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OPERATING MANUAL. MAN-067, REVISION D

OPENVISION HD.

OVHD-NDT-70 HARDWARE MANUAL

Revision Record

Revision	Date	Description
A	03/2023	Production Release
B	06/2023	FDA Accession Number Assigned, addition of CE compliance & minor updates to further demonstrate compliance to ANSI/HPS N43.5-2005
C	11/2023	Updates to add description of warning lights/audible alerts on device and cover x-ray tube disposal to comply with Canada Safety Code 34 and ANSI/HPS N43.5-2005.
D	01/2025	Updates to status lights to comply with Canada Safety Code 34 Section 3.1

DANGER – RADIATION WARNING

OpenVision™ HD devices must be operated only by trained and qualified radiographers who have read and understand this operating manual or by trained assistants working under their direct supervision.

The OpenVision™ HD is classified as a shielded x-ray tube assembly.

WARNING

The use of these radiographic devices by unqualified personnel, when safety procedures are not fully met, or when improperly installed, could result in life-threatening dangers.

The x-rays produced by these devices emit high levels of highly penetrating radiation during use.

Since radiation cannot be detected by the human senses, strict operating and emergency procedures must be followed. The proper use of calibrated and operable survey meters must be employed to avoid potentially dangerous levels of radiation exposure.

Take advantage of the three basic radiation protection methods to minimize radiation exposure:

Time: Spend less time near the radiation source.

Distance: Increase your distance in a direction away from the radiation source.

Shielding: Use effective shielding between you and the radiation source.

Do not perform any unauthorized modifications to the device or components of the system.

It is important that trained and qualified radiographers perform or supervise a daily safety inspection of the radiography system for obvious defects prior to operation of the system.

Do not use any components that are not approved for use with the radiography system, or after-market components that may compromise the safety designed into the system.

Consult with state and/or local governmental regulations and industry standards for additional requirements pertaining to the operation of any x-ray equipment.

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Table Of Contents.

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Equipment Specifications.

Table 1 OpenVision™ HD Specifications	
Part Number	OVHD-NDT-70
Imaging Specifications	
Detector Type	CMOS
Pixel Pitch	74.8 µm
Pixel Matrix	1944 X 1536
Sensitive Area	5.72” x 4.52” (145.4 mm x 114.9 mm)
Grayscale	16 Bit
System Resolution	1280 X 720
C-Arm Dimensions	
X-Ray Tube to Detector	9.5 in. (24 cm) to 20.9 in. (53 cm)
Throat Depth	21 in. (58 cm)
Detector Thickness	2.5 in. (6.4 cm)
X-Ray Tube Thickness	3.4 in. (8.7 cm)
System Weight	
C-arm	16 lbs. (7.2 kg)
HDMI Monitor	2 lbs. (0.9 kg)
Shipping Weight	50 lbs. (23 kg)
Beam Collimation	18° Horizontal / 10° Vertical
Startup Time	~30 seconds
Shutdown Time	~5 seconds
Battery Life (Continuous / Standby)	2 hours / 3 hours (5 Ah battery)
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	Wired HDMI Monitor: 7 in. LCD Wi-Fi Tablet: 10 in Touchscreen PirateEye Any device with HDMI input
Data Storage	Internal: 128 GB (Transfer via USB drive) Wi-Fi Tablet: 128 GB (Transfer via USB-C)
Shipping Dimensions	32 in. x 20.5 in. x 12.5 in (82 cm x 52 cm x 32 cm)
X-Ray Tube Classification	Shielded
Leakage Radiation Exposure Rate	Less than 2.58 E^{-04} C/kg in one hour (1 R/hr) at one meter from the x-ray tube target
FDA Accession #	2380041-000

The OpenVision HD is built in compliance with ISO 9001:2015 and meets the following standards when used as directed:

- ANSI/HPS N43.5-2005 (R.2013)
- 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 END 166 FTKN

Battery/Charger

c UL us Underwriters Laboratory for Canada and U.S.

Safety Precautions.

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

WARNING

The OpenVision™ HD is classified as a shielded x-ray tube assembly.

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

It is important that trained and qualified personnel perform or supervise a daily safety inspection of the OpenVision HD 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 HD 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.

During emergencies, release the trigger to cease x-ray production. Turn the key to the OFF position to turn off the device. If necessary, remove the battery.

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 or invalidate the safety integrity of the device.

WARNING: JOB SITE SAFETY PRECAUTIONS

Surveillance

Only trained and qualified individuals, or assistants working under their direct supervision, may operate the OpenVision HD 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 HD 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.

WARNING: ACCIDENTAL RADIATION OCCURANCES

An Accidental Radiation Occurrence is defined by Part 21 CFR 1000.3 as a single accidental event or series of accidental events that has/have resulted in injurious or potentially injurious exposure of any person to electronic product radiation as a result of the manufacturing, testing, or use of an electronic product.

Report any accidental radiation occurrences (ARO's) to QSA Global, Inc. so that QSA Global, Inc. may notify the Food and Drug Administration.

NOTICE: DOSIMETRY

It is the responsibility of users of this equipment to comply with all local, national and international regulatory and licensing rules and regulations. Proper dosimetry including film badges, thermoluminescent dosimeters or optically stimulated luminescence badges (OSL); direct reading pocket dosimeters and audible alarm ratemeters may be required to be worn during all radiographic operations.

Operating Conditions

OpenVision HD 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 HD operators are properly trained and qualified to perform radiographic inspections. This manual does not address radiographic inspection techniques or procedures.

Precautions

The OpenVision HD 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, detector housing, and display(s).

CAUTION

Do not attempt to open or modify the detector 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 HD system. The main housing and detector 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 HD system.

WARNING: Target Laser

This device uses a laser for targeting. This is classified as a Class 1 Laser Product since the laser is enclosed to make it safe. Class 1 laser products are designed to prevent the laser from becoming an exposure hazard. Class 1 laser products are considered safe under all intended conditions of normal use. No attempts to modify or remove the laser in this device should be made as this will void the Class 1 Laser Product safety classification.

WARNING: X-Ray Tube Dormancy

If the period between firing X-rays exceeds 60 days, then possible damage can result to the X-ray tube, causing machine failure or the issuance of error codes. For example, if the machine is not fired within 60 days and then fired on the highest settings, this may cause X-ray tube damage and improper machine operation. To prevent this possible damage, it is recommended that the user fire X-rays at least once every 60 days if the machine will sit idle for a period of time.

In the event that the machine has sat idle for 60 days or longer (that is, has not fired X-rays within the past 60 days or longer), then the X-ray Warm-up Procedure must be performed in full to prevent possible machine damage.

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Getting To Know Your Openvision HD.

What's Included

OpenVision™ HD is shipped complete in a custom hardsided case. Some components are packaged and placed in bags or located loose in the case.

