

***HDMag***<sup>®</sup>

High-Magnification Inspection Station  
User's Guide

Freedom Scientific, Inc.

440634-001 Revision C

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## **Technical Support**

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## HDMag at a Glance

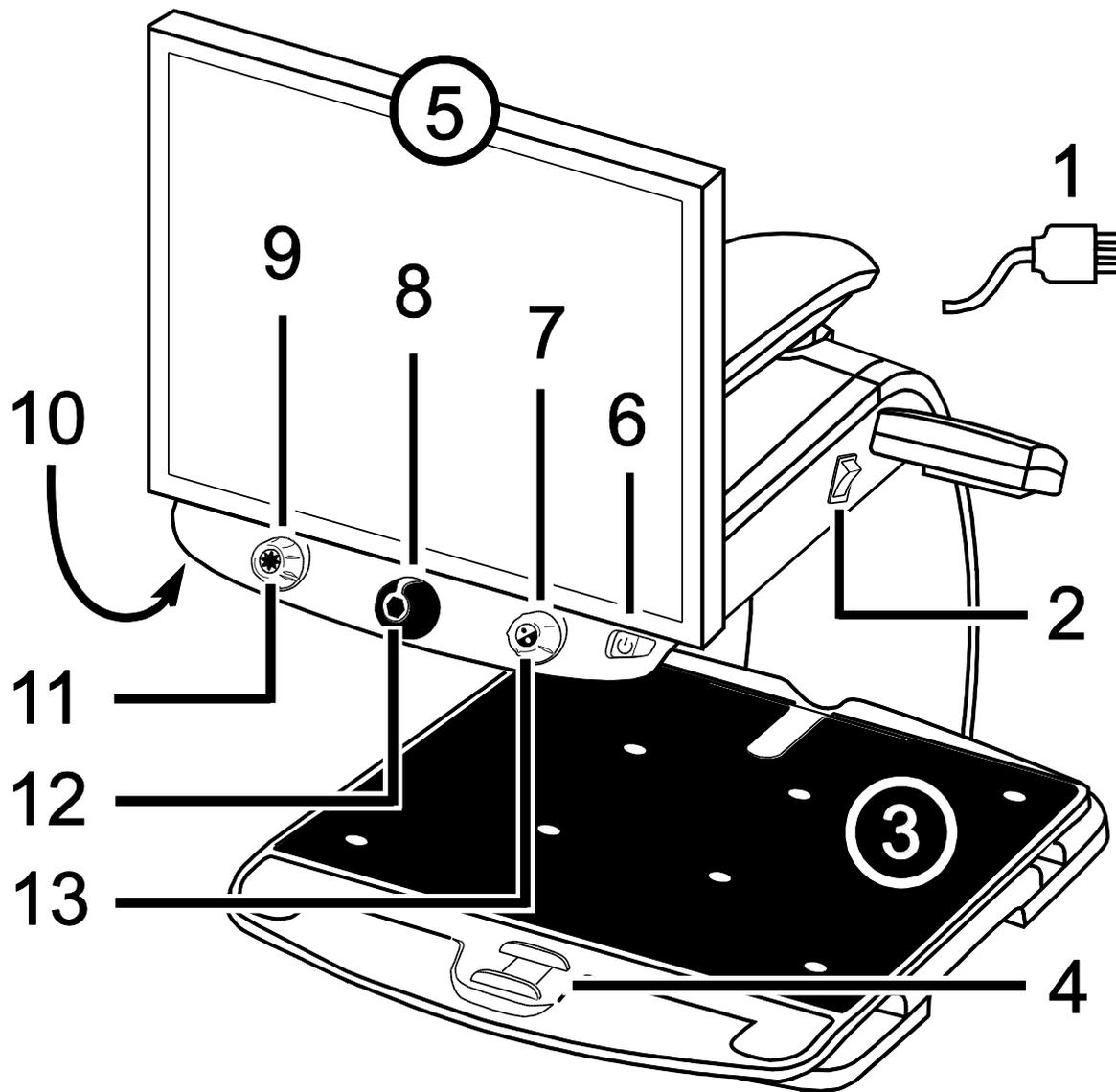
The HDMag<sup>®</sup> High-Magnification Inspection Station uses a high-definition camera to produce a clear picture with sharp images. Its large monitor and easy glide XY table provide for hands free inspection while also reducing eyestrain.

The HDMag includes the following features.

- Auto Focus, which creates the clearest view without any need to make adjustments
- 16 magnification levels depending on your monitor size
- Large LCD flat panel monitor allows for hands free inspection
- Monitor height and angle can be adjusted for the best view as well as more neck and upper back comfort when viewing
- Easy lighting controls to illuminate and adjust brightness of objects displayed on the screen
- Two sets of LED lights to provide optimum lighting of any object placed on the XY table
- Adjustable intensity LED lighting
- A large low-friction XY table that moves in multiple directions to conveniently view objects
- The XY table's braking mechanism lets you lock the table movement down tight when you want it to hold steady

- The XY table has eight #10-32 threaded screw holes to accommodate custom jigs and fixtures
- Four video color modes that allow for high contrast viewing: full color; gray scale; black on white; and white on black

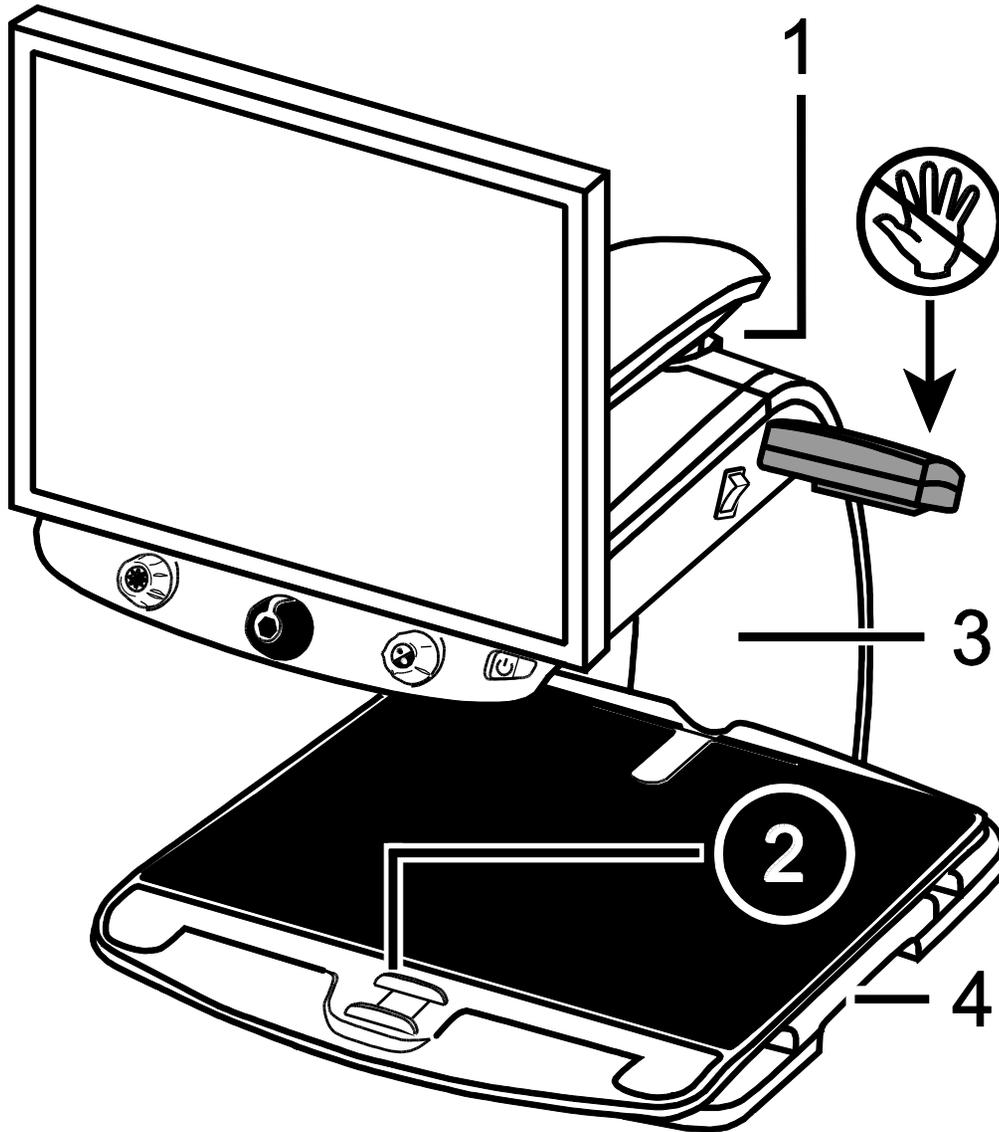
# Hardware Description



1. Power Cord
2. Master Power Switch
3. XY Table
4. Brake
5. Monitor
6. Power Button
7. Manual Focus Dial / Color Mode Dial
8. Magnification Dial
9. Brightness Dial
10. Focus Lock Button (bottom of control panel)
11. Find Button
12. Freeze Frame Button
13. Reference Line Button / Computer View Toggle Button

