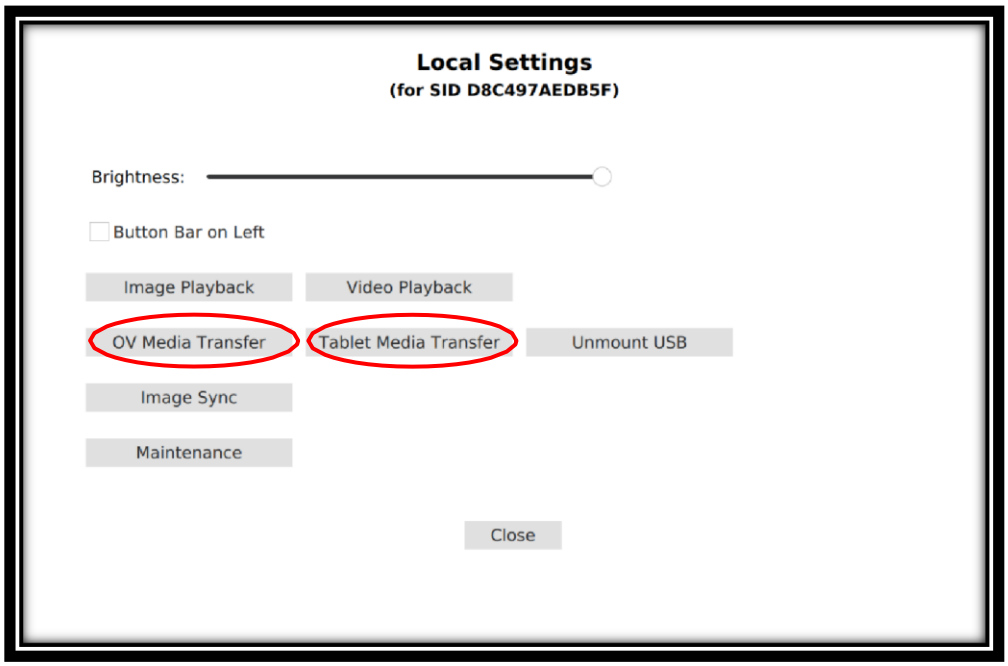

Figure 40 Local Settings Screen

Select desired folder to transfer and press the **Open** button (Figure 41). All media in that folder (snapshots and videos) will automatically transfer to the attached USB drive. Transfer in Progress window (Figure 42) will be displayed during transfer.

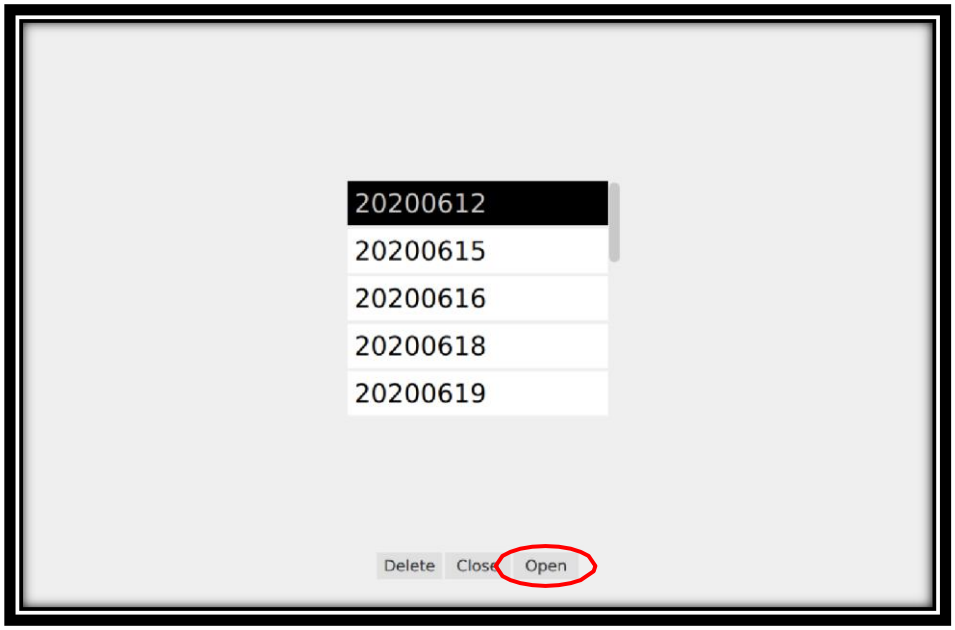

Figure 41 Media Transfer Screen

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CAUTION

DO NOT remove USB drive until “Unmount USB” operation has been completed. Otherwise, USB files may become corrupt and unusable.

Figure 42 Transfer in Progress

Once the media transfer is complete, tablet will transition back to the *Local Settings Screen*. Press the **Unmount USB** button (Figure 43) prior to removing the USB drive. This will assure the USB drive is properly unmounted. If this step is not completed, some files may be corrupted.

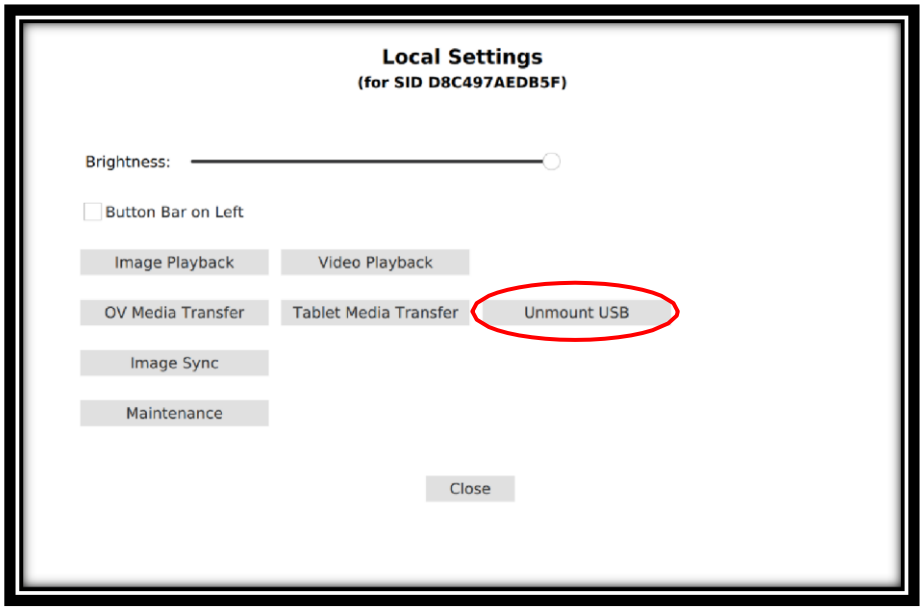

Figure 43 Unmount USB

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Image Playback

In the *Local Settings Screen* select the ***Image Playback*** button (Figure 44). Images stored on the OpenVision™ DX will only appear if an Image Sync has been performed.

