

APPLIED BALLISTICS
THE SCIENCE OF ACCURACY



ECHO™

MV THERMAL MONOCULARS

OPERATOR'S MANUAL



SIG SAUER®



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1.0 INTRODUCTION

Congratulations on the purchase of an ECHO® thermal product. Leveraging years of experience blending innovative electronic technologies with rugged optical systems, SIG SAUER's new ECHO thermal category provides a comprehensive spectrum of performance-driven optics to deliver the innovation and quality that has become synonymous with the SIG SAUER name.

The ECHO is covered by SIG SAUER® Infinite Guarantee.™

UPDATE WARNING

For the best possible user experience, scan the appropriate QR below to download the BDX 2.0® mobile app and update the ECHO firmware. Always ensure app is updated to current version.





2.0 CONTENTS

- ECHO MV Thermal Monocular
- EVA Zippered Case
- (2) 18500 Lithium-ion Rechargeable Batteries
- USB-C to USB-C Data Cable
- Lens Cloth
- Quick Reference Instructions



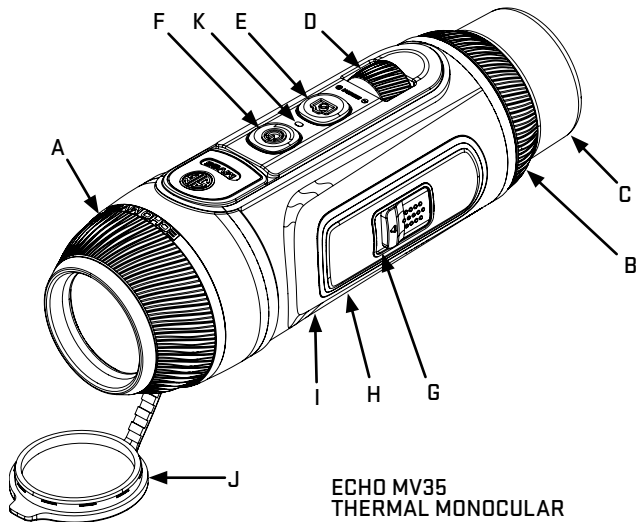
Scan the QR code to visit sigsauer.com where you will find additional information about SIG SAUER products, SIG SAUER Academy and the SIG Experience Center, Special Programs, and additional support.

3.0 KEY FEATURES

- LWIR 640x512 VGA 12um 50Hz thermal core with $\leq 20\text{mK}$ sensitivity
- Capture still photos and record video with audio
- BDX 2.0 enabled
- LRF model includes: Integrated 1000 yard laser rangefinder, and Applied Ballistics Ultralight
- 10-hour runtime
- SIG SAUER® Infinite Guarantee™

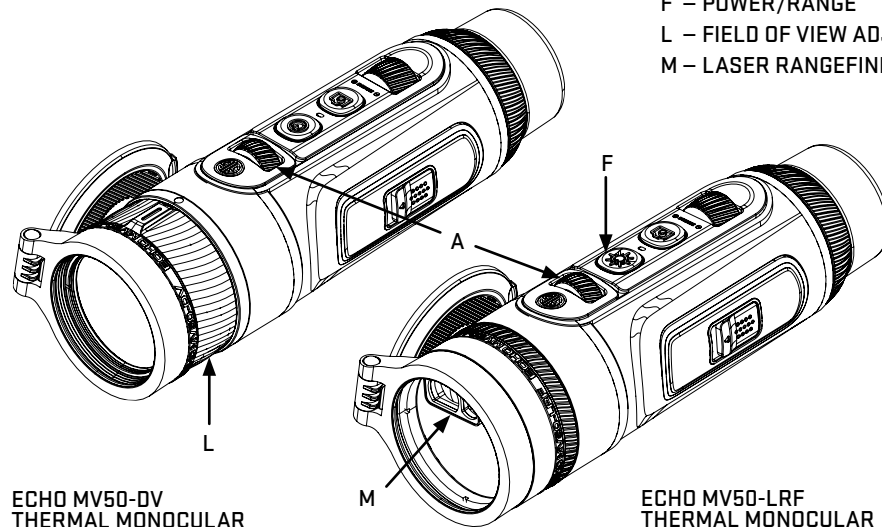


4.0 PRODUCT IDENTIFICATION



**ECHO MV35
THERMAL MONOCULAR**

- A – TARGET FOCUS
- B – SCREEN FOCUS
- C – ADJUSTABLE EYECUP
- D – MENU/ZOOM
- E – RECORD
- F – POWER/RANGE
- G – BATTERY COMPARTMENT
- H – USB CONNECTION
- I – TRIPOD MOUNT
- J – LENS COVER
- K – CHARGE/LOW POWER INDICATOR



