

Avenger 35

Thermal Imaging Riflescope

Model: TS300

User Manual



FUSION THERMAL
INFRARED ELECTRO OPTICS

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1. Description

The Avenger 35 is a premium grade offering from our thermal imaging scope product line. For maximum performance it features our Arclight Ultra HD Geranium Lens, WAVE12 Thermal Sensor, and XGEN (Next Generation Alloy Body). Supplied with a premium quality QD Scope Mount this device is ready for use on just about any platform with a picatinny rail. It's fantastic for hunting but may also be used as an observation device in a variety of applications. It works in complete darkness, rain, smoke, and fog only needing heat differential for high quality performance. The advanced 12-micron sensor allows for an extremely compact size and lightweight design. The 35mm focal length delivers a perfect balance between optical magnification and field-of-view.

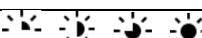


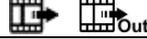
Fig. 1 Components and controls

2. Technical Specifications

Model	Avenger 35
Thermal Sensor	384 x 288, VOx Uncooled (WAVE12)
Sensor Pixel Size μm	12 micron
Frame Refresh Rate	50 Hz
Objective Lens	35 mm (Arclight)
Field of view	394' @ 1000 yards (3x optical magnification)
Display	1280 x 960 LCOS
Magnification, x	3X Optical, 6X Digital, & 12X Digital
Battery type	CR123 (2X required)
Max. Operation Time	4 hours (typical operation)
Compass & Motion Sensor	Yes (e-compass, angle degree & reticle tilt)
Length & Weight	7.6" & 16.2 oz. (w/o batteries or mount)
Detection Range	Up to 2000 Yards
Photo & Video Record	Yes (16 GB Internal Memory)
USB type	Type-C

3. Menu Icons

	Image Mode: White hot
	Image Mode: Black hot
	Image Mode: Red hot
	Image Mode: Color
$\times 1 / \times 2 / \times 3 / \times 4$	E-Zoom
	Display Brightness
	Image Sharpness
	Date and Time

	Wi-Fi
	Video out
	PIP
	Digital Compass
	Motion Sensor
	Auto NUC
	Battery Type Selector (3V disposable, or 3.7V rechargeable)
	Gun Profile Memory  G1  G2  G3  G4
	More Settings (advanced sub menu)
	Zeroing
	Blind Pixel Correction
	Compass Calibration
	System Information
	Factory Reset
	Return to the Main Menu
	Battery indicator

4. Operation

4.1 Turning the Unit On & Off

To **Turn ON** the unit long press the **Power** button and hold down until the Fusion Thermal logo appears on the display, about 3s. After approximately 6s the device will be completely powered on. To **Turn Off** long press the **Power** button for approximately 3s or until a shutdown confirmation challenge appears in your screen. The challenge will automatically display a blue indication on the checkmark, quick press the **M** button to acknowledge the selection and turn the unit off. If you decide not to turn the unit off quick press the **Power** button to move the blue indication from the checkmark to the X and press the **M** button to cancel the shutdown.

4.2 Display Focus (Diopter Adjustment) – Eyepiece Focus Ring

The first step to great image quality is to use the eyepiece focus ring to bring the internal display screen into sharp focus. Simply rotate the focus ring on the eyepiece until the letters, symbols, and/or reticle on the internal display screen come into sharp focus. It is helpful to keep the front lens covered while performing this task. Note: The eyepiece focus ring is not your target focus. See Section 4.3 for target focus.

4.3 Target (Subject) Focus -Objective Lens Focus Ring

The Avenger 35 is equipped with a sleek and easy to use manual target (subject) focus. To bring your target/subject into sharp focus rotate the objective lens focus ring back and forth until you achieve the best possible view. Note: Overall optical performance is dependent upon achieving a good display focus first, see section 4.2.

4.4 NUC (Non-Uniformity Correction)

To maintain peak image quality thermal devices will occasionally need to perform a sensor temperature calibration commonly referred to as NUC (Non-Uniformity Correction) – Pronounced “Nuke”. This required function maintains top performance and eliminates image defects such as vertical bars and phantom images. When the Avenger 35 is in Auto Correction Mode (recommended) no user action is required to perform a NUC. The software will detect when NUC is needed and automatically perform the calibration for you. Just before the automatic NUC occurs, the user will see a 5s count down appear in the upper left of the display screen. When automatically performing the correction a momentary screen freeze will occur and a clicking noise will be heard as the internal shutter drops. This occurs more frequently when the system is first turned on and less frequently once the system warms up and stabilizes.

The user can perform a manual NUC at any time by a simultaneous quick press of **M & Camera** buttons. This will activate the internal shutter and NUC the system. For a non-shutter, completely silent NUC, long press the **M & Camera** button simultaneously. However, if a non-shutter NUC is performed the user must cover the front lens with a hand, or preferably close the front lens cover so the sensor will have uniform surface to calibrate against.