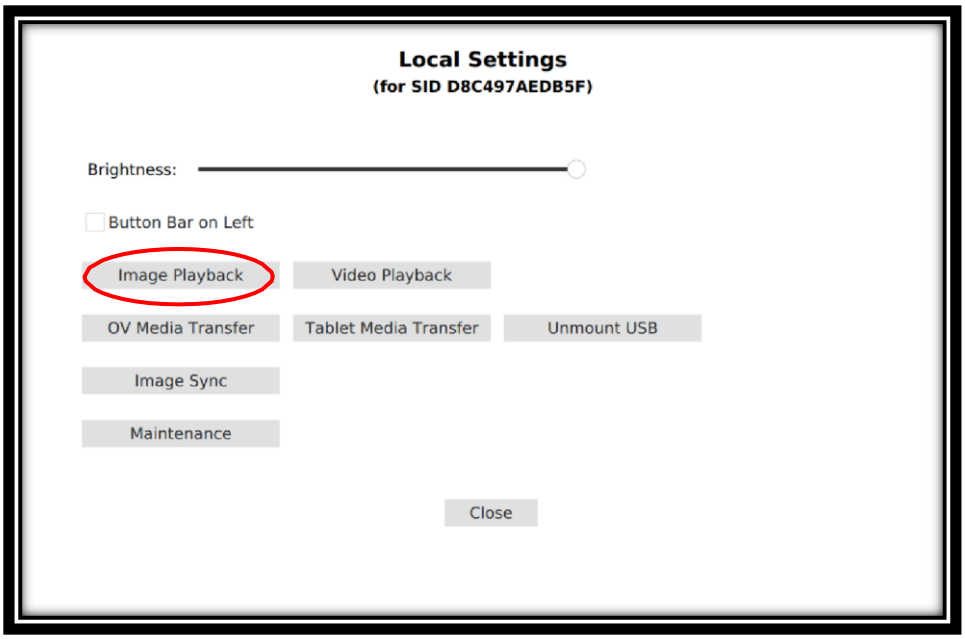

Figure 44 Image Playback Button

Press ***Select OV Folder*** or ***Select Tablet Folder*** button (Figure 45) to select the device.

Figure 45 Image Playback Device Selection

Select a folder from the list (Figure 46). If only one folder is available, you can directly scroll through ALL images. Folders can also be deleted from the *Folder List Screen*.

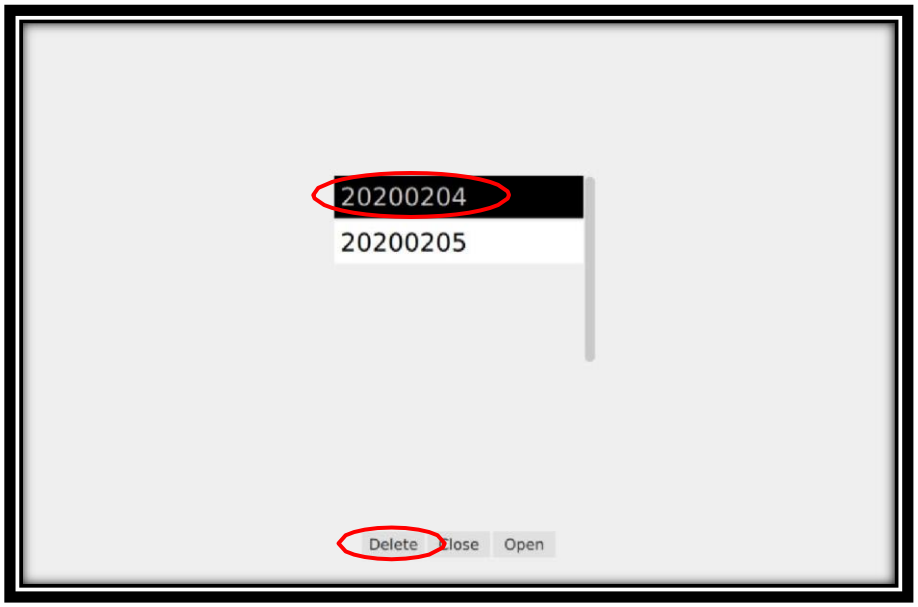

Figure 46 Image Folder List

Once the folder is open you can scroll though images (Figure 47).