## Transporting and Moving HDMag

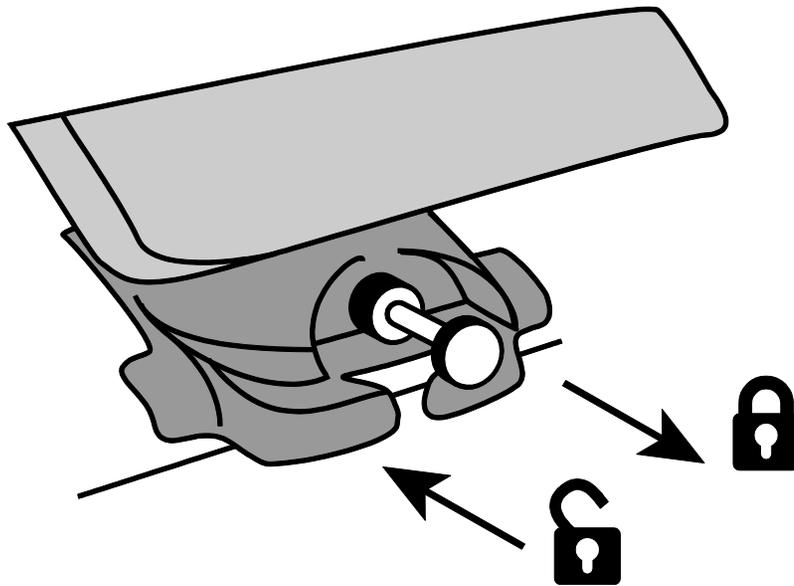
Use this image and the text on pages 5 and 6 to lift, carry, and position the HDMag.



1. Monitor Arm Lock
2. Brake
3. Rear Post
4. Repositioning Grips

**Note:** Do NOT lift HDMag by the rear LED lights.

1. Lock the monitor arm to secure and prevent the monitor from moving to the left or right.



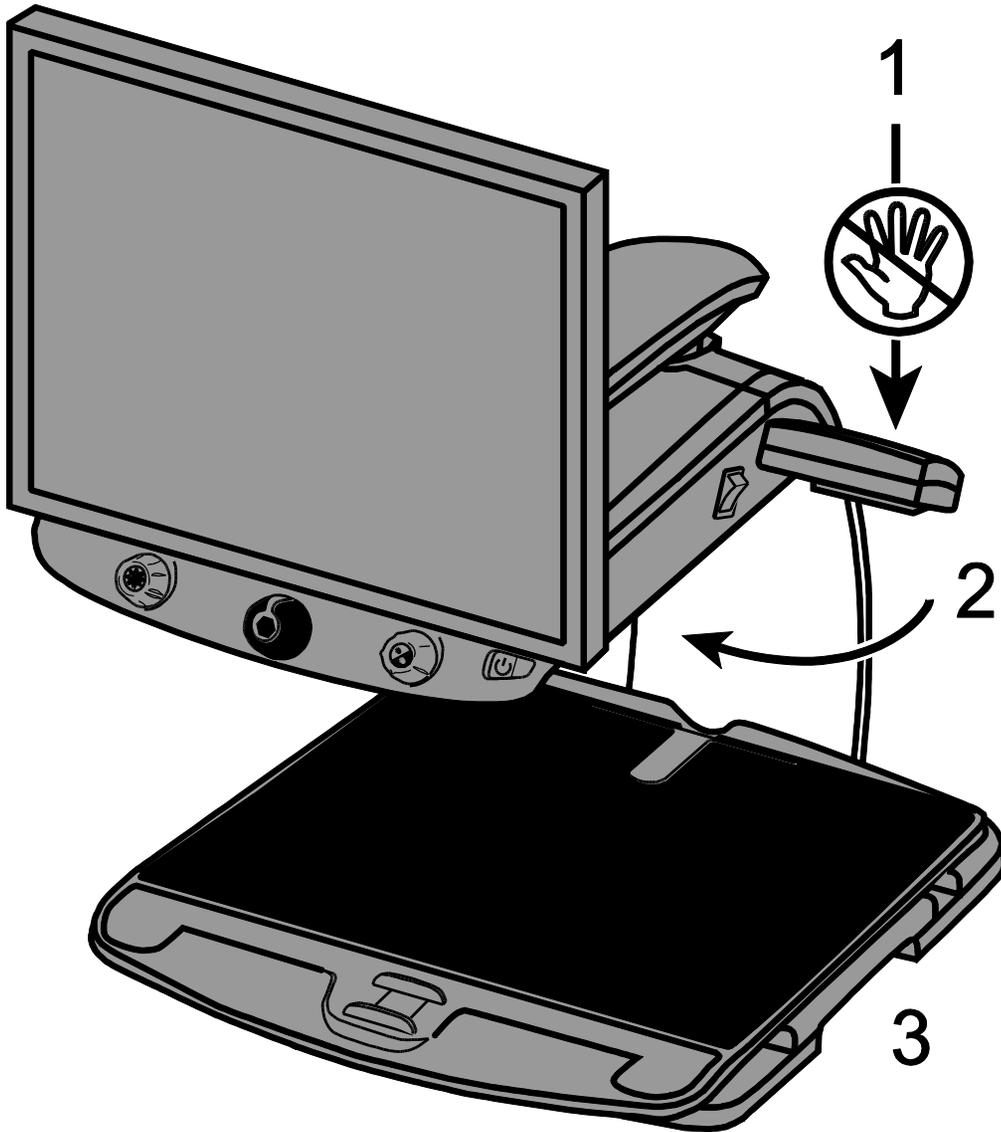
Pull pin out to lock.

**Note:** Monitor arm must be in center position before pins lock.

Push pin in to unlock.

2. Lock the **XY table** to stop it from moving by pushing the red brake lock away from the unit.
3. Lift and transport the HDMag by the **rear post** to move it to a sturdy surface such as a table, desk, or countertop. One suggested method is to wrap your forearm around the rear post and then lift as shown in the next figure.

**Important: Do NOT lift HDMag by the rear LED lights.**



Do NOT lift by the rear LED lights.

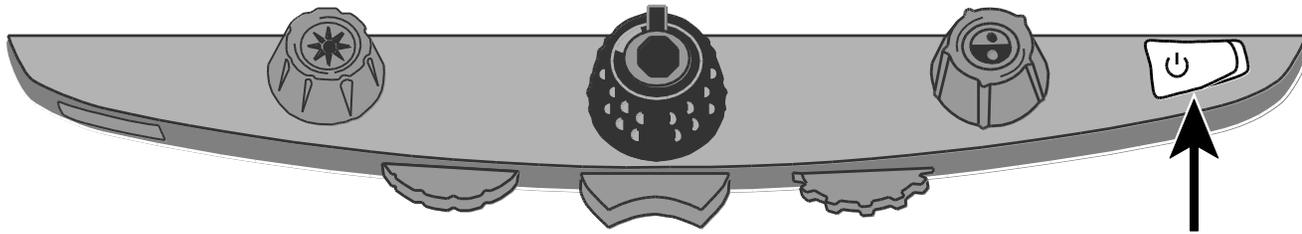
Wrap forearm around rear post and lift to transport.