4.5 Photographing and Video Recording

The Avenger 35 was designed for both still photography and video recording equipped with 16GB of internal memory storage. The photo and video files are named with a time stamp, so be sure to reset the date and time (see section 4.6) before getting started.

To take a still photo quick press the **Camera** button. The image will freeze for half a second and a camera icon  will appear in the upper right of the display screen. The image is automatically saved to the internal hard drive.

To record a video long press the **Camera** button. When the system is capturing video the timer will display the recording duration on the upper right of the display screen in a MM: SS (minute: second) format. To stop the recording long press the **Camera** button again until the timer disappears. Note: If you do not stop the recording by long pressing the **Camera** button the video will not be saved and will be discarded when the unit shuts down.

Photo and video files can be exported to an external computer by connecting the supplied USB

/ USB-C cable just like other cameras, see Memory Access in section 4.7.

Note: The number of the recorded files is limited by the capacity of the internal memory. Be sure to regularly check the available space of the built-in hard drive by connecting to your computer.

4.6 Date and Time Setting

Select the **More Settings** icon from the main menu and enter the advanced submenu by quick pressing M. Scroll down and select the Date and Time icon (looks like a clock) and quick press M. The date and time format will become visible. Note the blue color and the two triangle icons above and below the currently selected value. The date format is displayed as YY.MM.DD (2020.01.01) and the time format is displayed in 24-hour format HH:MM (14:48). Switch between year, month, day, and time with a quick press of the **M** button. Select the correct value for each as you proceed with a quick press of the **Power** or **C** button. Save your changes and exit the submenu with a long press of the **M** button.

4.7 Memory Access

When the device is turned on and connected to a computer, it will be recognized by the computer in the same manner as a flash memory card. Once recognized you can use this to access the device's memory and make copies of pictures and videos.

- Turn on the thermal unit and connect it with the computer via Type-C cable.
- Double click “My computer” on the desktop - double click to open the icon with internal

memory name  - double click and open the device named ‘Internal Storage’ to access the built-in memory.



- There are different folders named by time in the storage  20191218 .
- Recorded photos and videos from a given day are found in file names with the same date.
- Select desired files or folders to copy or delete as desired.

4.8 Reticle On/Off

The Avenger 35 may be used for a host of applications including general observation and search and rescue. For these applications it may be advantageous to temporarily turn the reticle off. This is easily accomplished with a simultaneous 4 second press and hold of the **Power** + **M** + **Camera** buttons. To turn the reticle back on repeat the process. Note: When

the reticle is turned off, all the operations related to it in the reticle menu will be hidden, including the setting of the reticle type and color, the operation of zeroing, and blind pixel correction. This feature is only available if the reticle was initially enabled at the factory. If not, you can enable the reticle for the first time with a long simultaneous press of the **Power** + **Camera** button and click the **M** button four times.

4.9 Shortcut Menu

The Avenger 35 is equipped with a shortcut menu to help you access the most commonly used features of the product. There are three layers to the shortcut menu. They are accessed by giving a specific number of quick presses to the **M** button while in the normal viewing mode. One quick press of the **M** button brings you to Layer 1, where you will find digital zoom and image brightness. Two quick presses of the **M** button brings you to Layer 2, where you will find color pallet options (white hot, black hot, etc.) and image sharpness. Three quick presses of the **M** button brings you to Layer 3, where you will find reticle design options and reticle color. To make a desired adjustment while in a specific layer use the **Power** or **Camera** button accordingly. See Table 1 below for additional information. To exit the Shortcut Menu, press the **M** button a fourth time, or do nothing and wait 4 seconds for it to exit the shortcut menu and return to normal operation.

Table 1 **Shortcut Menu**

Press M	Shortcut Menu	Operation
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<p>1 time</p>	<p style="text-align: center;">Shortcut Menu Layer #1 Digital Zoom and Brightness Setting</p> 	<ul style="list-style-type: none"> ➤ <u>Quick press</u> the Power button to perform. E-zoom value setting, ranging from level one to four. ➤ <u>Quick press</u> the Camera button to perform 1 to 4 brightness level setting.
<p>2 times</p>	<p style="text-align: center;">Shortcut Menu Layer #2 Color Pallet and Sharpness Setting</p> 	<ul style="list-style-type: none"> ➤ <u>Quick press</u> the Power button to perform color pallet selection white hot, black hot, red hot and color. ➤ <u>Quick press</u> the Camera button to perform 1 to 4 sharpness level setting.
<p>3 times</p>	<p style="text-align: center;">Shortcut Menu Layer #3 Reticle Color and Reticle</p> 	<ul style="list-style-type: none"> ➤ <u>Quick pressing</u> the Power button to perform reticle color setting-white, black, red and green. ➤ <u>Quick pressing</u> the Camera button to choose a reticle design.