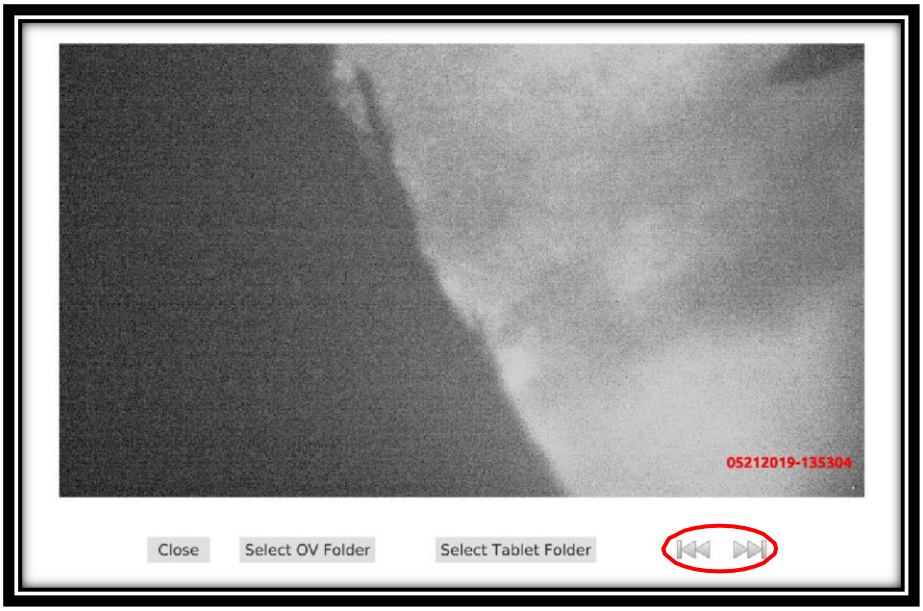

Figure 47 Image Scroll

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Video Playback

For Video Playback, transition *to Local Settings Screen* and press ***Video Playback*** button (Figure 48). Videos stored on the OpenVision™ DX will only appear if an Image Sync has been performed. Folder navigation and delete functions are identical to image playback.

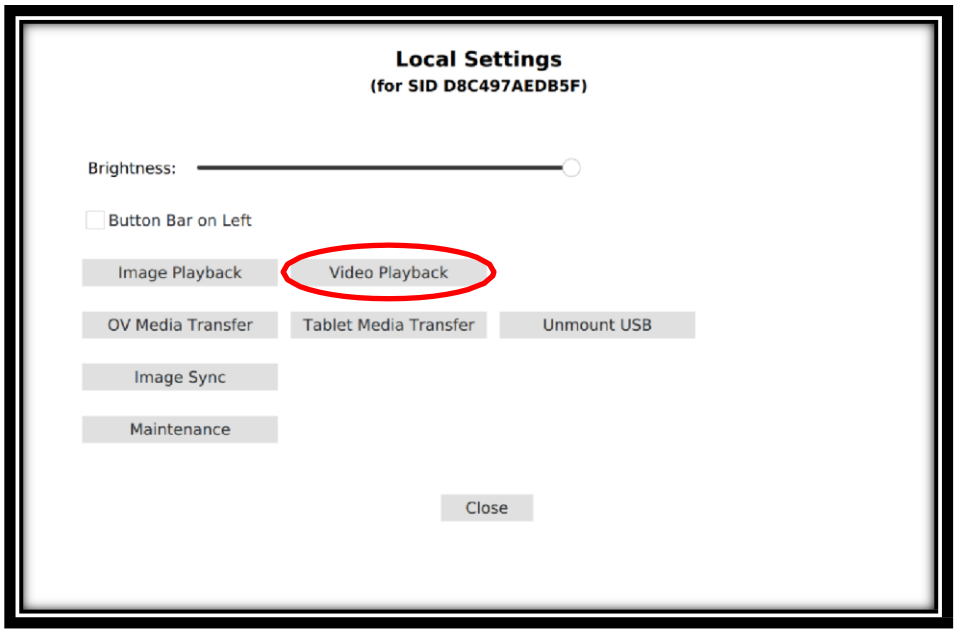

Figure 48 Video Playback Button

Press ***Select OV Folder*** or ***Select Tablet Folder*** button (Figure 49) to select the device.

Figure 49 Video Playback Device Selection

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Select a folder from the list (Figure 50). If only one folder is available, you can directly scroll through ALL videos. Folders can also be deleted from the *Folder List Screen*.

Figure 50 Video Folder List

Standard video playback controls are available to the selected video (Figure 51).

Figure 51 Video Playback

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Video Stitching

Video stitching allows the OpenVision™ DX target camera videos and X-Ray image videos to be viewed seamlessly on the tablet. Video Stitching must be selected in the OpenVision DX *System Administration Screen* for the Video Stitching functionality to operate (Figure 52).

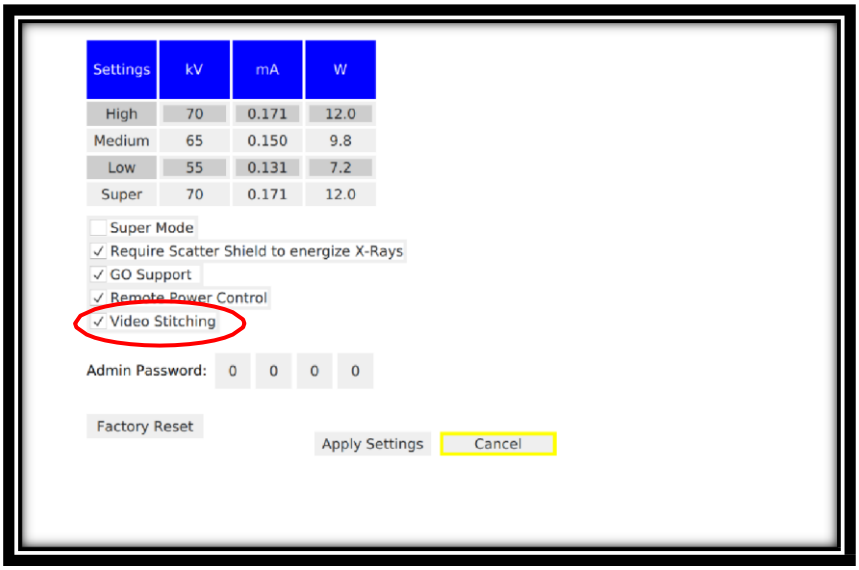

Figure 52 Video Stitching Selection

When a video recording is started on the OpenVision DX it will record the target camera video and a separate X-Ray image video. When the files are transferred to the tablet via the Image Sync command they will be “stitched” together. As the Image Sync and stitching process takes time, it is recommended that this be when time allows. Please verify both the tablet and OpenVision DX batteries are fully charged.