**ECHO MV50-DV
THERMAL MONOCULAR**

**ECHO MV50-LRF
THERMAL MONOCULAR**

- A – TARGET FOCUS
- F – POWER/RANGE
- L – FIELD OF VIEW ADJUSTOR
- M – LASER RANGEFINDER



5.0 SAFETY AND OPERATION PROCEDURES



WARNING LASER



- **THE ECHO MV50-LRF IS CLASSIFIED AS A CLASS 3R LASER.**
- **DO NOT PRESS THE RANGE BUTTON WHILE AIMING AT THE HUMAN EYE OR WHILE LOOKING INTO THE TRANSMITTING OPTICS ON THE OBJECTIVE SIDE.**
- **DO NOT TAKE THE PRODUCT APART OR MODIFY THE PRODUCT IN ANY WAY TO EXPOSE INTERNAL ELECTRONICS THAT MIGHT CAUSE DAMAGE OR ELECTRIC SHOCK.**

CAUTION

DO NOT POINT THE ECHO MONOCULAR DIRECTLY AT THE SUN, FAILURE TO COMPLY WILL DAMAGE THE THERMAL SENSOR.



WARNING: CANCER AND REPRODUCTIVE HARM—www.P65warnings.ca.gov

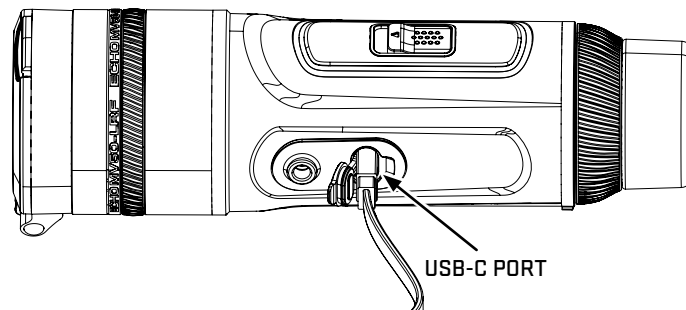
6.0 OPERATION

6.1 POWER

The ECHO Monocular is powered by a rechargeable built-in battery and a removable, external 18500 battery. When both batteries are fully charged, the device draws power from the removable battery. The device will automatically switch to the internal battery when the external battery is depleted or removed. This will not affect the operation of the device.

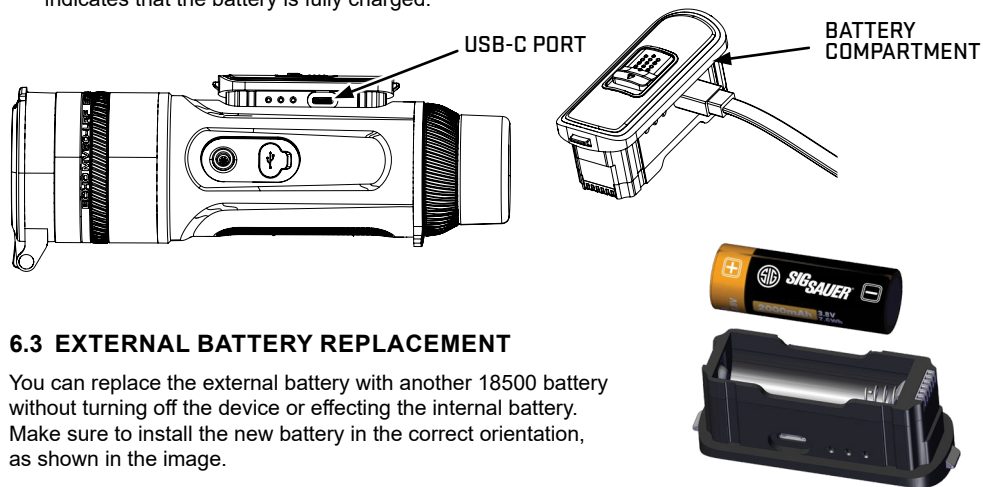
6.2 CHARGING

- Recharge the internal battery through the USB-C port on the bottom of the device.





- Recharge the external battery by removing the battery compartment and applying power through the side USB-C port. There are 3 charge indicators next to the port. Red indicates charging and Green indicates that the battery is fully charged.

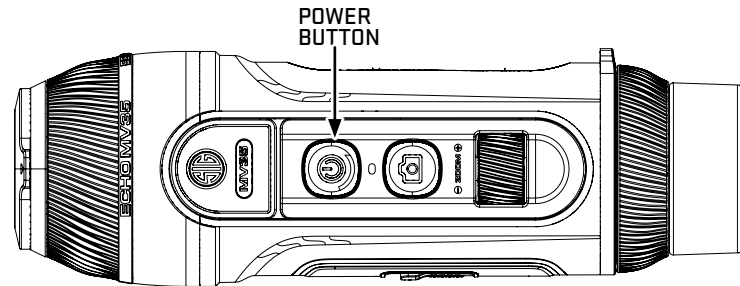


6.3 EXTERNAL BATTERY REPLACEMENT

You can replace the external battery with another 18500 battery without turning off the device or effecting the internal battery. Make sure to install the new battery in the correct orientation, as shown in the image.