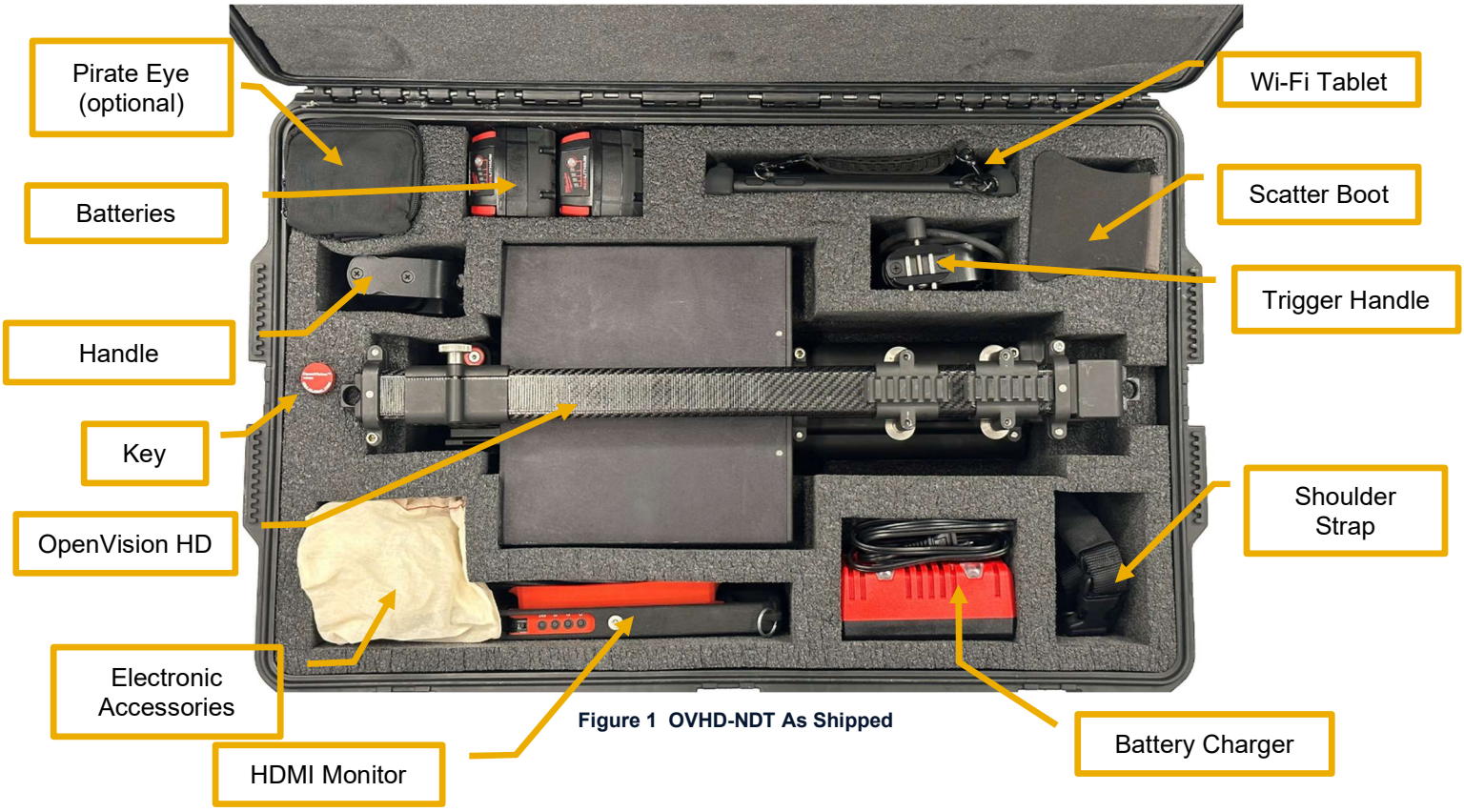
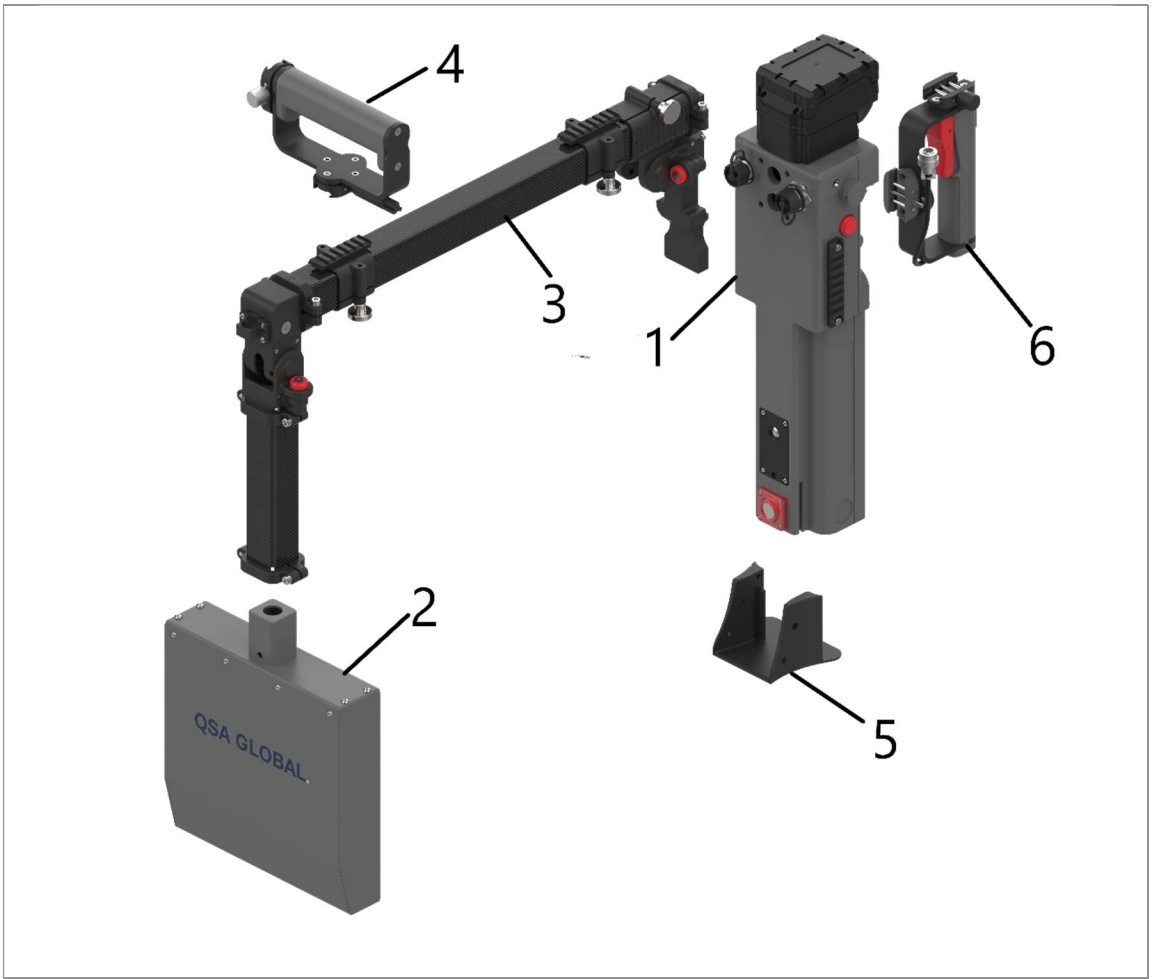


Figure 1 OVHD-NDT As Shipped

ITEM	PART #	DESCRIPTION
1	-	Monitor Sunscreen
2	-	Tablet Charger (with optional tablet only)
3	ELE114	USB-A to USB-C Adapter – Allows connection USB-A flash drive (with optional tablet only)
4	ELE115	Ethernet Adapter – Allows connection from Ethernet to OpenVision HD or Tablet
5	ELE116	USB 3.0 Adapter – Connection from OpenVision HD USB-A to Ethernet Adapter
6	-	Monitor batteries and charger
7	-	USB charger cable – Allows for changing monitor batteries via USB outlet
8	ELE111	USB Wall Charger – Allows charging of monitor batteries via standard 120 outlet
9	TOL028	7 Piece Allen wrench set
10	313425	Bungee Sling
11	313056	Controller Key – Used to turn on / power up OpenVision HD – Removed for shipment