4 times	Exit Shortcut Menu	—
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4.10 Shortcut Buttons

To quickly access the most frequently used functions the Avenger 35 has preprogrammed shortcut buttons for your use.

Button	Quick Press	Long Press
Power	Digital Zoom	Power on /off
M	Open the Shortcut Menu	Open the Main Menu
Camera	Take a Still Photo	Video Recording
M + Camera	Manual NUC w/Shutter	Manual NUC w/o Shutter (silent operation, but must close lens cover)
Power + M	Standby Function on/off	Stadiametric rangefinder function
Power + M + Camera	Change units of measure between cm/m and inch/yard (must be on screen with units)	--

5. Main Menu

- In the normal display mode, long press the **M** button to enter the Main Menu. The Main Menu options are as follows: Ultraclear Mode, Wi-Fi (reserved for future development), Auto NUC, Video Out, Picture-In-Picture, Compass, Motion Sensor, Battery Type, Gun Profile, and More Settings (Advanced Sub Menu).
- Scroll up and down between menu options by quick pressing the **Power** or **C** button. Note: The current selection is indicated in blue.
- Quick press the **M** button to make changes or enter the advanced sub menu.



Fig. 2 The Main Menu

5.1 Ultraclear Mode

The Ultraclear Mode was designed to enhance performance by boosting thermal sensitivity during poor visibility conditions: cloudy, rainy, foggy, etc. It is not needed or recommended for continuous use.

5.2 Battery Type

Use this feature to select correct battery voltage for your application, (3V for standard CR123A disposable batteries and 3.7V for most rechargeable batteries.) Note: It is important to check your batteries for correct voltage.

5.3 More Settings (Advanced Sub Menu)

Under the main menu interface, select the “More Settings” option at the bottom of the menu, click **M** button to enter the advanced sub menu for additional features, which include Zeroing, Blind Pixel Correction, Compass Calibration, Date and Time Setting, System Information, Factory Default Reset, and Return to the main menu.



Fig. 3 The secondary menu for more settings

5.3.1 Zeroing

Sighting in the Avenger 35 is very simple and can often be done with one or two shots. To begin make sure the reticle is on and select a Gun Profile (G1, G2, G3, G4) in the main menu so you can remember your zero. You can save up to four different zeros by using the Gun Profile designator. The Gun Profile feature allows you to quickly move the scope from one gun to the next or to accommodate a change in point-of-impact that may be observed from using different ammunition with the same gun.



Fig. 4 Zeroing interface

- The Zeroing Interface is found within the **More Settings** Advanced Sub Menu. To get there from normal operating mode long press the **M** button to open the **Main**

Menu and scroll down to the **More Settings** icon at the very bottom. Quick press the **M** button to enter the Advanced Sub Menu. The Zeroing Interface is found at the top of the Advanced Sub Menu list, its icon is a reticle. When the Zeroing icon is highlighted in blue quick press the **M** button to enter the Zeroing Interface as shown in figure 4. When you are in the Zeroing Interface, the reticle is shown as a small cross and dot.

➤ We suggest you begin by setting your target at 25 yards. Using the interface reticle aim at the target bullseye and take a shot. Locate the bullet hole after shooting.

➤ **If the bullet hole can be observed on the display screen:**

Very often the bullet strike will generate enough heat on the target that the point of impact that can be observed thru the thermal scope, at least temporarily. In this case follow the directions below.

- Position the reticle on the bullseye (original aiming point) and hold it there. While doing so long press the **M + Camera** button at the same time to freeze the image. You will see a Snowflake icon appear on the upper-left corner of the screen when the screen is frozen.
- Next use the **M** button to move between the options for adjusting the horizontal (left/right) or the vertical (up/down) point-of-impact. Please note the current selection is indicated in blue. After you select your adjustment direction press the **Power** or **C** button to move the reticle to the position of actual point-of-impact. You will note that the software leaves the dot behind to indicate your original aiming point.
- After making your correction long press the **M** button to save your adjusted zero and exit back to the advanced sub menu. Re-enter the zeroing interface and take another shot to confirm correction and repeat as necessary.

➤ **If the bullet hole cannot be seen on the display screen:**

- Walk to the target and measure the horizontal and vertical distance from the bull's eye to the actual point-of-impact.
- According to the measured distance, move the reticle up/down or left/right by pressing the **Power** or **C** button and make the required correction. Use the **M** button to move between the options for adjusting the horizontal (left/right) or the vertical (up/down) point-of-impact. Please note the current selection is indicated in blue. As you make your adjustments notice that the dot will

remain at the original aiming point. This is how you know you are adjusting in the correct direction. Remember you are adjusting the crosshair to the actual point-of-impact and the amount of corrected change you are making will be displayed in the scale at the bottom of the screen. The amount of each click adjustment is .62 inches at 100 yards. If you are sighting in at 25 yards the amount of each adjustment is cut by a fourth. Therefore, the point-of-impact movement for each adjustment at 25 yards will only be .155 inches.