6.4 POWER ON THE MONOCULAR

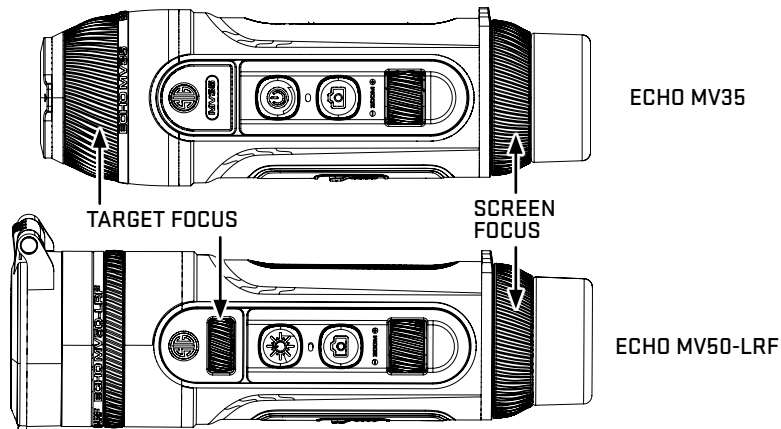
Press the power button and hold for approximately 5 seconds until the screen illuminates.





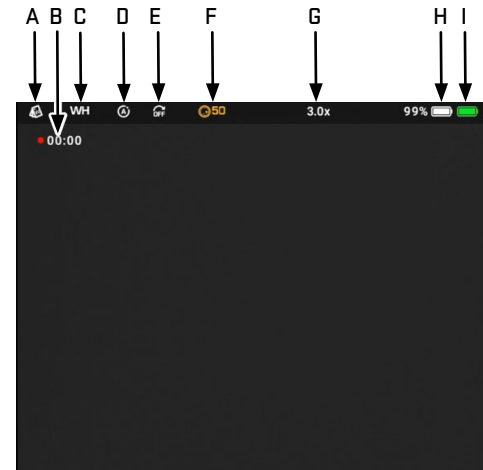
6.5 FOCUSING THE MONOCULAR

1. Adjust the Screen Focus Ring to focus the thermal display until it looks crisp and clear. This setting will be different for every user.
2. Adjust the Target Focus Ring or Wheel to bring the target into focus. This adjustment will need to be made frequently when using the device to observe different distances.



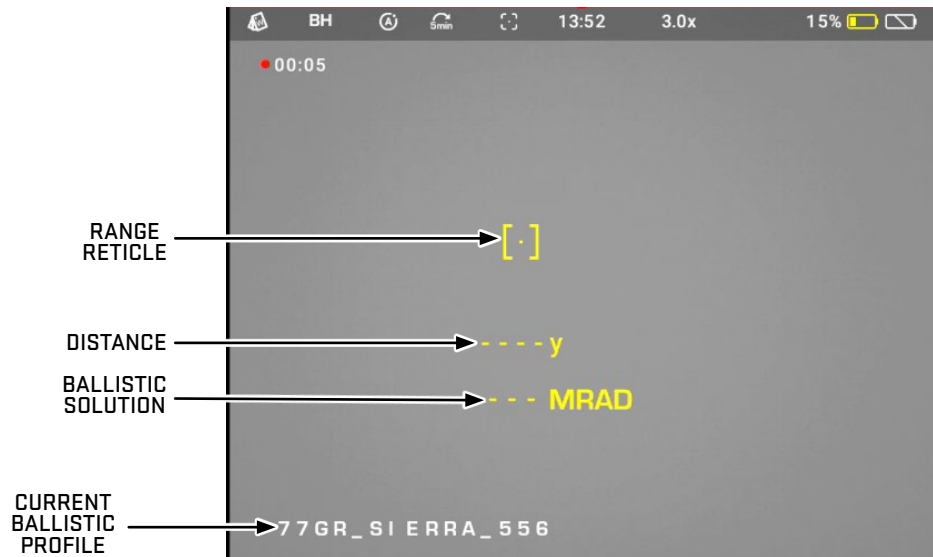
6.6 MONOCULAR DISPLAY INFORMATION

- A – COLOR TONE
- B – RECORDING
- C – COLOR PALETTE
- D – NUC MODE
- E – MOTAC MODE
- F – FOV (MV50-DV)
- G – ZOOM
- H – INTERNAL BATTERY
- I – EXTERNAL BATTERY