Figure 2 - OpenVision HD as shipped misc. components

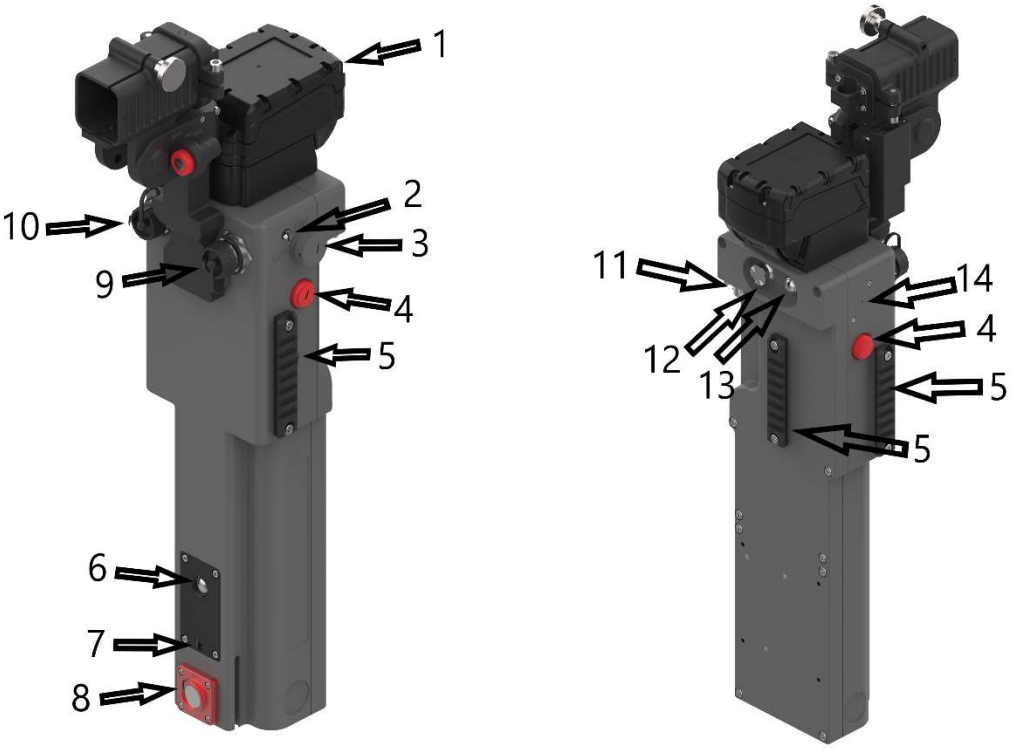
System Overview



Item	Part No.	Description
1	515100	OpenVision HD Main Housing
2	515200	OpenVision HD Detector
3	515300	OpenVision HD C-Arm Assembly
4	515400	OpenVision HD Handle Assembly
5	415600	Backscatter Shield Assembly (Scatter Boot)
6	515500	OpenVision HD Trigger Handle

Figure 3 OpenVision HD Assembly Description

Main Housing



Item	Part No.	Description
1	ELE054	Milwaukee® M18™ Battery
2	---	CPU Power Indicator
3	313056	Controller Key
4	415100-E01	System Status Dialight Indicator
5	RAI002	Picatinny Rail - Short
6	---	Targeting Camera
7	---	Targeting Laser
8	---	X-Ray Collimator
9	415100-E15	HDMI Port 1
10	---	USB Port
11	---	Trigger Connection
12	---	Hat Switch
13	---	Image Capture / Input Button
14	---	Buzzer Speaker

Figure 4 OpenVision HD Main Housing Assembly (Item # 415100-NDT)

HDMI Monitor

The OpenVision HD monitor (Figure 5 and Figure 6) is a lightweight 7-inch HDMI display. It can be connected to either of the two HDMI ports provided on the OpenVision HD via the HDMI cable provided. The monitor comes configured to work with your OpenVision HD system. Spare batteries and a battery charger (Figure 7) are included.

Figure 5 Monitor Assembly

Figure 6 Back of Monitor

Figure 7 Battery Charger

Trigger Assemblies

OpenVision HD comes standard with an adjustable trigger handle (Item # 515500). The trigger handle can be used for X-ray firing and image / video capture. Refer to Figure 9 for the connection location.

Figure 8 Adjustable Trigger Handle (Item # 515500)

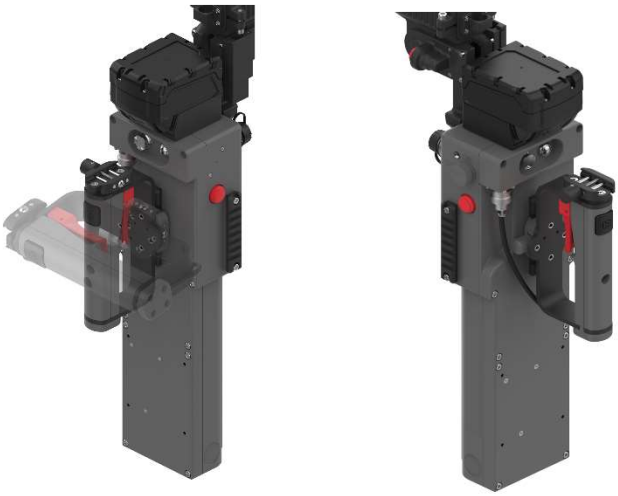


Figure 9 Trigger Handle Assembly Orientation Options

Principles Of Operation.

Radiography uses X-rays or gamma rays passing through a specimen onto an imaging medium (film, digital detector, imaging plate, etc.) on the opposite side. The quality and quantity of radiation reaching the imaging medium is largely determined by the object's thickness and density. Radiation *energy* (X-ray = kV; Gamma Ray = isotope) governs its penetrating power. Radiation *intensity* is governed by current (milliampere or mA) for X-rays, and by content activity (Curie/Becquerel) for radioisotopes.

Radiographic Quality

Radiographic quality depends on an image's photographic (density, contrast) and geometric (definition, distortion) properties. Proper *energy* and *intensity* selection are both essential for producing high-quality radiographs.

Sources (X-Ray & Gamma Ray)

Table 2 Radiation Comparisons

Radiation Source	Energy (Quality)	Intensity (Quantity)
X-Ray	Determined by voltage (kV) Higher kV = shorter wavelength = higher penetration	Determined by tube current (mA) Higher mA = more electrons = more X-rays
Gamma Ray	Determined by type of radioisotope (keV or MeV) Higher isotope energy = increasing penetrating capability: Co-60 > Cs-137 > Ir-192 > Se-75	Determined by radioactivity (Ci/Bq): Gamma Rays produced by unstable nuclei disintegrations Higher Ci = more disintegrations of nuclei = more gamma rays

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Radiation Zones.

Output Radiation Levels

OpenVision™ HD radiation levels vary depending on kV/mA settings. QSA Global, Inc. performs testing at maximum power at the highest kV setting (70 kV, 0.17 mA) to verify collimation and image quality. Operators must be aware of safe boundary distances while using the OpenVision HD. When the main housing is fully expanded (“D” = 53 cm [20.8 in]), the most susceptible area of high dose rate (when specimens do not block entire X-ray output beam) is immediately adjacent to detector housing. The “C” callout in Figure 10 is positioned in this approximate area.