To begin the Image Sync and Video Stitching select ***Image Sync*** from the *Local Settings Screen* (Figure 53). This will begin the transfer and stitching of videos from the OpenVision DX. All images and videos from the OpenVision DX will be transferred to the tablet, it is recommended that files be Sync'd daily.

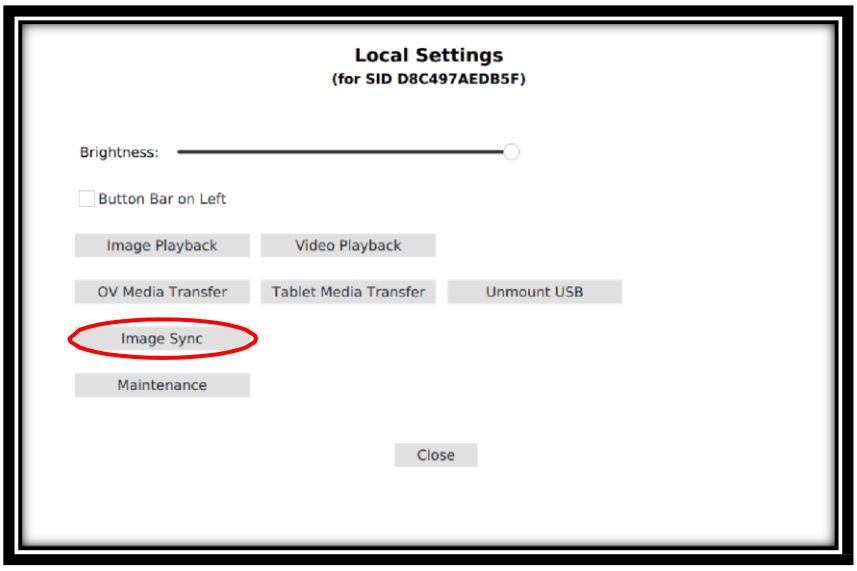

Figure 53 Image Sync Selection

Image sync progress screen appears (Figure 54).

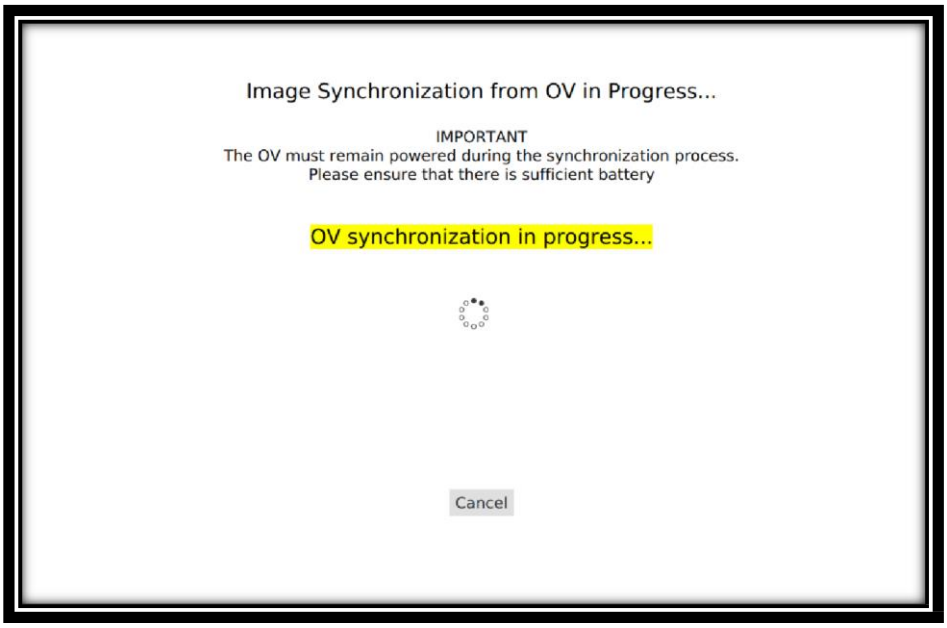

Figure 54 Image Sync in Progress

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If stitching is required a progress screen appears (Figure 55). You can cancel the Sync process at any time.

Figure 55 Stitching Progress

A COMPLETED message will appear when the image sync is complete (Figure 56). If the battery dies during this process it will need to be repeated. All data transferred prior to the OpenVision DX shutting down will remain so the next SYNC process should be shorter.

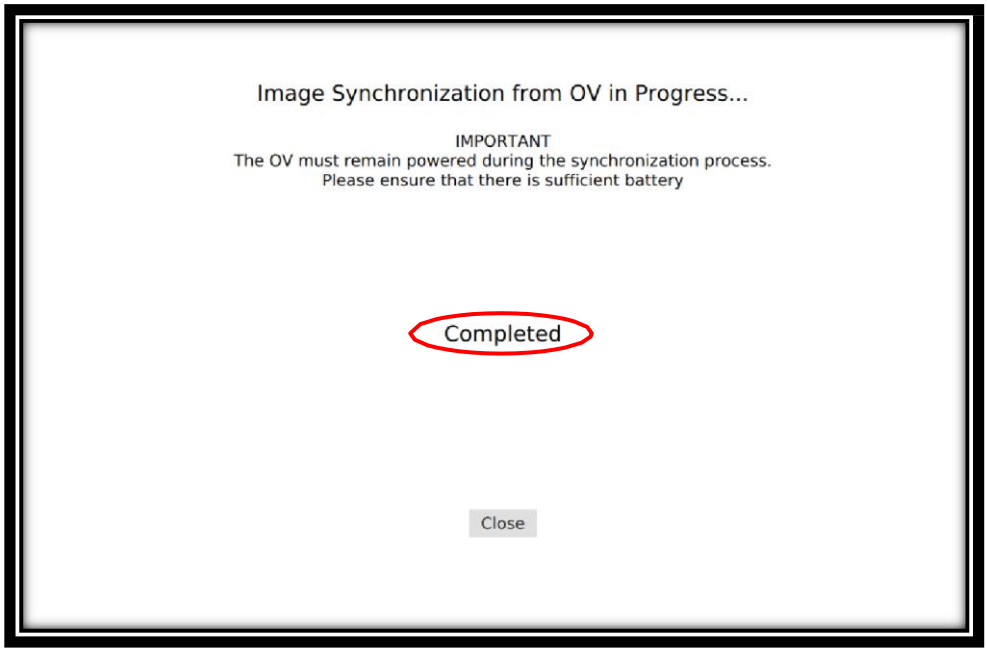

Figure 56 Sync Completed Screen

Brightness Adjustment

The tablet's screen brightness can be adjusted by sliding the *Brightness* bar left or right (Figure 57).