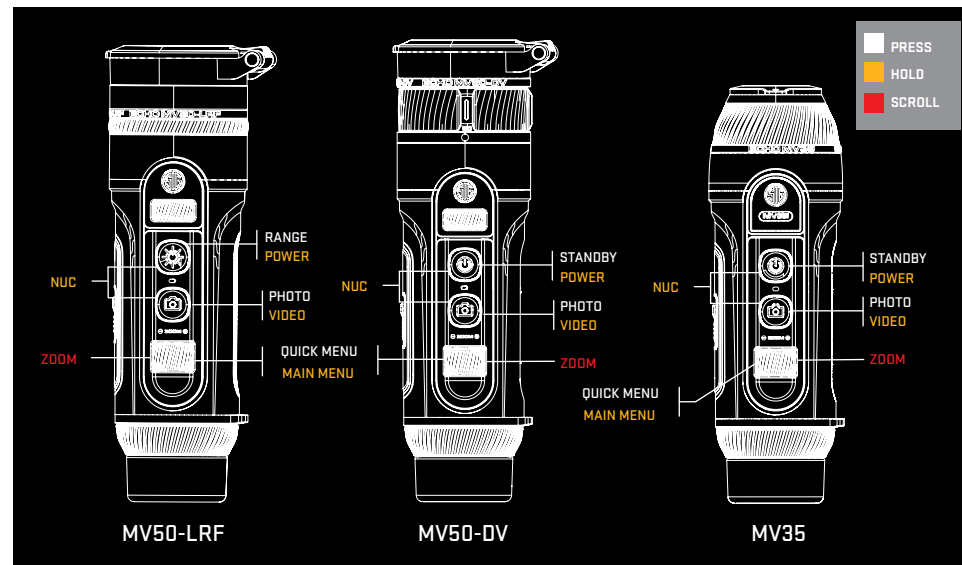




6.7 LASER RANGE FINDER SCREEN



6.8 INPUT CONTROLS

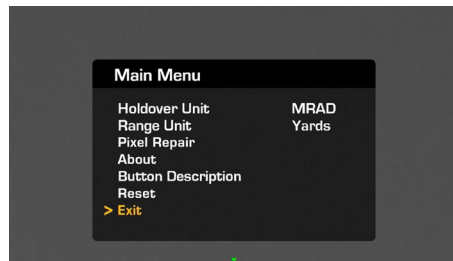
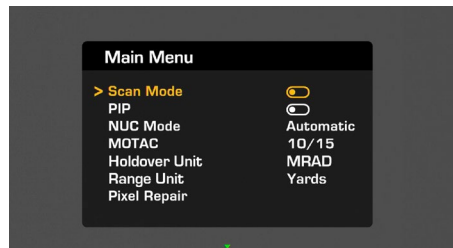




6.9 MENU OPTIONS

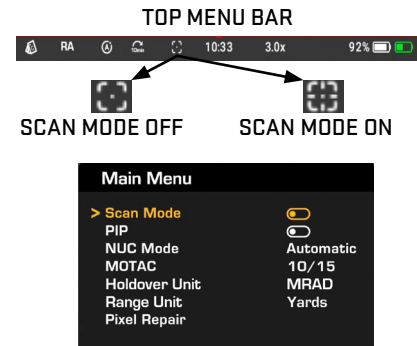
MAIN MENU

- Scan mode
- PIP (Picture in Picture)
- NUC Mode (Non-Uniformity Correction)
- MOTAC (Motion Activation)
- Holdover Unit
- Range Unit
- Pixel Repair
- About
- Button Description
- Reset
- Exit



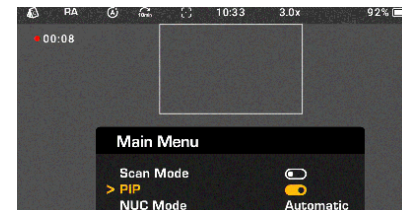
SCAN MODE (LRF MODEL ONLY)

When enabled, the rangefinder will continuously determine distance after the LRF ranging button is activated and will continue to update the range until the button is pressed a second time. If a profile is loaded, a solution will be calculated with the final distance ranged.



PIP (PICTURE IN PICTURE)

Enables a zoomed window overlaid on the image.

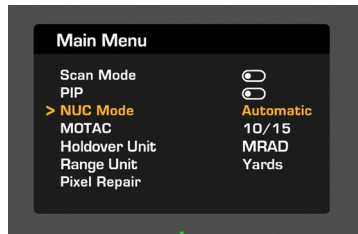




NUC MODE (NON-UNIFORMITY CORRECTION)

Thermal sensors need to be normalized (or trained) to reproduce a clear thermal image. Thermal detectors are influenced by their own heat and this normalization can drift over time. NUC is the renormalizing of the thermal sensor pixels.