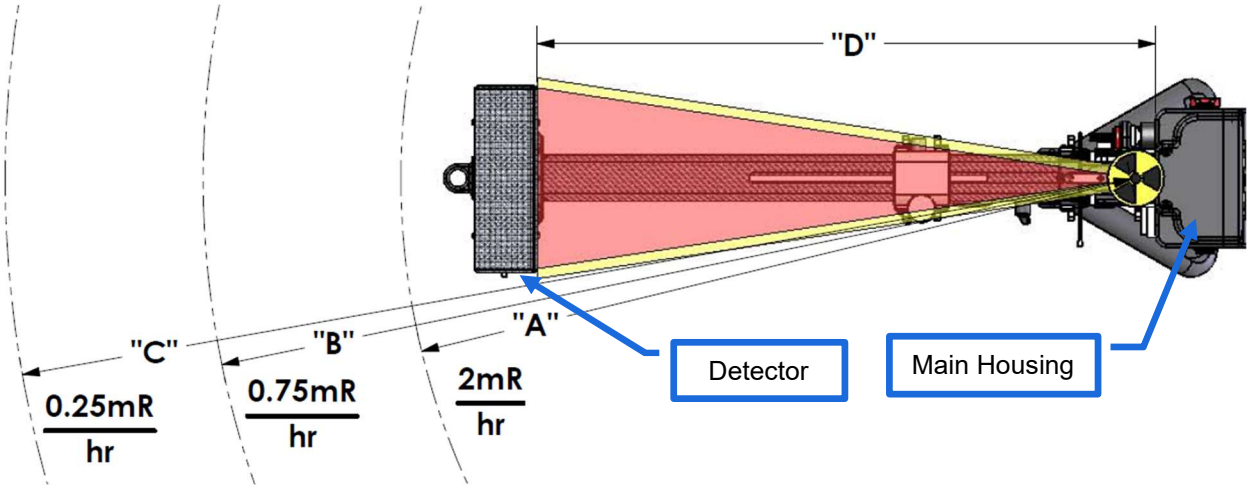


Figure 10 OpenVision HD Output Boundary Distances

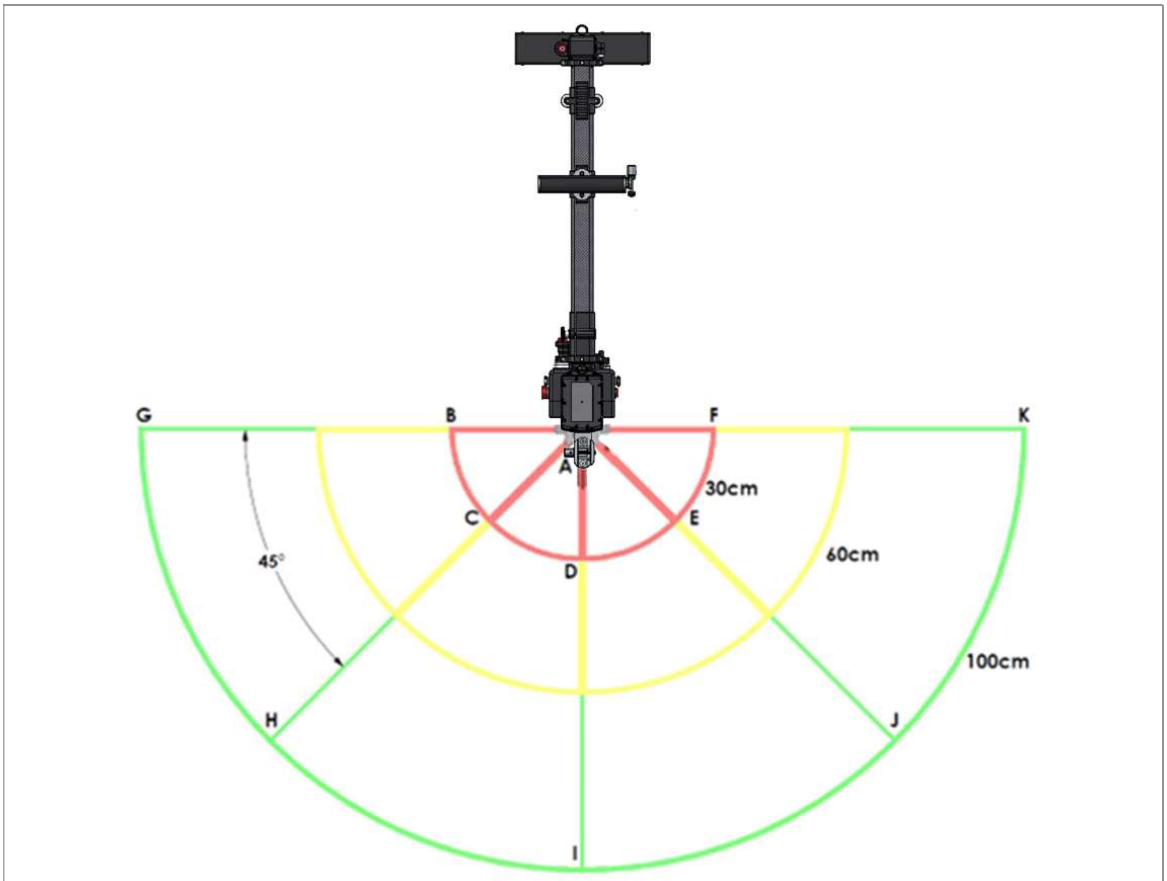
Figure 10 shows boundary distances for 2, 0.75 and 0.25 mR/hr. Table 3 details typical distances for these boundary levels with different operating conditions.

Table 3 Boundary Distance Comparison

Main Housing Distance to Detector (in [cm]) “D”	kV / mA	Boundary Distance (ft [m])		
		2 mR/hr (20 µSv/hr) “A”	0.75 mR/hr (7.5 µSv/hr) “B”	0.25 mR/hr (2.5 µSv/hr) “C”
20.8 [53] (Fully Expanded)	70 / .17	37.84 [11.53]	61.78 [18.83]	107.01 [32.61]
13.8 [35]	70 / .17	9.48 [2.89]	15.48 [4.72]	26.82 [8.17]

Actual measurements can vary based on the material being scanned and its geometry. To minimize operator exposure, QSA Global, Inc. recommends using a backscatter shield assembly (Item # 415600) with your OpenVision HD.

Backscatter Radiation Levels



Survey Point	Without Backscatter Shield mR/Hr (µSv/hr)	With Backscatter Shield in mR/Hr (µSv/hr)
A	1 (10)	1(10)
B	14 (140)	14 (140)
C	15 (150)	6 (60)
D	1 (10)	0 (0)
E	11 (110)	2 (20)
F	12 (120)	7 (70)
G	1 (10)	1 (10)
H	4 (40)	≤BKGD
I	≤BKGD	≤BKGD
J	2 (20)	≤BKGD
K	≤BKGD	≤BKGD

Figure 11 Example Scatter Radiation Survey

Figure 11 shows an example survey of backscatter radiation (user exposure) for a typical sample (**NOTICE:** for reference only; actual readings may vary). The example survey shown in Figure 11 was created with the following conditions:

- 6 in steel pipe
- 2 in calcium silicate insulation
- .040 in [1 mm] thick aluminum cladding
- 70 kV @ 0.17 mA (maximum power at the highest kV level)

See the following section for additional information on backscatter.

Backscatter

Backscatter occurs when X-rays interact with material (piping, insulation, etc.), potentially travelling in undesirable directions (e.g. towards the operator). Backscatter is dependent on many variables including geometry, material, and energy level. It can potentially increase the dose to the operator's extremities.