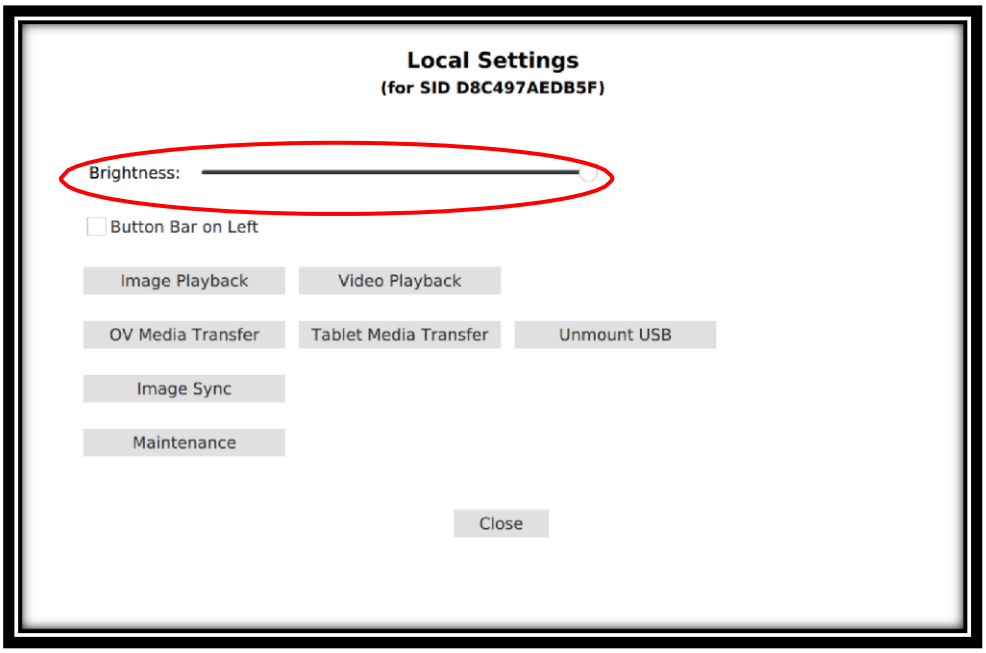

Figure 57 Brightness Control

Control Panel Configuration (Button Bar)

The Control Panel on the *Home Screen* (Figure 28) can be positioned on the left or right side of the tablet's screen. Default is on the right; the check box (Figure 58) allows you to position it on the left.

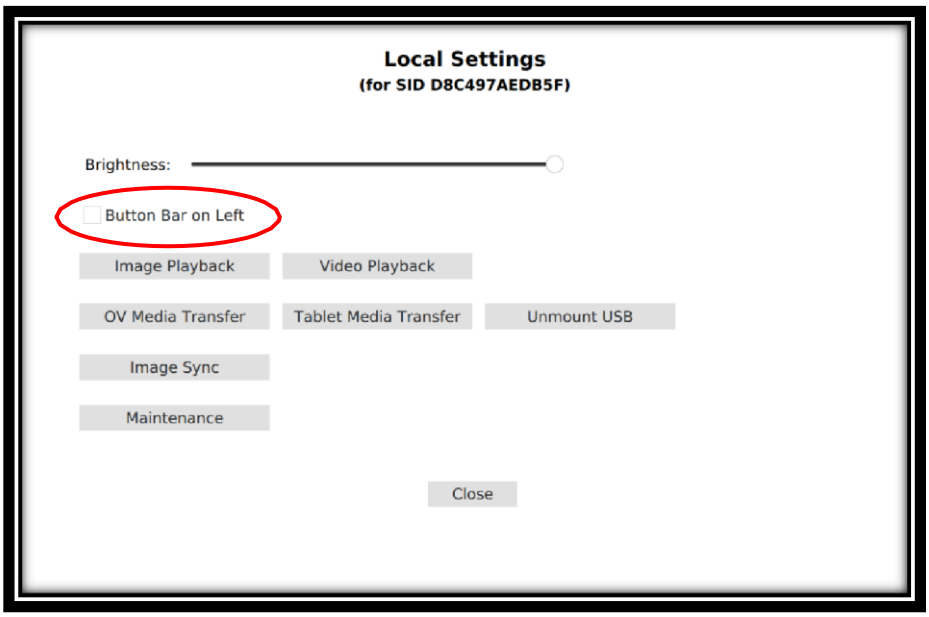

Figure 58 Control Panel Configuration

NOTE: The ***Maintenance*** button is for QSA Global, Inc. use only.

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Remote Power Control

The remote power control option allows the user to adjust kV and mA via the tablet. To enable this feature, the *Remote Power Control* option must be selected (Figure 59) in the OpenVision™ DX *Software Administration Screen*.

Figure 59 Remote Power Control Selection

Once the *Remote Power* Control option is enabled, the kV, mA and FPS can be selected and adjusted via the tablet by pressing on the ***kV***, ***mA*** or ***FPS***. A corresponding window will pop-up and you can adjust kV (Figure 60), mA (Figure 61) or FPS (Figure 62) by pressing either - or + buttons and then pressing the ***Apply*** button.