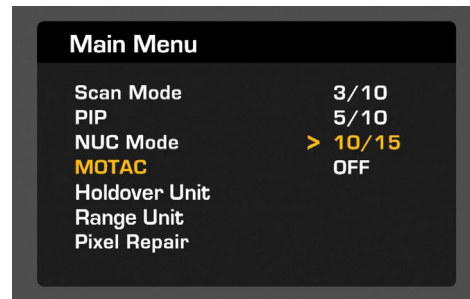
- NUC is performed with an internal shutter, which can be heard as a click during the operation.
- The NUC operation will interrupt video momentarily while it completes.
- Automatic NUC will occur approximately once every 1 minute.
- A countdown warning will appear near the center of the screen 5 seconds before the NUC occurs.
- A manual NUC performed by a pressing the power and record buttons together will perform a NUC immediately and restart the 1 minute timer.
- Manual NUC will never automatically perform the operation and relies on the user to initiate a NUC. This gives the operator complete control of their image quality and NUC timing.
- NUC Mode will be displayed in the status bar at the top of the Sight Display.
- Automatic 
- Manual 



MOTAC™ (STANDBY AUTO-SHUTDOWN)

In order to extend battery life, MOTAC senses device activity and will power down the unit when not in use.

- Option 3/10 will turn off the display after 3 minutes of no activity and will turn off the entire unit after 10 minutes of no activity.
- Options 5/10 and 10/15 adjust the timed automatic shutdown and function the same as above.
- OFF turns MOTAC off. The unit **will not** shut itself off due to inactivity.
- If the display has turned off, press any button to wake the system.





HOLDOVER UNIT (LRF MODEL)

The unit of measure used for the calculated ballistic solution.

- MOA – Minute of Angle
- MRAD – Milliradian

Main Menu

PIP	MOA
NUC Mode	> MRAD
MOTAC	
Holdover Unit	
Range Unit	
Pixel Repair	
About	

RANGE UNIT (LRF MODEL ONLY)

The unit of measure used for the rangefinder distance.

Main Menu

NUC Mode	> Yards
MOTAC	Meters
Holdover Unit	
Range Unit	
Pixel Repair	
About	
Button Description	

PIXEL REPAIR

Pixel Repair will fix any pixels that may have become “stuck.”

1. Before initiating repair, close the lens cap to provide a uniform temperature throughout the sensor.
2. Press the menu scroll wheel to initiate the repair. The device will return to the Main Menu when complete.

Main Menu

MOTAC	10/15
Holdover Unit	MRAD
Range Unit	Yards
> Pixel Repair	
About	
Button Description	
Reset	

ABOUT

Displays device information.

- Model Name
- Firmware Version
- Hardware Version
- WiFi Version

ECHO-MV50-LRF

SW: 2.0.6

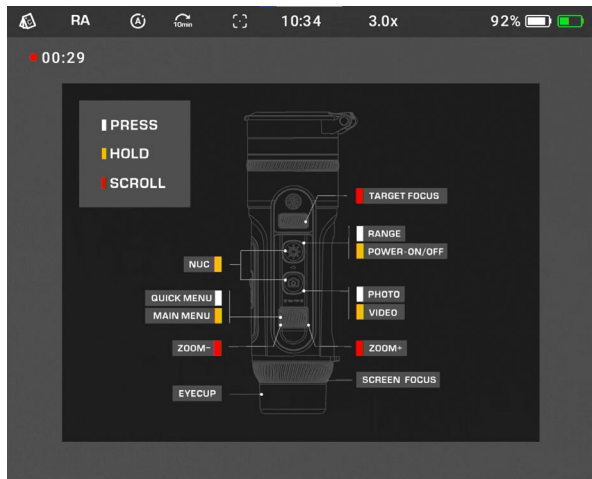
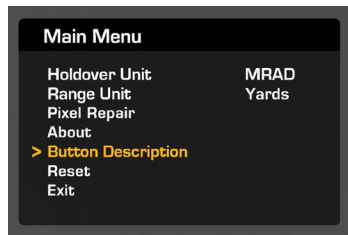
HW: 4.0.0

WiFi Ver: 206



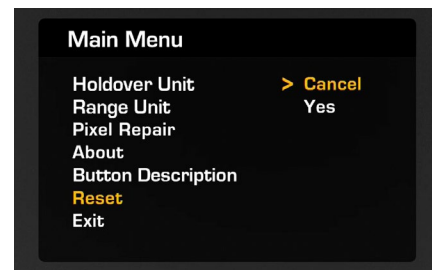
BUTTON DESCRIPTION

Quickstart guide for operation of the device.



RESET

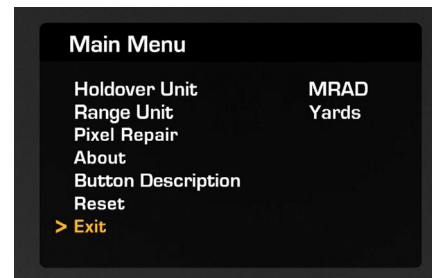
Returns all settings back to the factory defaults.



EXIT

Exit the Main Menu.

Pressing and holding the Menu Scroll Wheel will also exit the Main Menu.