The best way to minimize backscatter is to use the lowest kV / mA combination to achieve acceptable images. Use of the optional backscatter shield (Figure 12) will help reduce the amount of backscatter when firmly applied to the scanning surface as shown in Figure 14.

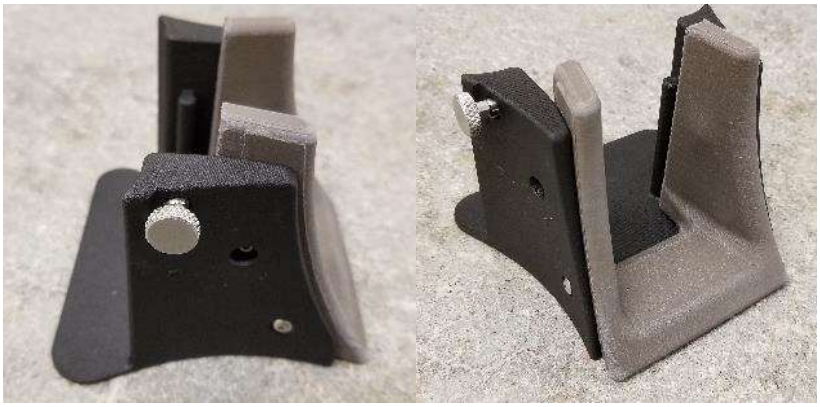


Figure 12 Backscatter Shield (Item # 415600)

CAUTION: Whenever scanning an unknown material and/or geometry, it is recommended that operators monitor for backscatter levels to minimize operator dose.

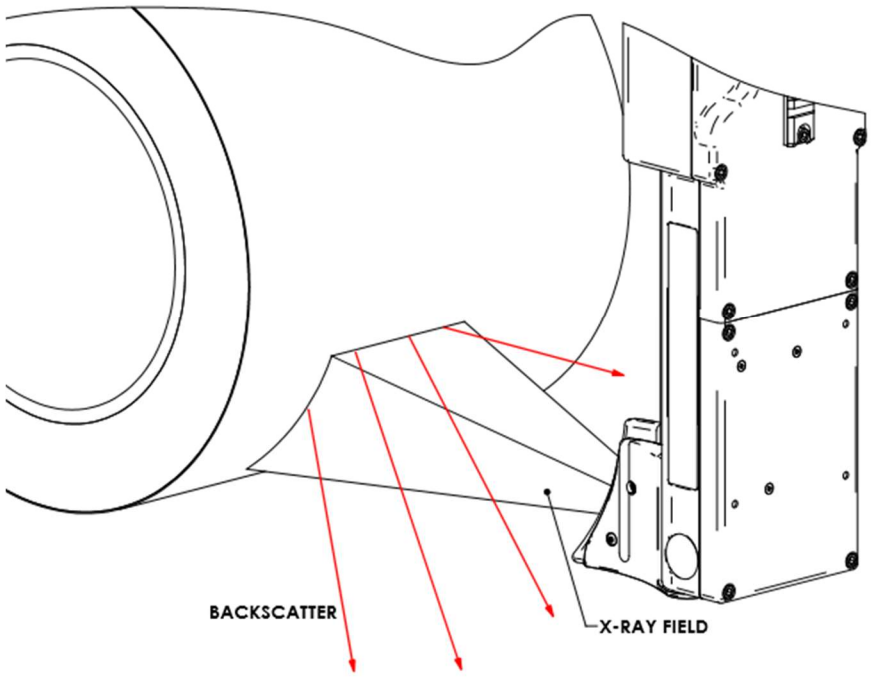


Figure 13 Example of Backscatter

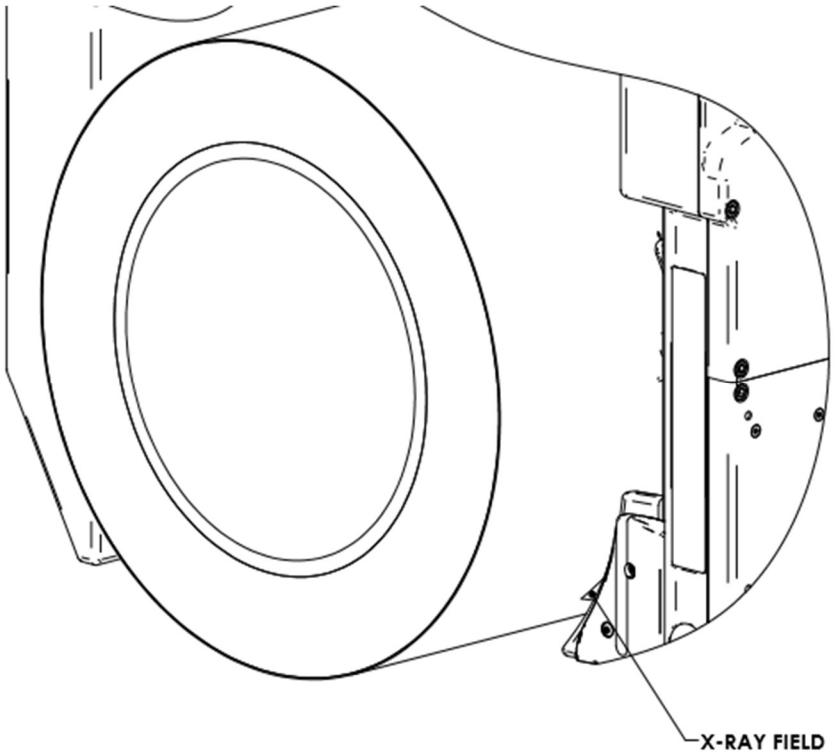


Figure 14 OpenVision HD with backscatter shield properly positioned against insulation sheathing.

Operation.

WARNING

When the key is initially turned to “ON”, the unit will warm up and the system status indicator will turn **AMBER** (see Figure 4). Once the unit has warmed up and is ready to make an exposure, the status indicator will turn **GREEN**. When the trigger is depressed to make an exposure, an audible beep warning every 1 second is generated, and the status indicator will again turn **AMBER** (see Figure 4). The audible beep and the **RED** status indicator light together indicate that ionizing radiation is being produced. The status indicator light will again turn **GREEN** after completion of an exposure once the unit is ready to perform another exposure. The CPU power indicator light will now be **BLUE**. (Note: if the trigger is depressed but the unit is not ready to take an exposure (e.g., no **GREEN** indicator or scatter shield not in place), then the audible alert will trigger for 4-5 beeps then stop, but no x-rays will be produced.)

Once an exposure is successfully initiated, the exposure will continue until either the trigger is released, or 90 seconds have elapsed. The maximum time a single exposure can be performed with this device is 90 seconds after which the device will automatically turn off. The indicator light will again turn **GREEN** after completion of an exposure once the unit is ready to perform another exposure.

NOTE: The device can produce a **RED** status indicator light, but this only occurs when the unit is indicating an operational error.

If you wish to perform extended operations with the OpenVision HD system, ensure that ambient temperatures are below 120 °F (49 °C) and above -20 °F (-29 °C).

Quick Setup / Scanning

After the controller key is turned ON, the System status indicators (located on either side of main housing will turn **GREEN** when the system is ready.