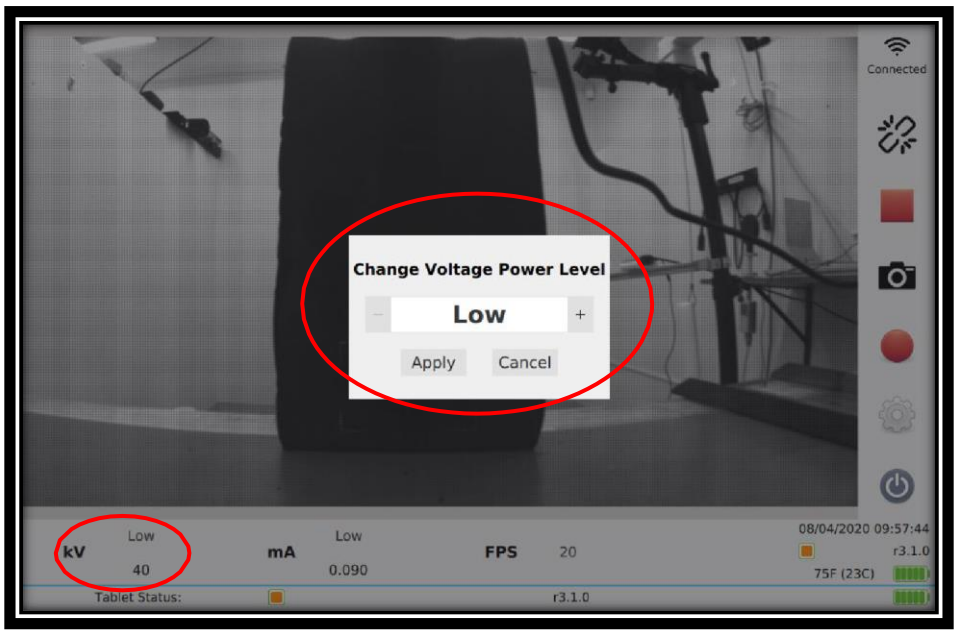

Figure 60 kV Selection and Adjustment

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Figure 61 mA Selection and Adjustment

Figure 62 FPS Adjustment

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Tablet Tethering

The Tablet can connect directly to the OpenVision System via an Ethernet cable through the USB Ports. This feature gives the system the ability to continue use in high Wireless traffic areas that would normally inhibit the effective use of a Wifi connection. Tethering the Tablet can also aid in the transfer of media files from the System to the Tablet for processing.

To enable Tablet Tethering, a Secondary Ethernet Dongle is required.

With the Ethernet Cable attached, Insert the Ethernet dongle into the USB Port of the System. Enter the Admin screen on the system by holding the Toggle switch to the left for 3 seconds. Scroll to “Ethernet Server”, and Select it. Scroll back to “Apply Settings” and Select it (Figure 63).

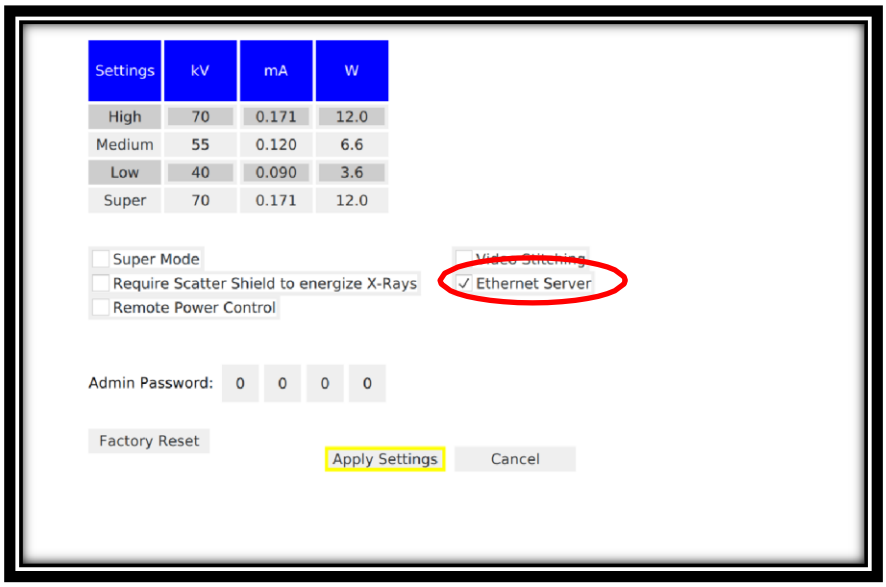

Figure 63 Ethernet Connection

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Plug the secondary Ethernet Dongle into the opposite end of the Ethernet cable. Plug the Ethernet dongle into the Tablet USB Port. In a moment, the Signal Strength meter on the tablet should go to full strength (Figure 64). The Tablet is now ready to Sync, and Stream with all Tablet functions available.

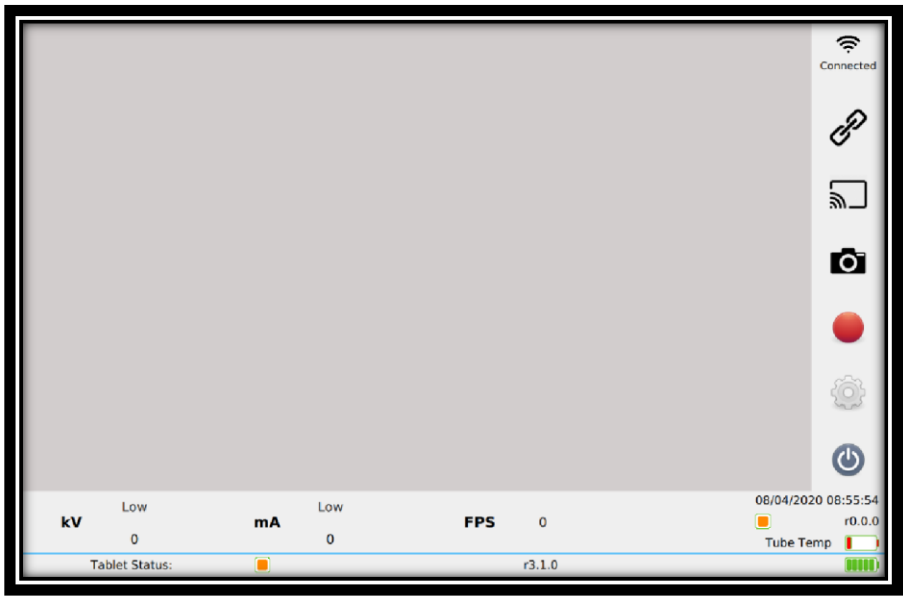

Figure 64 Tablet Tethering

REMOTE SOFTWARE UPDATES.