QUICK MENU

- **Display Brightness:** Adjusts OLED display light output.
- **Image Tone:** Sets warm or cool tone to the image
- **Palette:** Sets the color palette of the thermal image.
- **Image Contrast:** Adjusts the dynamic range of the image.
- **Image Sharpness:** Applies levels of image sharpening effect to the image.
- **Exit:** Exits Quick Menu, pressing and holding the Menu Scroll Wheel will also exit

Quick Menu	
> Display Brightness	5
Image Tone	Warm
Palette	White Hot
Image Contrast	3
Image Sharpness	3
Exit	

7.0 INSTALLING AND USING THE BDX APP

To get the most out of the thermal monocular, download the SIG ballistics app (SIG BDX®) and synchronize a smartphone with the ECHO.® Connecting to the app will allow the user to download recordings, live stream video, and update software.

Devices equipped with a laser rangefinder can generate and transmit a ballistic profile to an ECHO riflescope. Once synced, the system provides precise shooting solutions based on the measured range. When paired with the ECHO riflescope, it displays a disturbed aiming point, automatically adjusting for the correct holdover based on the selected cartridge.

7.1 BALLISTICS DATA XCHANGE

This section details how to download the BDX app, pair the app with an ECHO, and create a custom bullet profile.

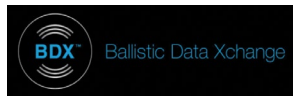
1. Turn Bluetooth on

Go to your phone's settings on an Android or iOS device and make sure that Bluetooth is turned on.



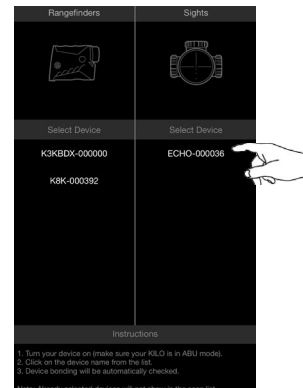
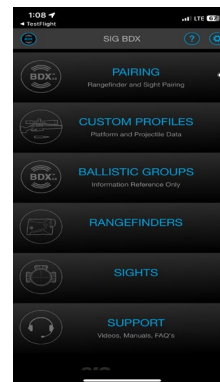
2. Download the BDX app from the App Store/Google Play Store

Go to the App Store or the Google Play store and download the SIG SAUER BDX app. Search for the word SIG SAUER or BDX, or use the QR codes below.



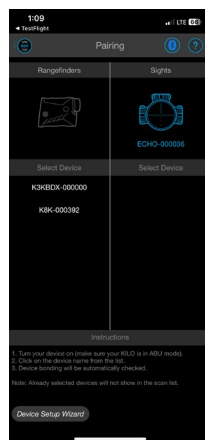
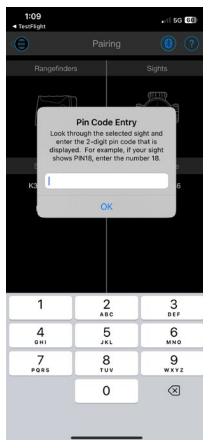
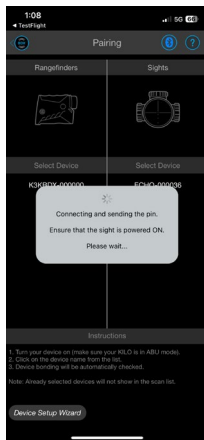
3. Pair SIG SAUER BDX App with the ECHO

- On a smartphone, launch the BDX App.
- Click on "PAIRING." Ensure the ECHO is on. If off, power on by holding the power button.
- The ECHO should be listed in the "Sights" column (LRF models will appear as LRF) and below "Select Device." The ECHO's serial number will be listed in white letters.
- Select the correct serial number.





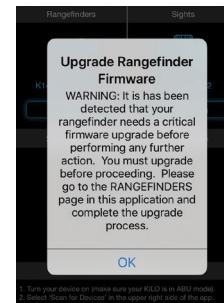
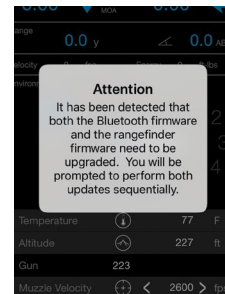
- e. A prompt to enter a pin number will appear on your app. The corresponding pin number will be displayed on the screen of the ECHO.
- f. Enter the pin and press “OK” to complete pairing. The ECHO’s ID will be shown in blue listed below the “Sights” column. If the incorrect PIN code is entered, the process can be restarted.



NOTE

Updating the ECHO to the latest software during pairing. Prompts may appear after connecting through the sights or rangefinder page to update the software on the ECHO. These software updates are mandatory and allow SIG SAUER to ensure that the BDX App and ECHO perform optimally.

- Most updates take less than 5 minutes.
- Ensure that the ECHO is turned on and that the smartphone has at least 25% battery life remaining before installing any software updates.
- For best operation, be sure to keep the smartphone awake during the entire installation process.