- Unlock main housing by pressing red circular release button and unfold to operating position:

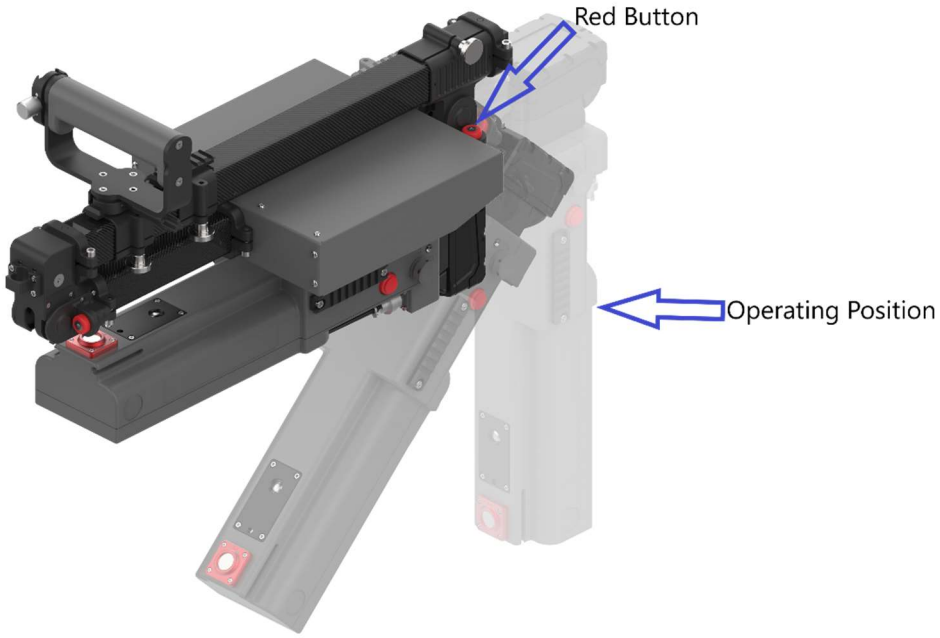


Figure 15 Unlock Main Housing

- Repeat action for detector side:

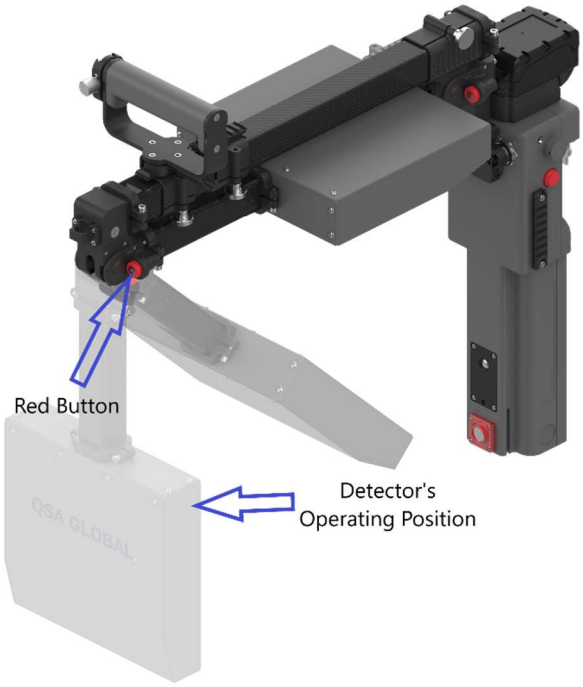


Figure 16 Unlock Detector Side of C-Arm

- Position handles, attach and position pistol grip and monitor mount as desired:

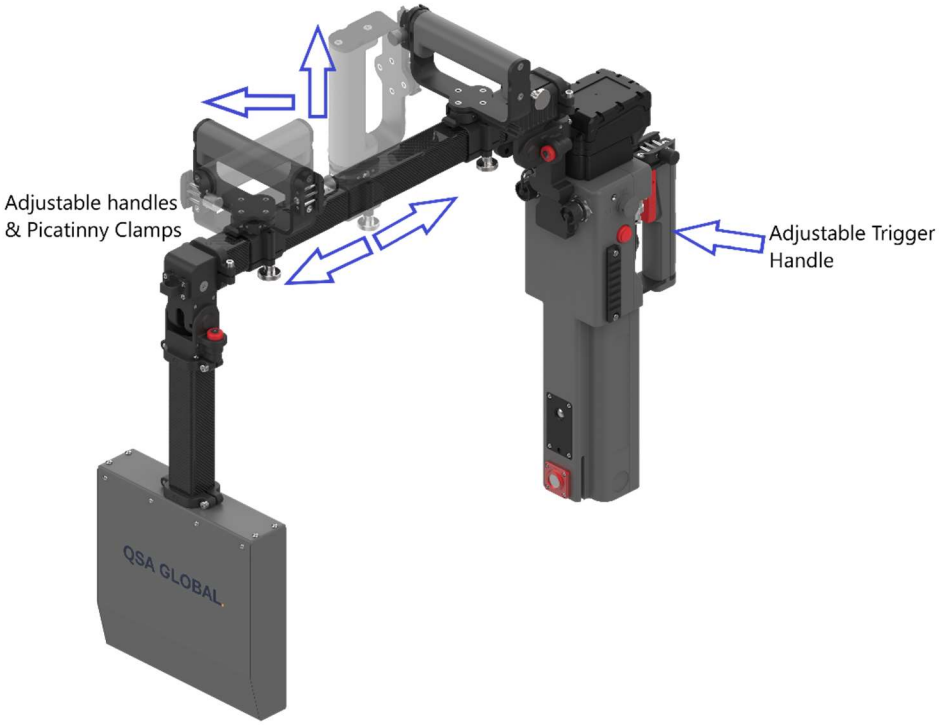


Figure 17 - Handle Adjustments

- The OpenVision HD utilizes standard picatinny rails and allows the handles and grips to be configured in multiple ways to suit different applications (Figure 18) shows one such configuration. The grip is moved to the top tube and the D-handle is moved to the main housing.

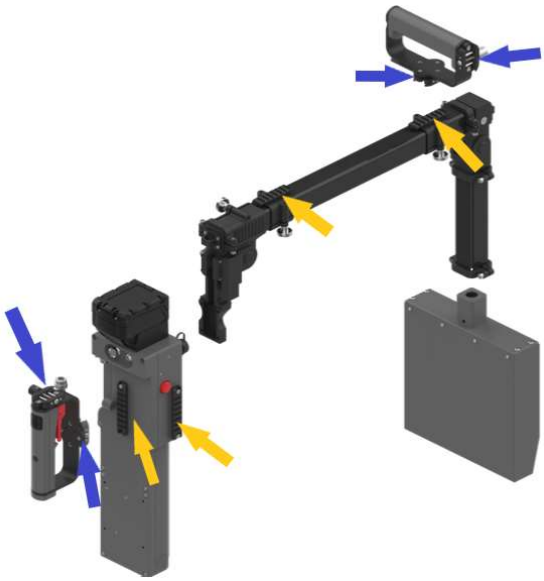


Figure 18 - Optional Handle Configuration Example

- Install the HDMI cable from monitor. Remove cover, install cable into mating connector replace cover.