Use the repositioning grips to slide and move the unit to where you want it on the desk.

4. Use the **repositioning grips** on both sides of the XY table to move and position the unit to your liking once it is on a sturdy surface.

## HDMag Power and Monitor Adjustment

1. Plug the **power cord** from the middle power connector on the rear of the HDMag to an electrical wall outlet.
2. Press the **white master power switch** located near the LED light on the right side of the unit.
3. Press the **green standby power switch** on the right side of the control panel.

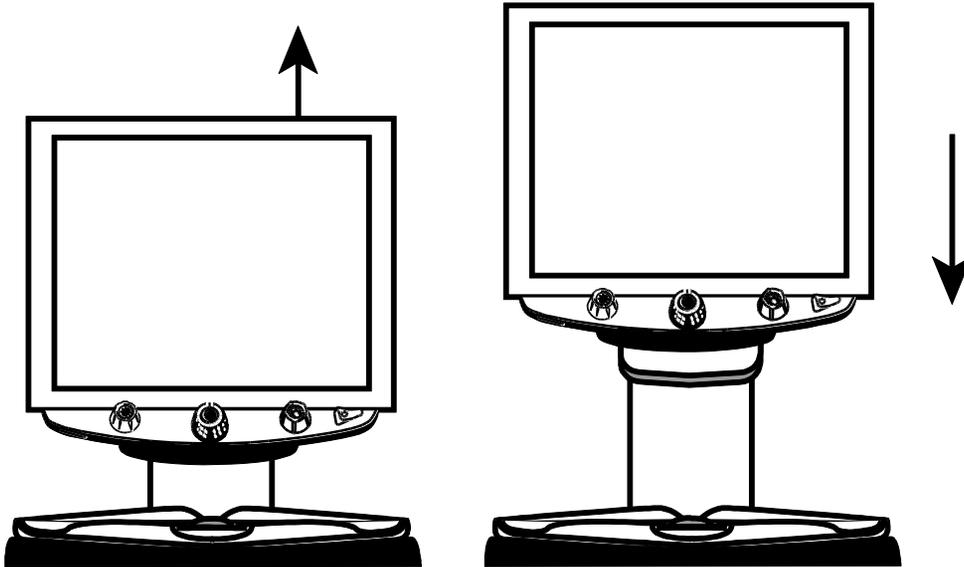


**Note:** If the monitor screen remains blank, make sure that the monitor is turned on.

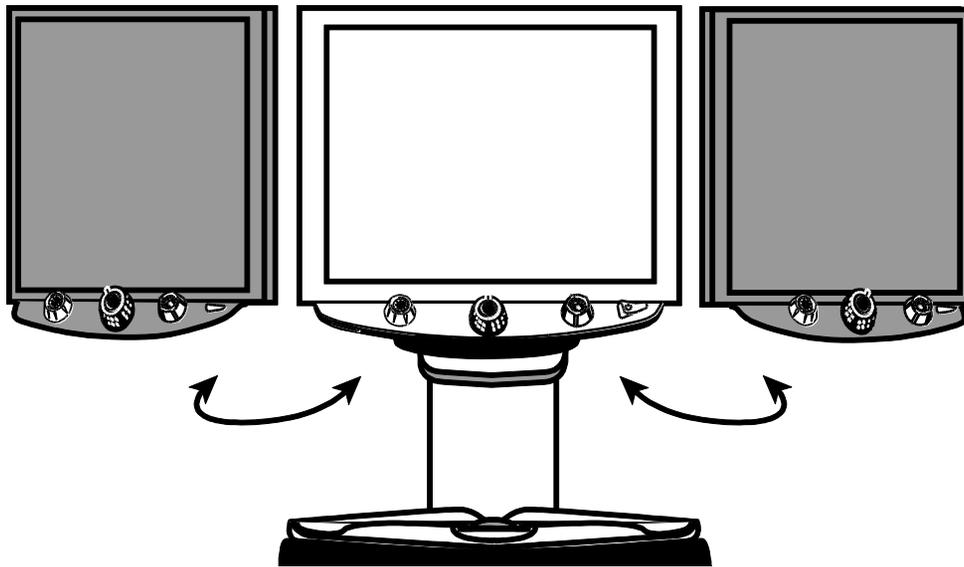
4. Hold the sides of the monitor with both hands and move it up or down to change the height, or turn the monitor left or right to adjust the angle for the best view.

If the monitor does not move to the left or right, make sure to release the arm lock (push the locking pin in) located at the base of the monitor arm. Also, make sure that the monitor is raised up so that it freely moves from left to right.

For arm lock information, refer to *Transporting and Moving HDMag* as previously mentioned in this document.



Moving the monitor up or down.



Turning the monitor left or right. Always unlock the monitor arm before turning the monitor left or right.

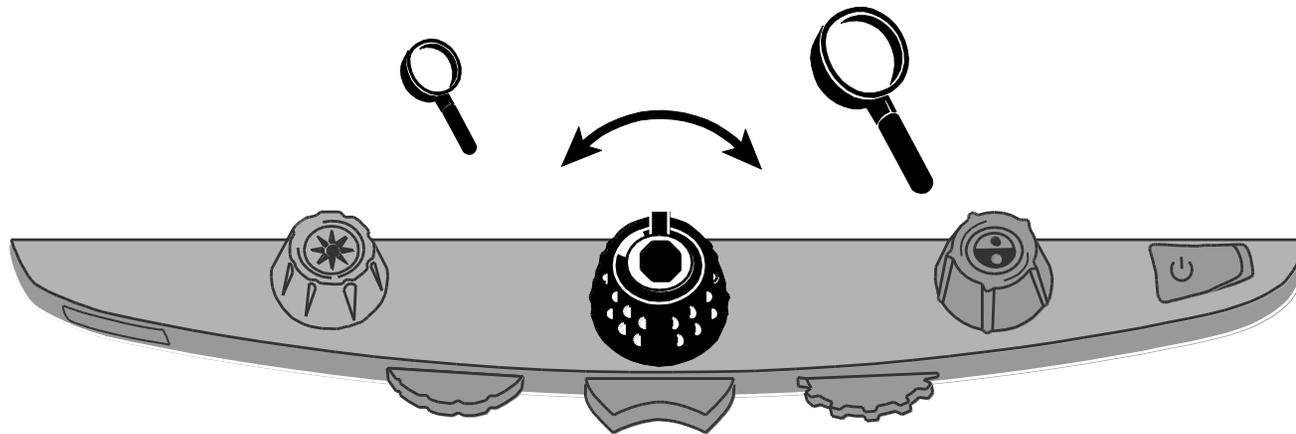
# Magnifying Objects

## Positioning an Object and Adjusting Screen Brightness

1. Place the item that you want to magnify onto the center of the XY table. There is also an indentation located at the rear of the XY table to hold cylindrical objects in place. This prevents an item from rolling on the table.

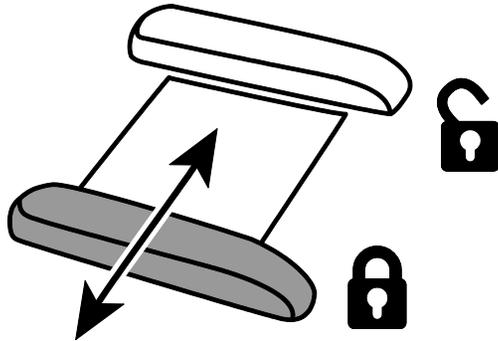
**Note:** If you are using a custom jig or fixture to hold an item, use the appropriate screw holes in the XY table to position the item and keep it in place. The table has eight #10-32 threaded screw holes.