The OpenVision™ DX is capable of remote software updates. These updates can be performed with or without the tablet, and are performed at the customers discretion. An ethernet connection is required in order to perform software updates.

For information on the latest software revision please visit:

https://www.qsa-global.com/openvision-software-updates or contact your local QSA representative.

Performing a Software Update *WITH* a Wi-Fi Tablet

Turn on the tablet and allow the OpenVision DX APP to launch. Turn on the OpenVision DX and wait for the green LED's.

Plug the ethernet dongle (provided with all OpenVision DX units) to an Ethernet connection (Figure 65).

Figure 65 Ethernet Dongle

Connect the dongle into the USB C slot of the tablet (Figure 66)

Figure 66 USB Dongle to Tablet

The tablet will automatically begin updating. The tablet will restart, and once the restart is complete, the tablet is ready for use.

Performing a Software Update of the OpenVision System with a Wi-Fi Tablet

If the OpenVision System is does not have the same software version as the Tablet, the Tablet will need to update the System. When a Tablet first syncs with a System, the tablet will check its version, and update it if needed.

To update the System with the tablet, power ON both the OpenVision System, and the Tablet. Press the “SYNC” Button on the tablet. The update will begin and the update screen will show on the tablet (Figure 67)

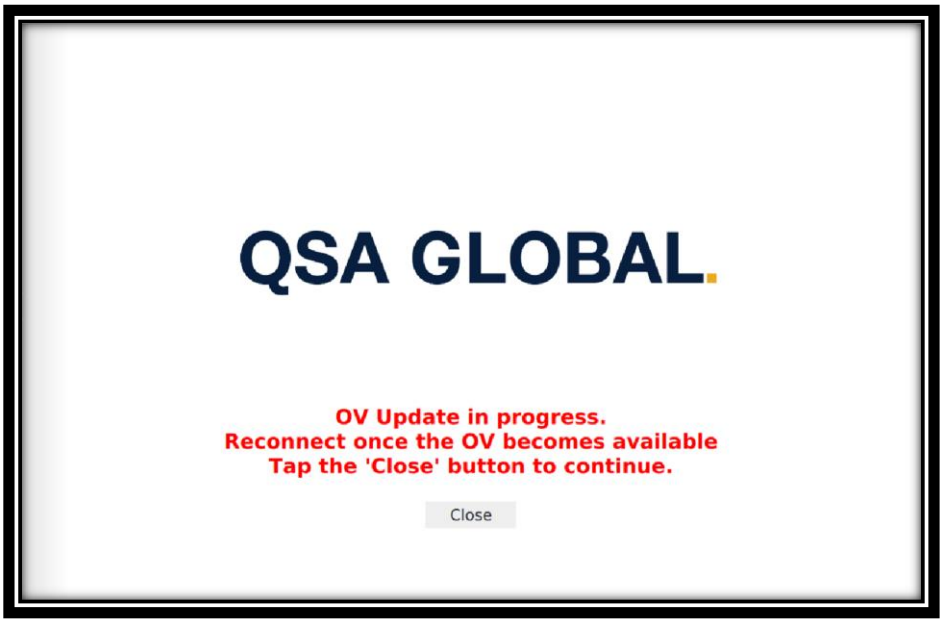

Figure 67 Tablet updating System

The System screen, as well as all LED indicators with the exception of the main power LED will go blank during the update. The update may take several minutes to complete. Do **NOT** turn the machine off or remove the battery until the update has completed. The update will be complete when the system user interface returns to the screen. Note: the user interface may not fully return to the user screen, and hold up on the main intro screen, or display an 006 Error code. Once the system completes, it will need to be restarted. Turn Off the power switch and restart the system. The update will be completed.

Performing a Software Update *WITHOUT* a Wi-Fi Tablet

Turn on the OpenVision™ DX and wait for the green LED's.

Attach the USB A-C adapter (provided with all OpenVision DX units) on the ethernet dongle (provided with all OpenVision DX units) (Figure 68).

Figure 68 USB A-C Adapter

Connect the Ethernet cable into the dongle, then plug the connection into the USB port on the OpenVision DX (Figure 69).

Figure 69 Ethernet Connection to OpenVision DX

The system will automatically begin the update when the connection is recognized. The screen will go blank, and the all LED indicators with the exception of the main power LED will go blank during the update. The update may take several minutes to complete. Do NOT turn the machine off, or remove the battery until the update has completed. The update will be complete when the system user interface returns to the screen. Note: the user interface may not fully return to the user screen, and hold up on the main intro screen, or display an 006 Error code. Once the system completes, it will need to be restarted. Turn Off the power switch and restart the system. The update will be completed.

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MAINTENANCE.

The OpenVision™ DX has been designed to require minimal maintenance by the operator. QSA Global, Inc. recommends daily visual inspection of the system. Specific attention should be paid to the following:

- M18™ battery and its mount (on top of Main Housing) – Ensure both are clean, and in sound shape.
- HDMI cable – Inspect for any cracks or wear.
- Allen/thumb screws – Check for tightness.
- Imager bag – Check for excessive wear.

Use a soft, damp cloth to clean to remove dirt and grime from the OpenVision DX.

CAUTION

Do not use solvents or apply cleaning agents directly on the OpenVision DX as this can damage the components and/or corrode the electronics.

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TROUBLESHOOTING.

CAUTION

Opening the OpenVision DX potentially will damage the system and will void any warranty. If faced with any issues with the OpenVision DX, contact your QSA Global, Inc. representative immediately for guidance.

The OpenVision™ DX has been designed as a rugged, safe, reliable system. A series of interlocks and self-checks are built into the system to ensure safe operation. These checks may trigger an error code which will prevent normal operation of the OpenVision DX. Use Table 4 as a reference guide for system error codes.