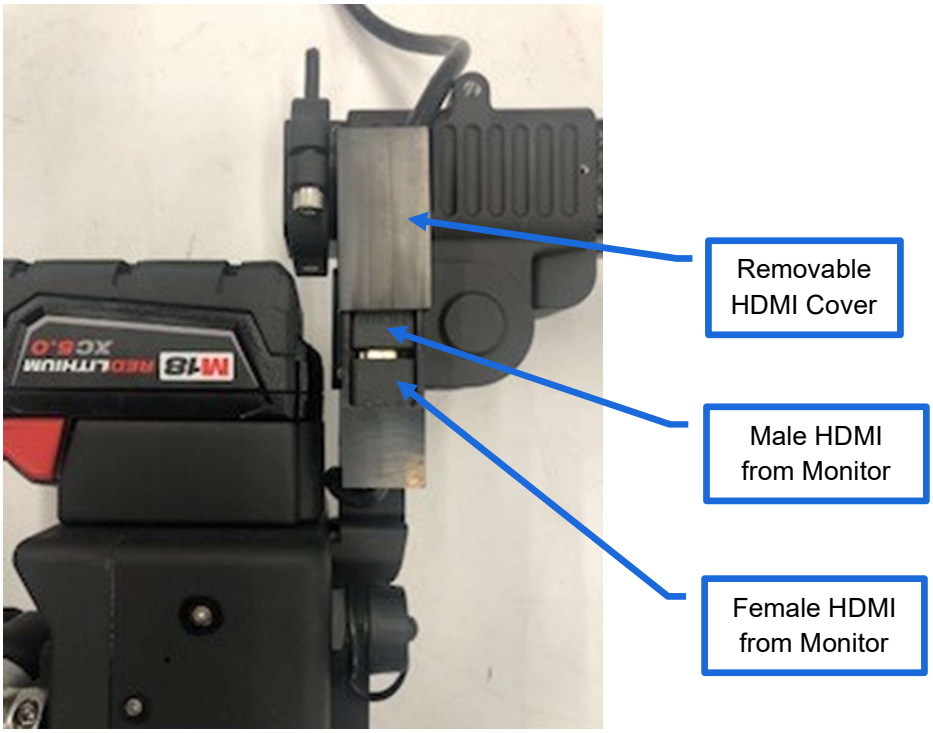


Figure 19 HDMI Cable Installation

- Turn monitor ON (located on upper-right corner of monitor).

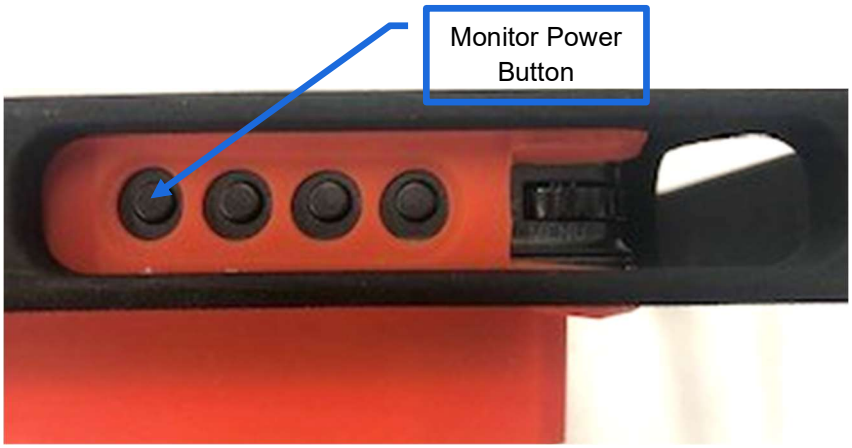


Figure 20 Monitor Power Button

- Install Trigger Switch by pushing up and twisting until it locks into place.

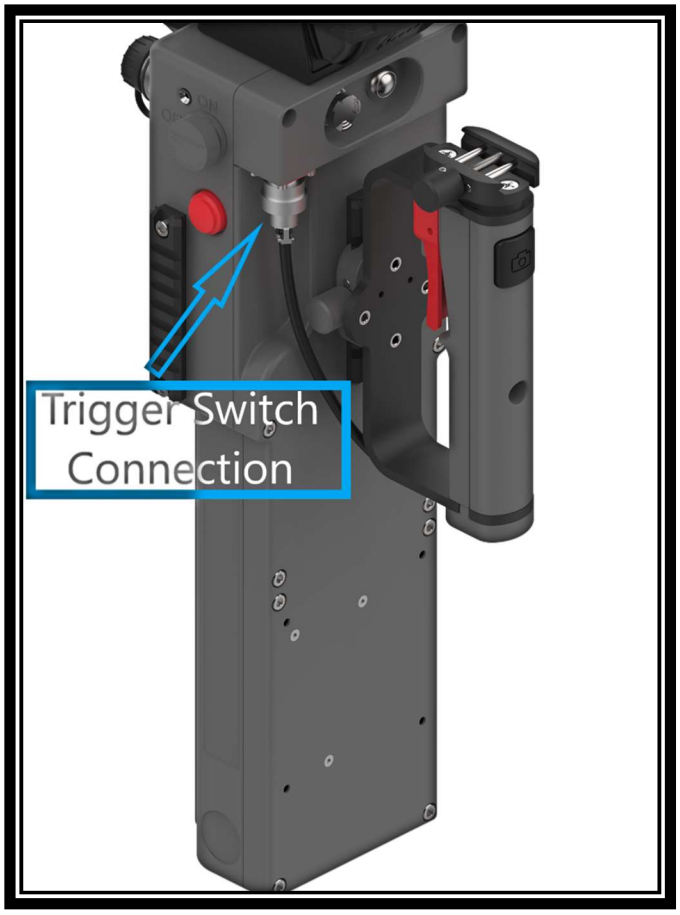


Figure 21 Trigger Switch Connection

- 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.

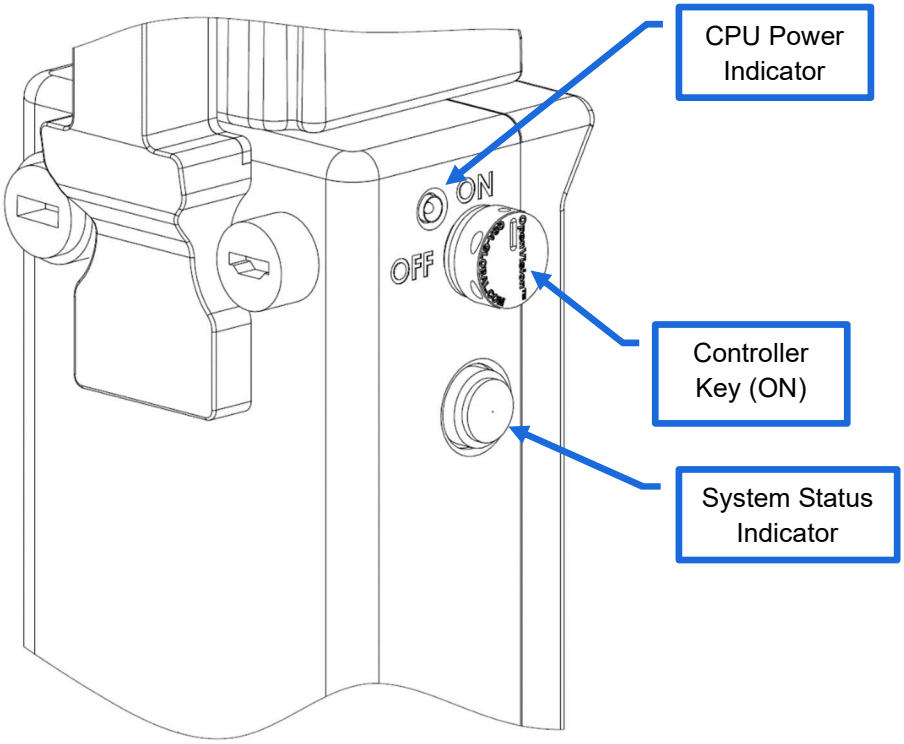


Figure 22 Indicators and Power Switch Details

- Verify kV and mA settings on main status screen.
- Safely perform test shot to verify X-ray functionality.
- During the first exposure after set up, ensure the status indicator light turns **RED** and that the audile beeps are produced during the exposure.