2. Turn the **black Magnification dial** to adjust magnification.



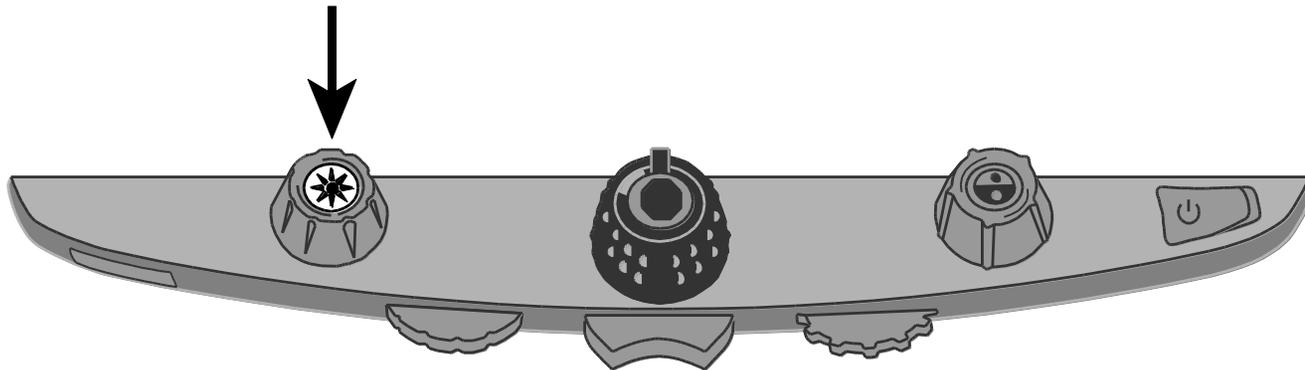
Sixteen magnification values are available as you turn the dial. These values vary based on the HDMag model you are using. For more information, refer to *Appendix E – Magnification Tables* later in this document.

3. Unlock the **XY table** to move it in any direction so that you can better position and display the item on the screen for easier viewing.



4. Press and hold the **Find button** located in the center of the **yellow Brightness dial** to zoom out and see more of the item. A set of crosshairs display on the screen. Move the XY table and use the crosshairs to center and view a new area of the item displayed on the screen.

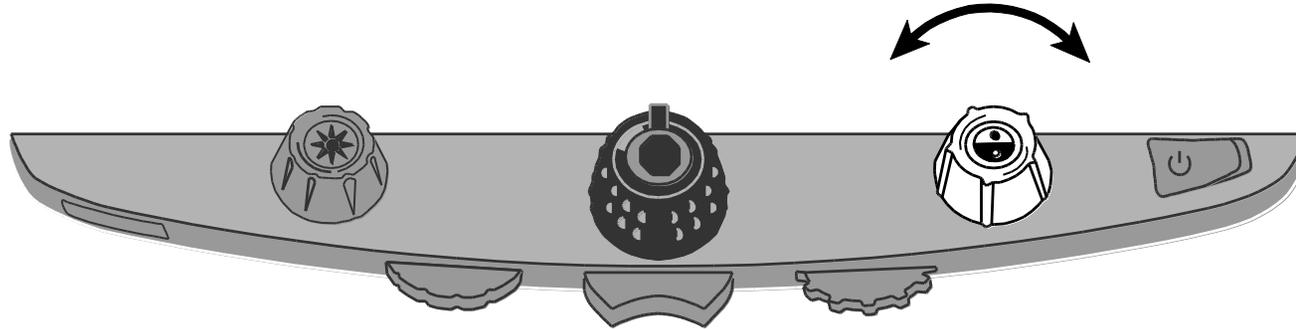
Release the **Find button** to turn off the crosshairs and zoom in to the new area.



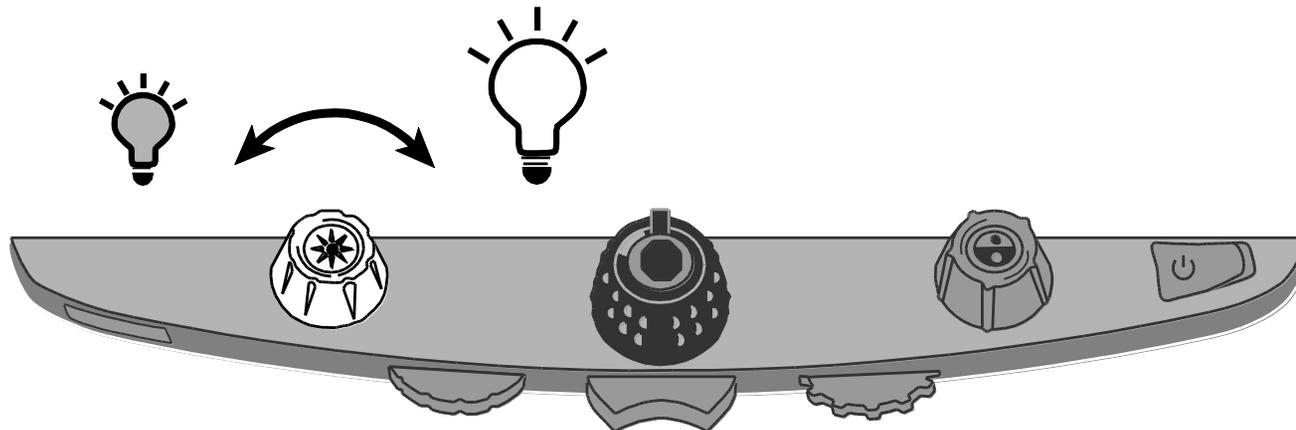
5. Lock the **XY table** to prevent accidental movement.

6. If necessary, turn the **blue dial** to choose a color mode that provides the best screen view. Default color modes are full color; gray scale; black on white; and white on black.

**Note:** When Focus Lock is off, the **blue dial** selects color modes. For more about Focus Lock, refer to *Using Manual Focus* in the next section.



7. If necessary, turn the **yellow Brightness dial** to adjust screen brightness.



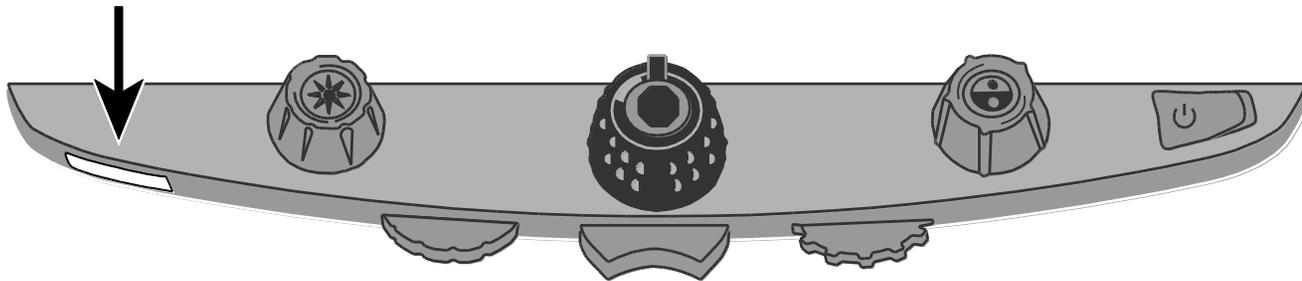
**Note:** HDMag has two sets of LED lights to illuminate the XY table. For more information, refer to *HDMag LED Lights*.

## Using Manual Focus

By default, the camera automatically focuses on the closest object in view. However, when viewing a three-dimensional object on the XY table, you can turn the **blue Manual Focus dial** to adjust the focus on specific areas of the object. For example, this is useful if you are looking at a chip on a circuit board and you first want to inspect the solder joints, and then adjust focus to view the top or other areas of the chip. Manual focus allows for great flexibility when viewing items of varying depth.