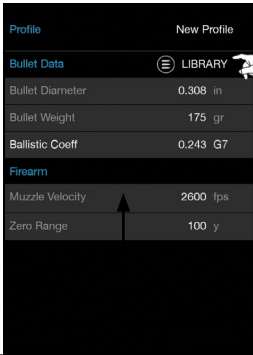
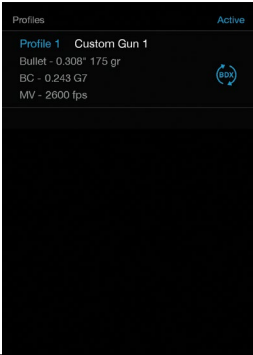
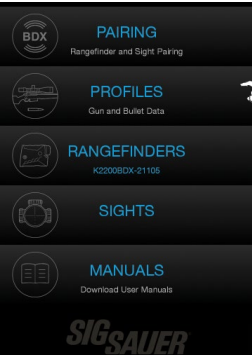


4. Configure Bullet Profiles

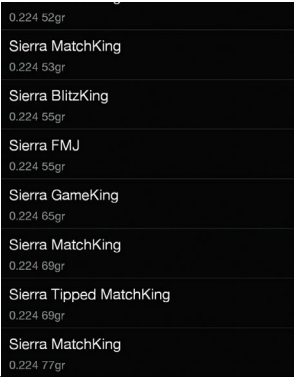
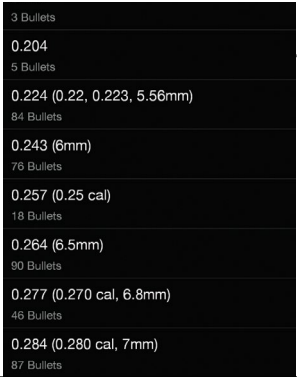
The BDX app allows operators to create and modify up to 25 profiles. Only one profile can be active at any time. The profile that is active will have a blue BDX icon to the right of the profile. The BDX app comes with one default .308 Winchester profile.

To edit an existing profile:

- a. From the home screen of the app, select “PROFILES.”
- b. Select profile that the operator wishes to edit.
- c. Select “LIBRARY.”



- d. Choose a caliber and bullet manufacturer.
- e. Select the bullet intended for use. Once selected, your bullet data will be populated from the database.
- f. Continue to complete the firearm and scope data sections.
- g. Press “Save” in the top right to save the profile.
- h. From the “Profiles” page, click the BDX profile button to activate this profile. The BDX icon will turn blue to indicate the profile is active.



ACTIVE PROFILE
INDICATION
ICON

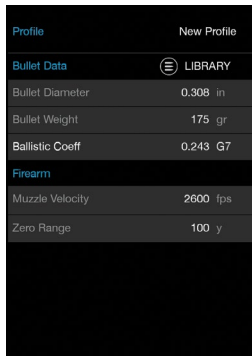


To rename a profile:

- Select profile that the operator wishes to edit.
- From the “Profile Editor,” select current name.
- Type a new name.

To create a new profile:

- From the home screen of the app, select “PROFILES.”
- Select “New profile” in the upper right corner of the App.
- Follow the same sequence of the above steps, “**To edit an existing profile,**” for selection of caliber, manufacturer, and all other information required.
- Return to the “Gun Profile” page.
- Click on the BDX icon to the right to activate this profile.



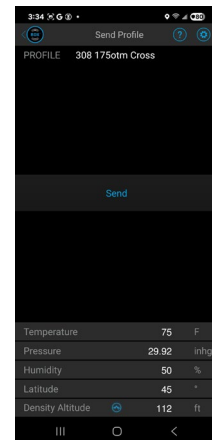
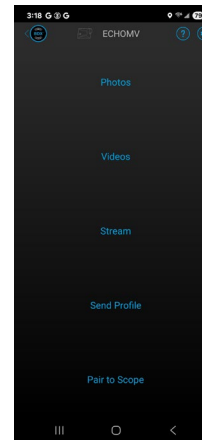
7.2 LOADING A BALLISTIC PROFILE (LRF MODEL)

- After pairing with your ECHO, navigate to the “Rangefinders” screen
- Select “Send Profile”.
- The active profile will be shown at the top. Tap a profile to change the currently selected active profile. Current environmental data is populated for your location and will be stored with your profile on the device.
- Press Send to sync the profile with your ECHO.

7.3 PAIR TO ECHO RIFLESCOPE (LRF MODEL)

LRF equipped ECHO Monoculars will pair with non-LRF model ECHO Riflescopes.

Use the “Pair to Scope” button to sync the two devices. Once paired together, ballistic solutions from your LRF Monocular will be sent to your ECHO Rifle scope reticle.