X-Ray Tube Warm Up

If your Openvision HD System has not been run for an extended period of time (60 days or more), you need to perform a Manual Warm Up of the X-Ray Tube as follows in steps 1-6 to avoid machine damage:

To perform a manual warm-up of the X-ray tube:

1. Install the controller key and turn to ON: allow time for system to initialize. While warming up, the status indicator light (located on either side of main housing) will turn AMBER. System status indicator lights will turn **GREEN** when the system is ready.
2. Set the kV and mA to the LOW settings.
3. Turn on x-rays for 30 seconds. Ensure the status indicator light turns from **GREEN** to **RED** and that the audible beeps are produced during the exposure.
4. Reset the kV and mA to the MEDIUM settings.
5. Turn on x-rays for another 30 seconds. Ensure the status indicator light turns from **GREEN** to **RED** and that the audible beeps are produced during the exposure.
6. The unit is now ready to run on any setting – LOW, MEDIUM or HIGH for normal inspection.

If any of the indicators noted in this section do not occur as noted or the machine is operating abnormally, shut down the device and review the information in the Troubleshooting section of this manual. If the issue cannot be resolved after reviewing the Troubleshooting section, then contact QSA Global, Inc. as the unit may require repair prior to further use.

Accessories.

Heads Up Display (HUD)

This accessory (Item #415140) allows for an alternative to a display mounted directly to the OpenVision™ HD system. HUD specifications:

Ballistic Protection Standards:

- U.S. MIL SPEC MIL-PRF-31013
- ANSI Z87.1+
- U.S. Federal OSHA
- CE EN 166 FTKN

Temperature:

- Storage: -4 °F to 140 °F (-20 C – 60 C)
- Operating: 32 °F to 122 °F (0 C – 50 C)

Weight

- 114 g

The display position can be moved in multiple directions based on user preferences:

Figure 23 Available directional adjustments to display

To make slight adjustments to the focus, adjust the diopter to the left or right using your index finger.

Figure 24 Diopter adjustment

The standard configuration provides the image to your right eye. Clear or tinted lenses can be used based on external lighting conditions.

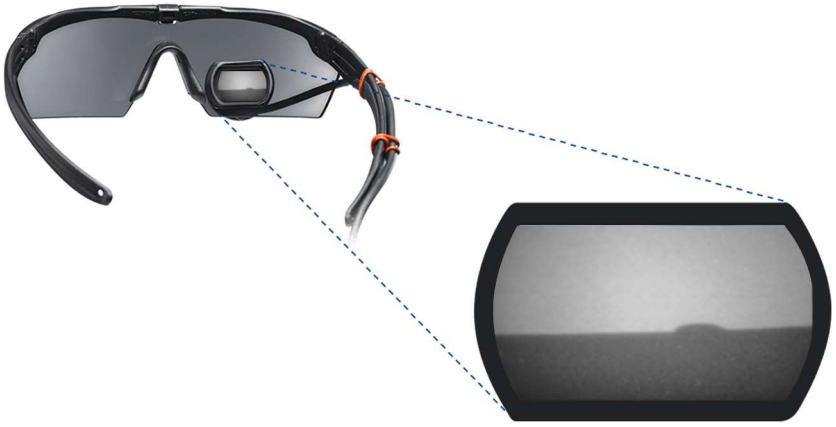
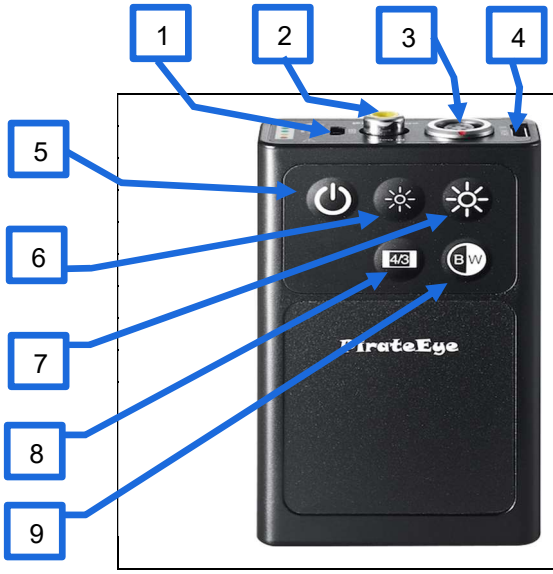


Figure 25 Example image output for HUD



1	Micro-USB charging port *
2	Video input
3	Output to heads-up-display
4	HDMI input
5	Power
6	Reduce brightness
7	Increase brightness
8	Toggle aspect ratio (4:3 / 16:9)**
9	Toggle color / black and white
*	The HUD controller must be charged separately with a USB charger. It is not powered by the OpenVision HD system. Expected battery life is 10 hours.
**	4:3 aspect ratio is recommended

Figure 26 HUD controller and power supply

Handle Options

The OpenVision HD comes standard with Trigger Handle Assembly (Item# 515500) and a non-trigger Handle (Item # 515400). The Trigger Handle and Handle can be swapped to multiple different mounting points depending on the user's preference.

Figure 27 – Item # 515500

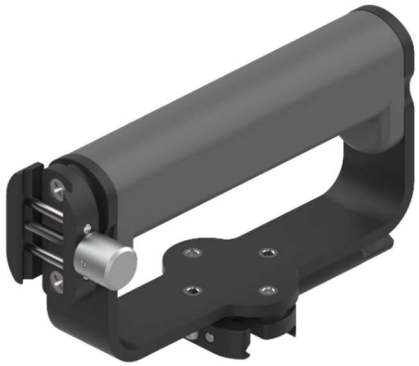


Figure 28 – Item # 515400

Wi-Fi Tablet

The Wi-Fi Tablet assembly (Figure 29) allows for wireless viewing and recording. See the software user manual (MAN-066) for operation instructions.

Figure 29 Wi-Fi Tablet (Item # 415430)

Maintenance.

The OpenVision™ HD 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.
- Detector cover – Check for excessive wear.

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

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

Disposal of X-Ray Equipment.

The OpenVision™ HD contains an x-ray tube which uses a beryllium window. Under normal use conditions, the beryllium in the x-ray tube does not represent an inhalation, ingestion or contact health hazard, however, since beryllium is a potential carcinogen, it must be disposed of in a controlled and safe manner.

Beryllium is normally recycled. In cases where this is not justified, they must be labeled, managed and disposed of in accordance with federal, state and local requirements. It is recommended to contact a commercial e-waste recycler/disposal company for assistance in recycling/disposing of the x-ray tube.

Troubleshooting.

CAUTION

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

The OpenVision™ HD has been designed as a rugged, safe, and reliable system. A series of interlocks and self-checks are built in to ensure safe operation. These checks may trigger an error code which will prevent normal. 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 the 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.
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.

QSA GLOBAL.

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Appendix 1: Parts List.

Part #	Description
OVHD-NDT-70	OpenVision HD System, Complete
515400	OVHD Handle Assembly
415440	OVHD Lightweight Monitor Assembly
415600	OVHD Backscatter Shield Assembly
ELE088	HDMI Cable
ELE054	Milwaukee® M18™ Battery
313056	Controller Key
415140	Pirate Eye Head Mount Display
415430	Tablet Assembly