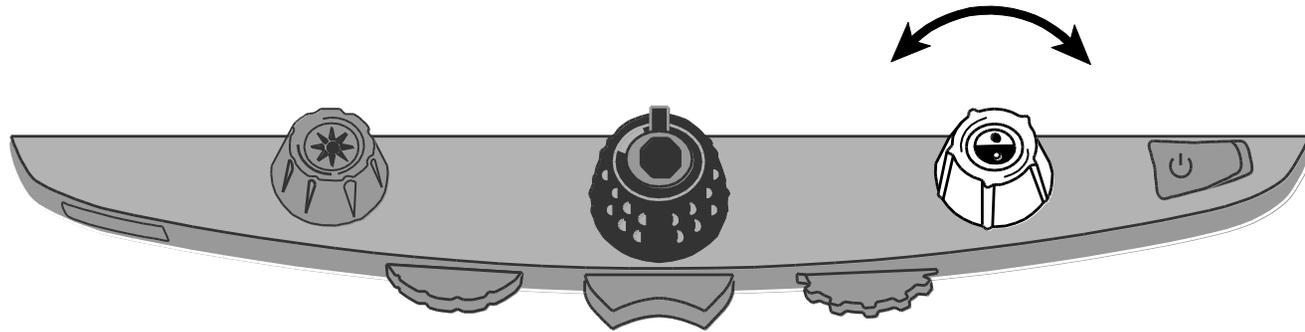
To use manual focus, do the following.

1. Press the **red Focus Lock button** once to turn on Focus Lock. The padlock icon appears on the screen: .



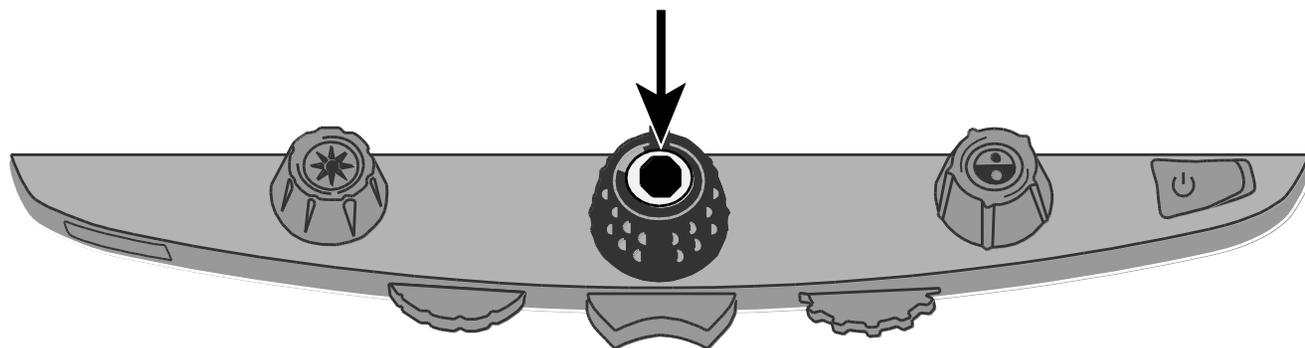
2. Turn the **blue Manual Focus dial** to sharpen focus on a particular area of the object displayed on the screen.

**Note:** Focus Lock must be on to use manual focus.



3. You can press the **Freeze Frame button** located in the center of the **black Magnification dial** to freeze the current image on the screen.

Press the **Freeze Frame button** again to return to the live view.



4. To turn off manual focus and restore automatic focus, press the **red Focus Lock button** again.

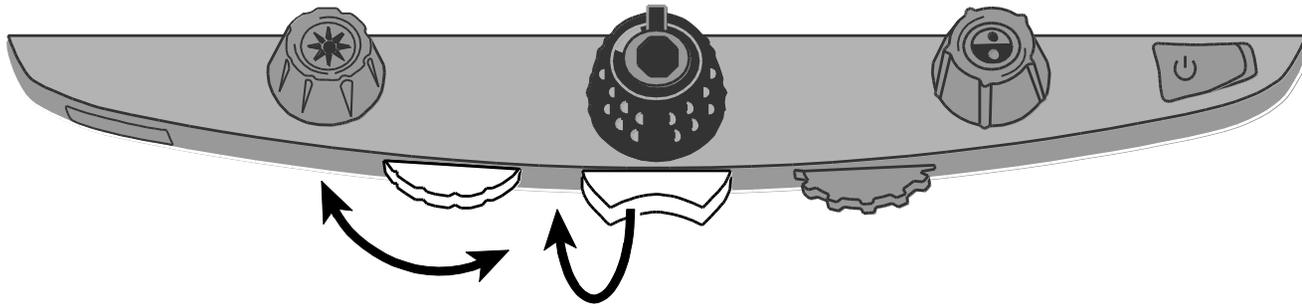
## HDMag LED Lights

HDMag has two sets of LED lights – the rear lights and the ring light – designed to illuminate items placed on the XY table. You can easily adjust the intensity of this lighting using the control panel's purple adjustment wheels. If an item is too shiny or reflective to view easily, you can adjust brightness or turn off the lights.

### Rear LED Lights

The rear LED lights extend from both sides of the camera module. To turn the lights on or off, and adjust brightness, do the following.

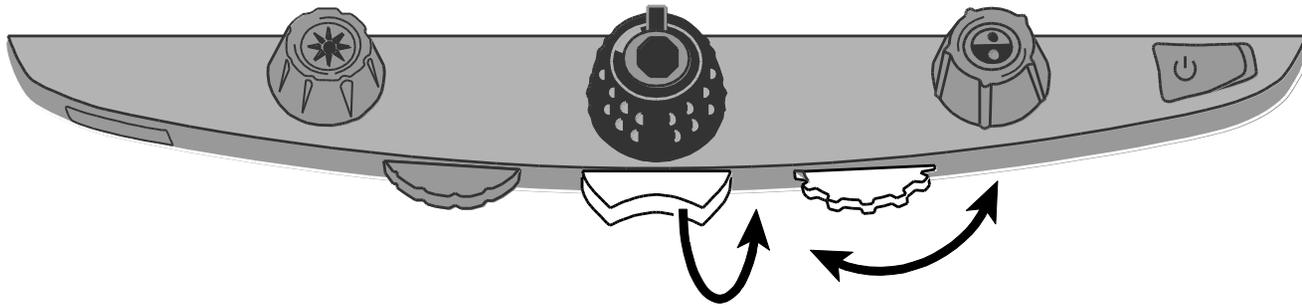
1. Press the center **purple light switch** to the left to turn on or off the rear lights.
2. Use the left **purple brightness wheel** to adjust brightness. Turn the wheel clockwise to increase brightness. Turn the wheel counterclockwise to decrease brightness.



## Ring LED Light

The ring LED light is a series of LEDs around the perimeter of the camera window that faces down onto the XY table. To turn the lights on or off, and adjust brightness, do the following.

1. Press the center **purple light switch** to the right to turn on or off the ring LED light.
2. Use the **right purple brightness** wheel to adjust brightness. Turn the wheel clockwise to increase brightness. Turn the wheel counterclockwise to decrease brightness.



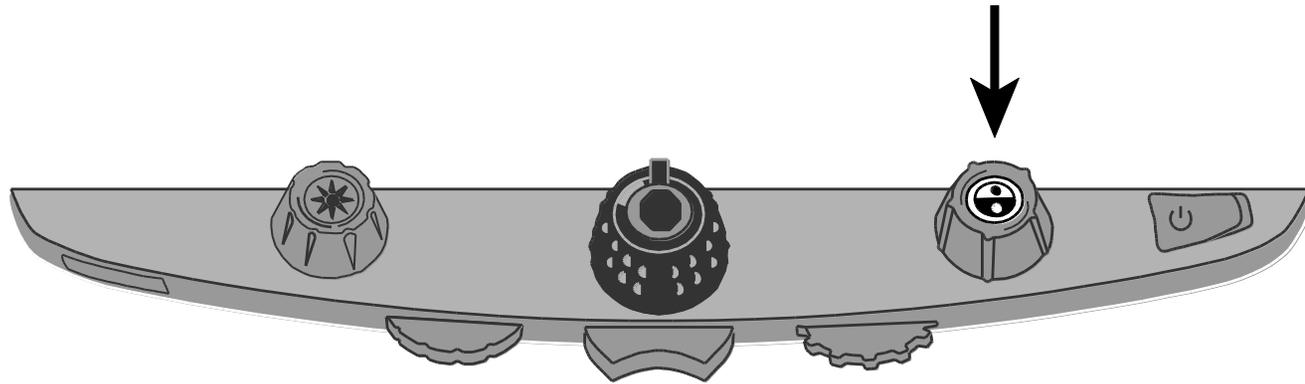
## Using the Reference Line

The reference line is a single horizontal line that displays on the screen to help you maintain your place while viewing an item on the XY table. It is useful when moving the XY table to scroll the item across the screen.