- After making your correction long press the **M** button to save your adjusted zero and exit back to the advanced sub menu. Re-enter the zeroing interface and take another shot to confirm correction and repeat as necessary.

Notes:

- In the zeroing interface the reticle moves one pixel with each quick press of the **M** or **C** button. To move the reticle faster press and hold the **M** or **C** button.
- Remember, if the adjustment scale is displaying in centimeters, you can change it to inches by simultaneously quick pressing the **Power**, **M** and **Camera** button.

5.3.2 Blind Pixel Repair Feature

Unfortunately, as thermal owners one of the things we've got to expect is an issue known as blind pixilation. You will know you are experiencing it when a white or black dot suddenly shows up on your screen and won't go away even after you NUC the unit. These small dots (blind pixels) are normal and are to be expected at some point. Fortunately, they are easy to fix with our built-in repair feature.

- The Blind Pixel Repair interface is found within the **More Settings** Advanced Sub Menu. From normal operating mode long press the **M** button to open the **Main Menu** and scroll down to the **More Settings** icon at the very bottom. Quick press the **M** button to enter the advanced sub menu. The Blind Pixel Repair feature is found second from the top of the advanced sub menu list, its icon is a square with a plus sign. When the icon is highlighted in blue quick press the **M** button to enter the interface as shown in Figure 5.
- In the Blind Pixel Repair interface quick press the **Power** or **C** button to move the cross cursor up/down or left/right. Quick press the **M** button to switch the orientation of X-axis (left/right) or Y-axis (up/down).

- After selecting the blind pixel, long press **Power** or **C** button to perform calibration, and press the same button again for cancellation. The number of the corrected blind pixels are shown on the status bar at the bottom of the screen.
- Repeat the above process till all blind pixels are corrected, long press the **M** button to save and exit.



Fig. 5 Blind pixel correction interface

5.3.3 Compass Calibration

Navigate to the bottom of the Main Menu and enter the “More Settings” sub menu where you will find a new list of icons. The third option down is the Compass Calibration feature, (Circle w/Arrow Icon), press the Menu button to enter calibration mode and you will see a three-axis coordinate system appear on your screen, see figure 6. When you see the three -axis icon rotate the unit three times in each of the three directions indicated making sure to accomplish everything within 15 seconds. At the 15 second mark the unit will automatically save calibration and return to normal operating mode.



Fig.6 Compass calibration interface

5.3.4 System Information

Click the **M** button to obtain information about the software version.

5.3.5 Reset to Default

- In the Advanced Sub Menu, select the default resetting item by **Power** or **Camera** button, then quick press the **M** button to enter the resetting interface as shown in figure 8.
- Quick press the **Power** or **C** button to make a choice. The “√” is to reset to the default, and the “×” is to cancel.
- When done, quick press the **Power** button to confirm the selection and the unit will restart.



Fig. 7 Default resetting interface

5.3.6 Return to the Main Menu

- Select the “Return” option by **Power** or **C** button.
- Quick press the **M** button to return to the main menu.

6. Preventive Maintenance

6.1 Battery Installation

- The battery power icon is displayed on the status bar (🔋) and there are four levels of power.
- When the lightning icon appears on the status bar, please change the battery in time so as not to affect the use.
- It is necessary to power off before replacing the batteries.
- Turn the **battery compartment knob** counterclockwise until it stops and lift to remove it.
- Install two CR123A batteries according to polarity instructions on the label inside the battery compartment as shown in fig. 8.
- Replace the battery cover and press it until it clicks - make sure the cover is closed on both sides. Do not turn/twist the battery compartment knob when reinstalling/closing, just push it down.



Fig. 8 Battery installation

Note:

- Please do not use different types of batteries or batteries with different power levels.
- Avenger 35 supports external power supply via Type-C cable with a USB icon displayed on the screen.

6.2 Product Cleaning and Maintenance

- Clean the Avenger 35 external body with a soft dry cloth or cloth damp with clean water. Never submerge the device in any liquid or rinse off with running water.
- Clean optical glass surfaces with air duster, or cleaning cloths specifically designed for this purpose. Do not rub the lens with any device that might scratch the surface.

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FUSION THERMAL, LLC PRODUCT REGISTRATION CARD

PRODUCT INFORMATION

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Purchase Date _____ Product Serial # _____

CUSTOMER INFORMATION

Name _____

Address _____

City _____ Country _____ Zip _____

Day Phone # _____ Home Phone # _____

E-mail address _____

.....

Customer Signature Required