NOTICE: Prior to any troubleshooting, please ensure that a fully charged M18™ battery is installed. A low battery may cause system to report false error codes.

Table 4 Error Code Guide.

Error Code	Description	Corrective Action
001	Memory Failure	Hard drive and/or system memory error or failure. If restart does not clear error, contact your QSA Global, Inc. representative for repair options.
002	LED Failure	Status Indicator LED(s) are not functioning properly. If restart does not clear error, contact your QSA Global, Inc. representative for repair options.
003	X-ray Tube Failure	X-ray tube is not communicating or has malfunctioned. If restart does not clear error, contact your QSA Global, Inc. representative for repair options.
004	X-Ray Over Temperature	X-ray tube has exceeded its operating temperature, forcing system to stop emitting X-rays. Perform following actions to recover from this error: • Turn off unit • Place in cooler environment for 30 minutes • Turn unit on
005	Board Over Temperature	Main control board has overheated. Perform following actions to recover from this error: • Turn Off unit • Place in cooler environment for 30 minutes • Turn unit on
006	Imaging Camera Failure	Communication error and/or failure with targeting camera. Perform a system restart, if a restart does not clear the error, contact your QSA Global, Inc. representative for repair options.
007	Targeting Camera Failure	Communication error and/or failure with targeting camera. Contact your QSA Global, Inc. representative for repair options.
008	Low Voltage	M18™ battery has insufficient charge; change battery.

Error Code	Cause	Description
009	Camera Communication Error	Communication error with internal camera. Cycle system power to clear error.
010	Camera Communication Error	Communication error with internal camera. Cycle system power to clear error.

WARRANTY.

Warranty and Limitation of Liability

QSA Global, Inc. (herein referred to as the manufacturer) warrants its product which it manufactures and sells to be free from defects in material and workmanship for a period of one year from the date of shipment. This warranty shall not apply to any product or parts which have been subjected to misuse, improper installation, repair, alteration, neglect, accident, abnormal conditions of operation, or use in any manner contrary to instructions.

The manufacturer's liability under such warranty shall be limited to replacing or repairing, at its option, any parts found to be defective in such respects, which are returned to the manufacturer, transportation prepaid; or at its option, to returning the purchase price thereof.

The warranty on other manufacturer's components shall be that of the original manufacturer whose warranty shall be binding. In no event shall the manufacturer be liable for any incidental or consequential damages, whether or not such damages are alleged to have resulted from the use of such product in accordance with instructions given by or referred to by the manufacturer.

QSA Global, Inc. assumes no liability or responsibility for the usage of this device for the generation of penetrating radiation. The use of such generators in any manner other than prescribed in a State registration or permitted by any State x-ray regulations may constitute a violation of such license or regulatory terms.

All other warranties, except those warranties expressly stated herein, including without limitation warranties of merchantability and implied warranties of fitness, are expressly excluded.

The warranty on this device is specifically limited to its use only with parts, and accessories manufactured by QSA Global, Inc. QSA Global, Inc. shall not be liable for any errors or omissions contained herein and the provision by QSA Global, Inc. of the information set out in this manual does not in itself constitute acceptance of any liability on the part of QSA Global, Inc.

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ADDENDUM

This addendum provides updated contact information not currently described in QSA Global, Inc. Handling Instructions and Operation and Maintenance Manuals.

The phone number to contact the EMEA + India Sales & Service center has been updated to **+ 00 420 377 183 838**.

Impacted Handling Instructions and Operation and Maintenance Manuals include:

- HI-018 (Safety Guidance for Radiography Sources) Issue 11
- HI-077 (Model 424-69 Handling Instructions) Issue 1
- HPI-115 (3605B Container Operating Instructions) Issue 5
- MAN-010 (Model 865 Operation and Maintenance) Issued October 2022
- MAN-020 (Model 650L Source Changer Operation and Maintenance) Issued May 2021
- MAN-027F (Model 880 Series Operation and Maintenance - French Translation) Issued November 2023
- MAN-027RU (Model 880 Series Operation and Maintenance - Russian Translation) Issued May 2021
- MAN-037 (Model 989 SCAR Operation and Maintenance Instruction Manual) Issued October 2022
- MAN-038 (Model Sentry 110 & Model Sentry 330 Operating and Maintenance Manual) Issued May 2021
- MAN-039 (Model 867 Operating Manual) Issued May 2021
- MAN-040 (Model 360 Series Operating Manual) Issued May 2021
- MAN-049 (Model 880SC Operating Manual) Issued May 2021
- MAN-054 (Model 1075 Operation and Maintenance Manual) Issued May 2021
- MAN-055 (Model 771 Radiographic Source Changer and Type A Transport Package) Issued November 2022
- MAN-056 (Sentinel Storage Container Instructions) Issued December 2022
- MAN-057 (Model 989M Operation & Maintenance Instruction Manual) Issued December 2022
- MAN-059 (OpenVision DX - OVDX-NDT-70 Hardware Manual) Revision D
- MAN-059F (OpenVision DX - OVDX-NDT-70 Hardware Manual – French Translation) Revision C
- MAN-062 (OV Security Hardware Manual) Revision D
- MAN-062F (OV Security Hardware Manual – French Translation) Revision D
- MAN-063 (OpenVision DX - OVDX-70 Software Manual) Revision E
- MAN-064 (Open Vision Security Software Manual) Revision B
- MAN-065 (Remote Controls SAN886 & 887 Series Operating Manual) Issued July 2021
- MAN-065CZ (Remote Controls SAN886 & 887 Series Operating Manual) Issued July 2021
- MAN-065RU (Remote Controls SAN886 & 887 Series Operating Manual) Issued July 2021

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- MAN-066 (OpenVision HD Software Manual) Revision B
- MAN-067 (OVHD-NDT-70 Hardware Manual) Revision C
- MAN-068 (OVHD-NDT-70 Hardware Manual) Revision A
- SI14050.CON (GammaMat TI, TI-F & TI-FF Manual) Issued May 2024

Should you have any questions regarding this addendum, please contact QSA Global, Inc. for further assistance.