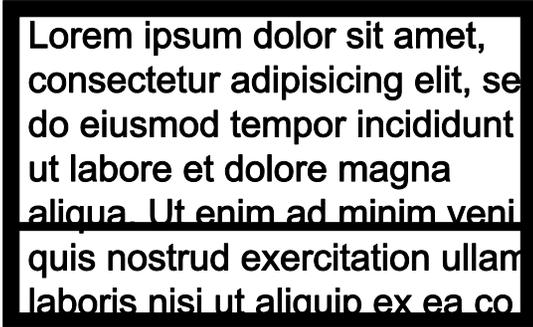
**Note:** The reference line is not available when HDMag is connected to your computer using the VGA connector.

To use the reference line, do the following:

1. Press the center of the **blue Manual Focus dial** to place a horizontal line across the screen.



The line displays approximately one third of the way up from the bottom of the screen.



Lorem ipsum dolor sit amet,  
consectetur adipisicing elit, se  
do eiusmod tempor incididunt  
ut labore et dolore magna  
aliqua. Ut enim ad minim veni  
quis nostrud exercitation ullam  
laboris nisi ut aliquip ex ea co

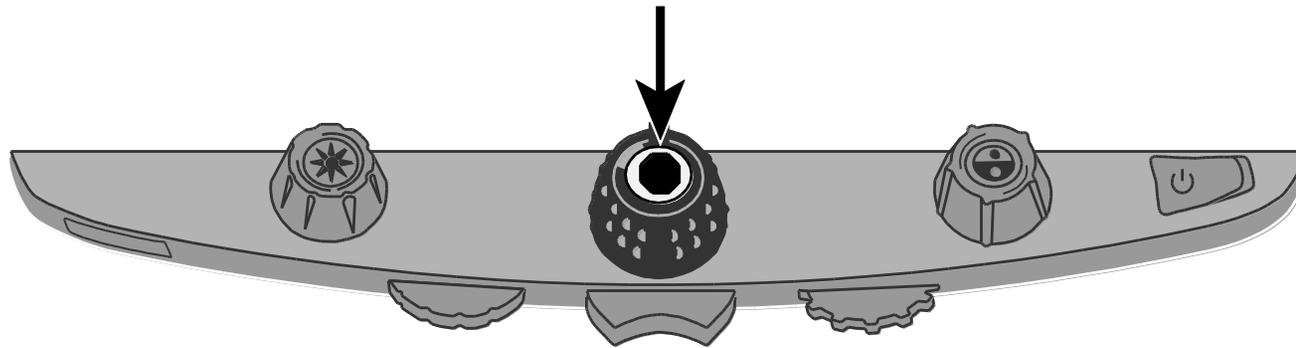
2. If necessary, unlock and move the XY table to display a different area of the item on the screen.
3. To remove the reference line from the screen, press the center of the **blue Manual Focus dial** again.

## Capturing an Image with HDMag Software

HDMag Software lets you view, capture, and save magnified images from HDMag to your computer. You can quickly and easily step through or jump to multiple images captured by the software.

When running the HDMag Software, you can capture images using the **Freeze Frame button** on the unit's control panel.

1. Press and hold the **Freeze Frame button** (center of **black Magnification dial**) for approximately one to three seconds.



2. When the image is captured:

- The HDMag hardware freezes the current image on its screen. The Freeze Frame icon (||) also displays in the lower left corner of the screen.
- An audible sound is made by the HDMag Software
- The captured image is automatically saved and displays in the Video window in the software's Picture view
- Its file name consists of the base name prefix, and the date and time, for example, HDMag YY-MM-DD HH\_MM\_SS
- A logo file will display if logos are enabled using the Logo preference settings
- If any tags are set to "Prompt for Changes," a dialog box displays so that you can create or edit an existing tag

Refer to the HDMag Software's help file for more information about software operation.

3. Press the control panel's **Freeze Frame button** again to clear the Freeze Frame icon and return to live view.

# Appendix A – Changing HDMag Settings

## General Navigation

The Configuration menu allows you to change HDMag settings. The following table describes buttons and dials used to select and move through settings.

<b>Red Focus Lock button</b>	<ul style="list-style-type: none"><li>■ Press and hold to open and quit the Configuration menu</li><li>■ Press to move to the next item</li></ul>
<b>Center of Black Magnification dial</b>	<ul style="list-style-type: none"><li>■ Press to select (✓) or clear (✗) a setting</li><li>■ Press to select different values for a setting</li></ul>

## Opening Configuration Menu and Editing HDMag Settings

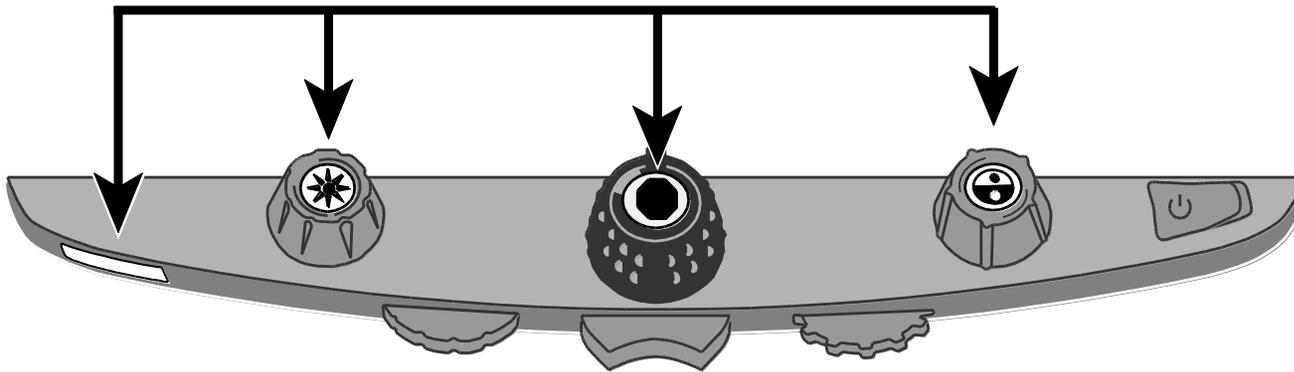
1. Press and hold the **red Focus Lock button** for approximately 10 seconds to open the Configuration menu. (Press and hold the button again at any time to quit the Configuration menu and save your settings.)
2. The Freeze Frame setting (||) displays on the screen. It is selected (✓) by default.

To turn off Freeze Frame, press the center of the **black Magnification dial**. The clear icon (✗) displays indicating that the setting is off.

3. Press the **red Focus Lock button** to step to Focus Lock: . It is selected by default.  
To turn off Focus Lock, press the center of the **black Magnification dial**.
4. Press the **red Focus Lock button** to step to Find: .  
To turn off Find, press the center of the **black Magnification dial**.
5. Press the **red Focus Lock button** to step to Reference Line: . It is selected by default.  
To turn off Reference Line, press the center of the **black Magnification dial**.
6. Press and hold the **red Focus Lock button** for 10 seconds to quit the Configuration menu and save changes.