7.4 DOWNLOAD MEDIA

App

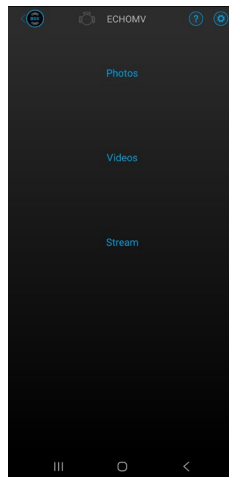
Media can be downloaded to a smartphone through the SIG BDX 2.0 APP. Access the files through the sights (or rangefinder MV50-LRF) page while connected to the ECHO.

Cable

Plug into a computer using the external USB-C port. The ECHO will enumerate as an external drive. Photos and Videos will be organized in two respective folders.

NOTE

The recording of media functionality is disabled while connected as a computer drive.



8.0 MAINTENANCE

8.1 CLEANING

CAUTION

ALWAYS BLOW DUST OR DEBRIS FROM LENSES PRIOR TO USING ANY CLOTH OR LENS PEN. FAILURE TO DO THIS MAY RESULT IN SCRATCHING OF THE LENSES.

- Keep lenses clear by using a soft cloth or provided lens cloth.
- The best way to maintain image quality is by keeping lenses clear of dirt and dust that cause scratches.
- Always use the provided flip-back lens covers to ensure that the sight optics remain protected.

8.2 TROUBLESHOOTING

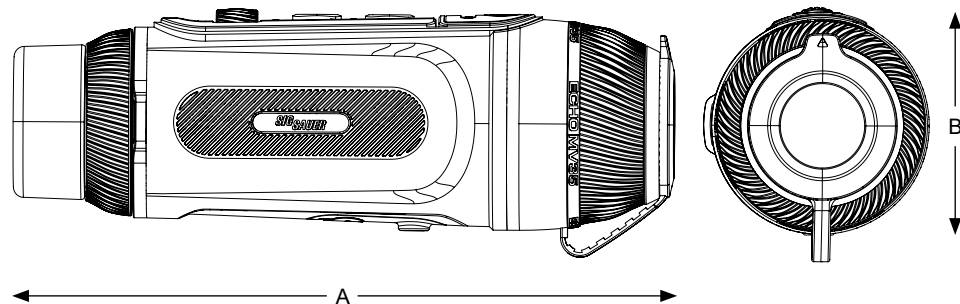
If product will not power on:

- Check orientation of 18500 battery.
- Ensure internal battery is fully charged.
- Install new 18500 battery.



SPECIFICATIONS			
Model	MV35	MV50-LRF	MV50-DV
SKU#	SOEC42200	SOEC42310	SOEC42320
Magnification	2-16	3-24	1.5-24
Field of View	12.4	8.7	17.1-8.7
Frame Rate	50 Hz		
Resolution	640x512		
Color Palettes	8		
Video Recording	Yes		
BDX Enabled	Yes		
Runtime	10 hours		
Battery	Internal and 18500 Replaceable External		
Waterproof	IP67		
OLED Screen Resolution	1024 x 768		
Pixel Pitch	12 µm		
Communications	Wi-Fi / Bluetooth		
Media Storage	32 GB		

MEASUREMENTS			
Model	MV35	MV50-LRF	MV50-DV
Overall Length	7.0 in (177.8mm)	7.6 in (193.0 mm)	8.1 in. (205.7 mm)
Overall Diameter	2.4 in. (61 mm)		
Weight w/o Battery	19.0 oz. (540g)	19.8 oz. (560 g)	21.2 oz. (600 g)



**WARNING LASER**

CLASS 3R LASER PRODUCT. INVISIBLE LASER RADIATION. DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS (BINOCULARS OR TELESCOPES)

This product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed.3, as described in Laser Notice No. 56, dated May 8, 2019.

FCC ID: 2AP8S IC: FG6223ASRD-W4
Po < 10W, $\lambda = 905 \text{ nm}$, $t = 28 \text{ ns}$



This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. The equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with these instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this product does cause interference to radio or television reception the user is encouraged to try to correct the interference by one or more of the following:

- Reorient or relocate the receiving antenna;
- Increase the separation between this product and the receiver;
- Connect the equipment to an alternative outlet or receiver;
- Consult a technician

CAUTION

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE. CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

**LASER APERTURE**

**FCC STATEMENT:**

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void authority to operate the equipment.

NOTE

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.

Shielded interference cable must be used with the equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

Specifications and designs are subject to change without any notice or obligation on the part of the manufacturer.

CAUTION

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:

- Reorient or relocate the receiving antenna;
- 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;
- Consult the dealer or an experienced radio/TV technician for help.

**INDUSTRY CANADA:**

This device complies with Industry Canada licence RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause interference, and
- This device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicable aux appareil radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

- l'appareil ne doit pas produire de brouillage, et
- l'utilisateur de l'appareil doit accepter tout brouillage radio électrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

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