## Reset Factory Default Settings

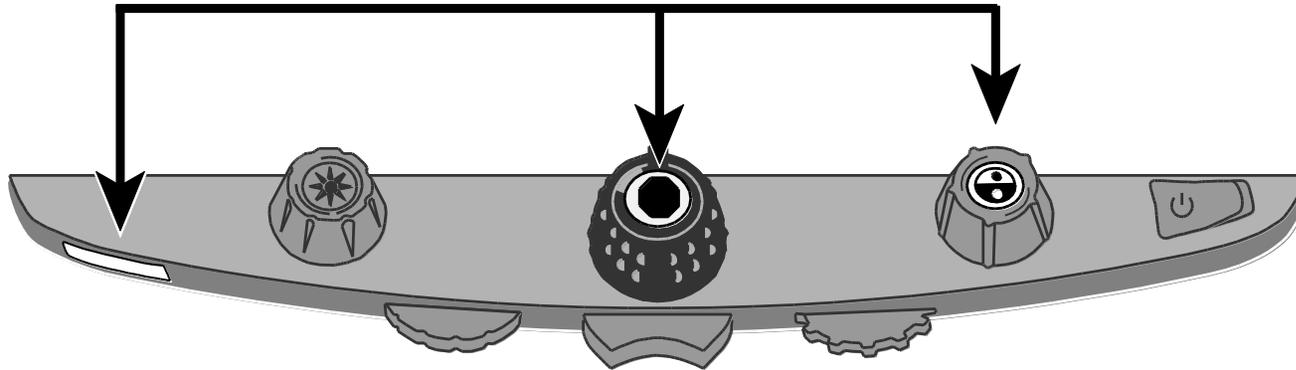
Press and hold the following dials and buttons simultaneously for 10 seconds to reset HDMag to its default factory settings. Release the dials and buttons when the screen goes blank.



- Red **Focus Lock** button
- Center of yellow **Brightness** dial
- Center of black **Magnification** dial
- Center of blue **Manual Focus** dial

## Display Firmware Version Number

Press and hold the following dials and buttons simultaneously for five seconds to display the firmware version number. The word **Ver.** followed by several sets of numbers flash one at a time on the screen. The first three sets indicate the unit's firmware version.



- Red **Focus Lock** button
- Center of black **Magnification** dial
- Center of blue **Manual Focus** dial

# Appendix B – Using HDMag as Your Computer Monitor

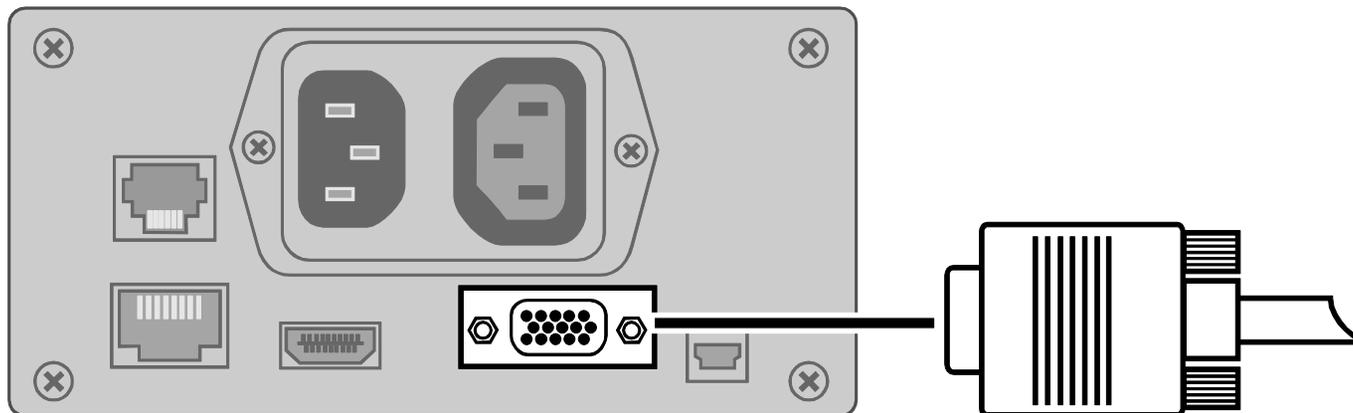
## Computer to HDMag through VGA

You can connect HDMag directly to your computer and use it as your primary monitor. When connected, you can always switch back to the camera view by pressing the center of the **blue Manual Focus dial**.

### Important:

Connecting HDMag to a computer requires a 15-pin VGA video cable. Count the number of pins, and make sure the video cable has all 15 pins. Anything less will not work.

1. Turn off both HDMag and your computer.
2. Connect one end of a VGA (video) cable to the video port on your computer. Refer to your computer documentation for the location of this port. Connect the other end of the cable to the VGA connector on HDMag as shown below.



3. Turn on HDMag and then your computer.

The video signal from your computer now goes to HDMag making it your computer monitor.

4. When using a laptop computer, make sure to turn on the laptop's VGA port. This is typically done by pressing and holding the **Fn** key along with one of the function keys ranging from **F1** to **F12**. Refer to your computer documentation for the correct function key.

Pressing this key combination usually cycles between seeing what appears only on the laptop screen, the external monitor's screen (HDMag), and both screens simultaneously.

5. Press the center of the **blue dial** to cycle the view between your computer and the HDMag camera. The computer view displays what you are running on your computer. The camera view displays items that are on the XY table.

When the camera view displays on the HDMag monitor, you can use all HDMag functionality. This includes changing magnification, selecting different color modes, changing brightness, and so on.

When the computer view displays on the HDMag monitor, HDMag functionality is disabled.

**Note:** If the image on your monitor is distorted in some way, for example, the screen is compressed horizontally or is skewed, or the screen is wavy, dull, or flickering, you may need to change the current screen resolution set on your computer. Refer to *Screen Resolutions* in the next section for a list of supported resolutions.

## Screen Resolutions

Below are screen resolutions supported for the following HDMag models. Black shaded cells indicate the recommended settings.

HDMag 24-inch	HDMag 22-inch	HDMag 20-inch	HDMag 17-inch
640 x 480p at 60Hz	720 x 400p at 70Hz	640 x 480p at 60Hz	640 x 480p at 60Hz
800 x 600p at 60Hz	640 x 480p at 60Hz	800 x 600p at 60Hz	800 x 600p at 60Hz
1024 x 768p at 60Hz	800 x 600p at 60Hz	1024 x 768p at 60Hz	1024 x 768p at 60Hz
1024 x 768p at 70Hz	1024 x 768p at 60Hz	1280 x 800p at 60Hz	1280 x 800p at 60Hz
1152 x 864 at 70 Hz	1024 x 768p at 70Hz	1280 x 960p at 60Hz	<b>1280 x 1024p at 60Hz</b>
<b>1280 x 800p at 60Hz</b>	1152 x 864p at 75Hz	1280 x 1024p at 60Hz	
1280 x 1024p at 60Hz	<b>1280 x 800p at 60Hz</b>	<b>1280 x 720p at 60Hz</b>	
1440 x 900p at 60Hz	1280 x 1024p at 60Hz	1600 x 900p at 60Hz	
1920 x 1080p at 60Hz	1440 x 900p at 60Hz		
	1600 x 1200p at 60Hz		
	1680 x 1050p at 60Hz		

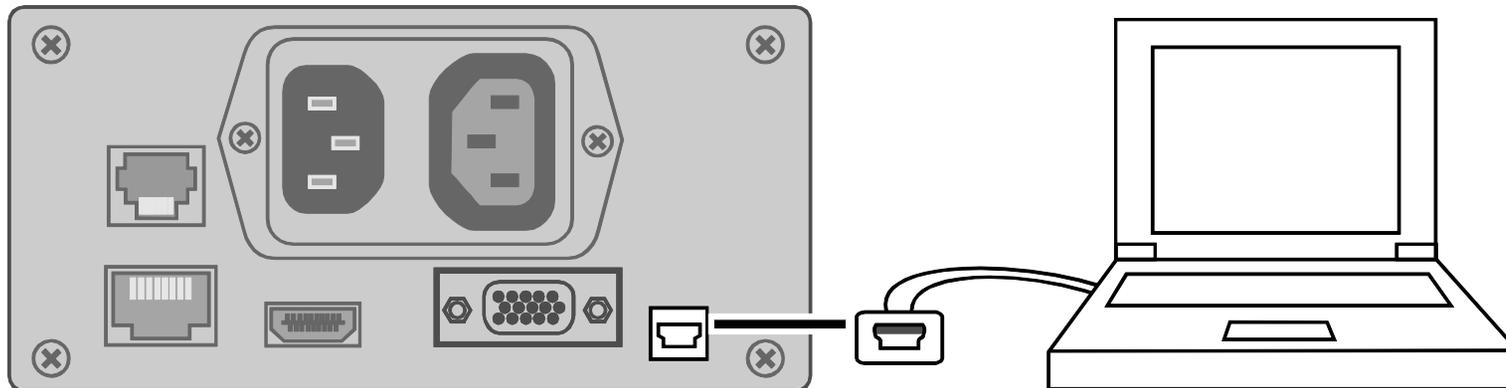
## Appendix C – HDMag and HDMag Software Connection

HDMag Software lets you view, capture, and save magnified images from HDMag to your computer. You can quickly and easily step through or jump to multiple images captured by the software. To use the HDMag Software, refer to the software documentation.

**Note:** Connecting HDMag to a computer requires a cable with a USB Mini-B plug.

1. To connect HDMag to a computer, connect the USB Mini-B plug into the USB connector on the back of HDMag.

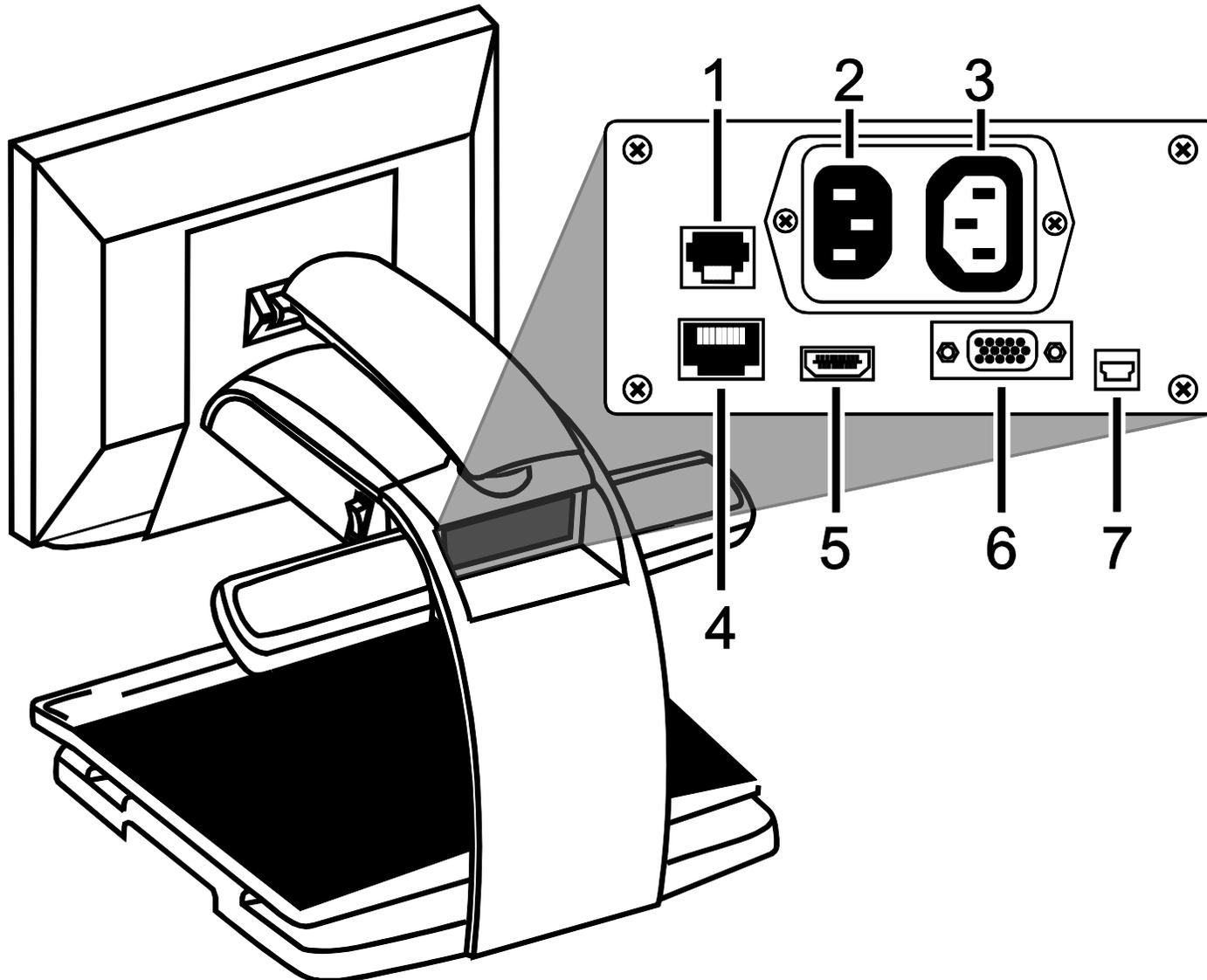
The camera image from HDMag goes directly to your computer. The HDMag view is visible using the HDMag Software



2. To use the software, refer to the HDMag Software user documentation for more information.

## Appendix D – Rear Panel Connectors

Use this image and the descriptions on the next page to identify HDMag connectors.



1. **Control panel jack:** Modular jack that connects the control panel to the HDMag camera. Do not disconnect cable unless servicing the unit.
2. **AC power connector:** Plug power cord from wall outlet to HDMag.
3. **Monitor power connector:** Plug power cord from monitor to HDMag.
4. **Test port:** Do not connect to this port.
5. **Monitor DVI connector:** Connects the HDMag monitor to the HDMag camera. There is no need to remove this monitor cable under normal operation. However, if you later decide to connect a TV or larger monitor to HDMag, then use this connector.
6. **VGA In video connector (15-pin):** Connects a computer to HDMag.
7. **USB connector:** Connects a computer to HDMag for operation with HDMag Software.

## Appendix E – Magnification Tables

HDMag 24-inch	HDMag 22-inch	HDMag 20-inch	HDMag 17-inch
1.8x	1.8x	1.5x	1.7x
3.1x	3x	2.5x	2.8x
4.1x	4x	3.3x	3.7x
5.1x	5x	4.1x	4.6x
6.7x	6.6x	5.4x	6.1x
8.8x	8.6x	7.1x	8x
12x	11x	9.3x	11x
15x	15x	12x	14x
19x	19x	16x	18x
25x	24x	20x	23x
39x	39x	32x	36x
56x	55x	45x	51x
72x	70x	58x	65x
90x	89x	73x	82x
106x	104x	86x	91x
127x	125x	103x	116x

## Federal Communications Commission Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Reorient or relocate the receiving antenna.
- Consult the dealer or an experienced radio or television technician for help.
- Changes or modifications not expressly approved by Freedom Scientific could void the user's authority to operate the equipment.

## Industry Canada ICES-003 Notice

This Class B digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

## Regulatory Compliance

### CAUTION

**Possibly hazardous optical radiation emitted from this product.**

### PRUDENCE

**Le rayonnement optique probablement hasardeux a émis de ce produit.**

- **Wavelengths:** 400 nm to 780 nm
- **Power:** 100-240V~ 1A 47-63Hz
- **Safety:** IEC 60950-1 IEC 60950-1 / UL 60950-1 / CSA C22.2.60950-1 / EN 60950-1: 2006 + A11:2009 + A1:2010
- **EMC:** FCC (CFR-47, part 15) Class B; Industry Canada ICES-003; EN 55022 Class B; EN 55024

## Safety and Maintenance

Do not stare at the lamp as it may be harmful to the eyes.

## Important Safety Instructions

Read and follow all warning notices and instructions marked on the product or included in the manual.

- Slots and openings in the product are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered.
- Do not allow anything to rest on the power cord, and do not locate the product where persons will walk on the power cord.
- Do not attempt to service this product yourself, as opening or removing covers may expose you to hazardous voltage or to other risks. Refer all servicing to qualified service personnel.
- When installed, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.
- Always operate the product in a place where the temperature is between 10° and 35s° C (50° and 95° F).
- Keep it away from wet areas, rain, and other sources of liquids. Do not submerge the product.
- Do not stare directly at the light emitted by the LED lighting as the bright light may be harmful to the eyes.
- Do not attempt to move the product without first locking the monitor arm and XY table.