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OPERATOR'S MANUAL
Thermal Binocular
ATLAS

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General Information

You must familiarize yourself with the entire manual before operating the equipment. Read the complete manual and follow all **WARNINGS** and **NOTES**. Study this manual carefully and understand all related safety precautions.

Scope

This manual provides the user with information related to operations, maintenance, and troubleshooting of the thermal binoculars ATLAS.

Models

Figures 1 represents the thermal binocular ATLAS.

Figure 1. ATLAS Thermal Binocular

Introduction

ATLAS is an uncooled universal thermal binocular detecting the long IR part of the spectrum (7.5 - 13.5 µm) and designed to meet the demands of security professionals, nature enthusiasts, sailors, hunters, and sportsmen alike. ATLAS offers unsurpassed performance when used for search and rescue operations, surveillance, perimeter control, and vehicle identification in addition to a wide variety of other applications.

The rugged and lightweight ATLAS combines an engineered plastic housing with optics that will satisfy the most stringent and demanding requirements. Regardless of ambient light conditions, smoke or haze, ATLAS detects even the slightest temperature differences of everything in the field of view and provides the user with clear "white hot", "black hot", colored or "edge-detected"

images of what would otherwise be invisible to the naked eye.

Safety Summary

- ATLAS is a precision electro-optical instrument and must be handled carefully at all times to prevent damage.

- To protect ATLAS from unnecessary damage and degradation of performance never point the unit at extremely hot objects, such as the bright sun or a hot, burning fire.

- Do not scratch the lens surfaces.

- Be careful not to touch the lens surfaces. To remove contamination or fingerprints use lens paper to carefully clean the surface of the objective lens.

- Do not carry batteries in pockets containing metal objects such as keys, coins, sharp tools, etc. Those objects can damage batteries and short-circuit them. Shorted batteries may become very hot and could potentially cause bodily harm.

Warnings

THE THERMAL IMAGING SENSOR USED WITHIN THE ATLAS IS VERY SENSITIVE TO EXPOSURE TO EXTREMELY HIGH LEVELS OF RADIANT FLUX (HEAT).

NEVER EXPOSE ATLAS, EITHER TURNED ON OR OFF, DIRECTLY TO THE SUN OR ANY OTHER SOURCE OF HEAT THAT THE HUMAN EYE CANNOT TOLERATE. EXPOSURE TO THE HIGH LEVEL OF RADIATION MAY DAMAGE THE ATLAS THERMAL SENSOR.

KEEP THE OBJECTIVE LENS COVER CLOSED AT ALL TIMES WHEN THE ATLAS IS NOT IN USE.

INADVERTENT SUN DAMAGE IS NOT CONSIDERED A DEFECT IN MATERIAL OR WORKMANSHIP, AND IS NOT COVERED IN THE PRODUCT WARRANTY.

Unit Overview

Figures 2 below shows the ATLAS thermal binocular.

Figure 2. ATLAS Thermal Binocular

Features

- Long range observation regardless of available ambient light
- Black Hot/White Hot polarity selection
- Color Pallet
- Edge Detect mode
- Digital 2x and 4x zoom
- High resolution throughout the entire field of view
- Nitrogen purged in order to prevent internal fogging and extend service life
- State of the art impact-resistant rubberized engineered plastics housing

Key Specifications

Key specifications are presented below in Table 1. Model specific characteristics can be found on product specification sheets or by contacting N-Vision Optics.

Table 1. Key Specifications

|	
Sensor type	Uncooled vanadium oxide (VOx) microbolometer
Detector resolution	640 x 480
Spectral response, μm	7.5 - 13.5
Detector pitch, μm	12
Refresh rate, Hz	60 or 9 (International Model)
Start-up time, sec	< 5
Objective lens	50mm F1.2
FOV, degree	9 Horizontal, 7 Vertical
Focus	Manual
Detection, man size target, m	2250 (60% Detection Probability)
Recognition, man size target, m	820 (60% Recognition Probability)
Identification, man size target, m	430 (60% Identification Probability)
Analog output	NTSC or PAL
Output resolution, NTSC	640 x 480
Output resolution, PAL	768 x 574
Power, internal	Three CR123 (DL123) batteries
Power, external	USB
Display	Color
Display resolution	800 x 600
Diopter adjustment, diopters	Fixed 0-diopters
Size (L x W x H) cm / in	14.8 / 5.8 x 12.4 / 4.8 x 61 / 2.4
Weight, grams / oz	575 / 20
Surface finish	Black
Operating temperature range, ⁰C	-40 to +50
Storage temperature range, ⁰C	-40 to +71
Internal Memory	60 Images

ATLAS Components
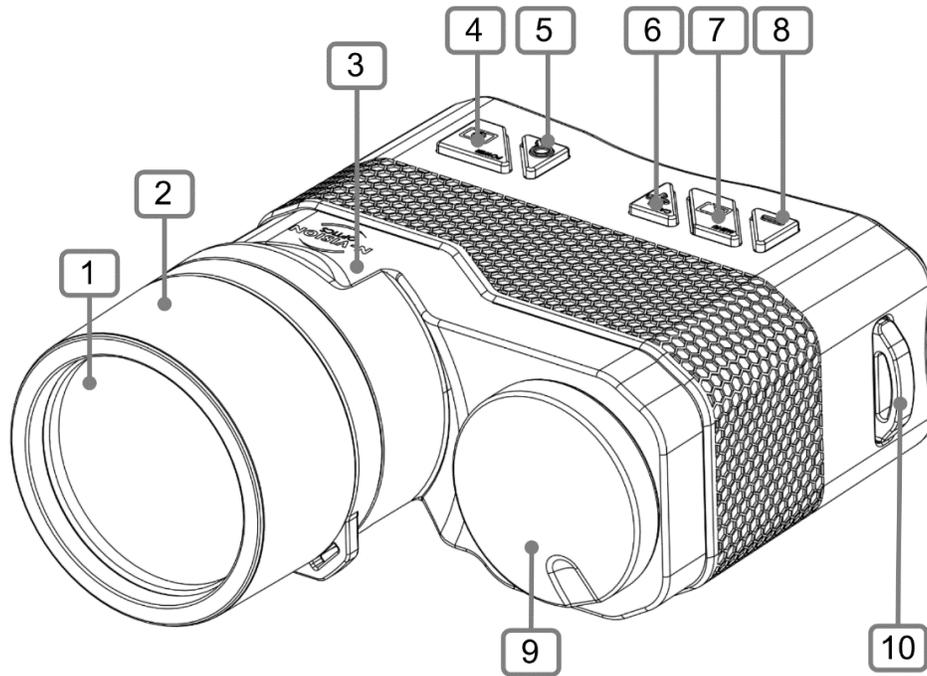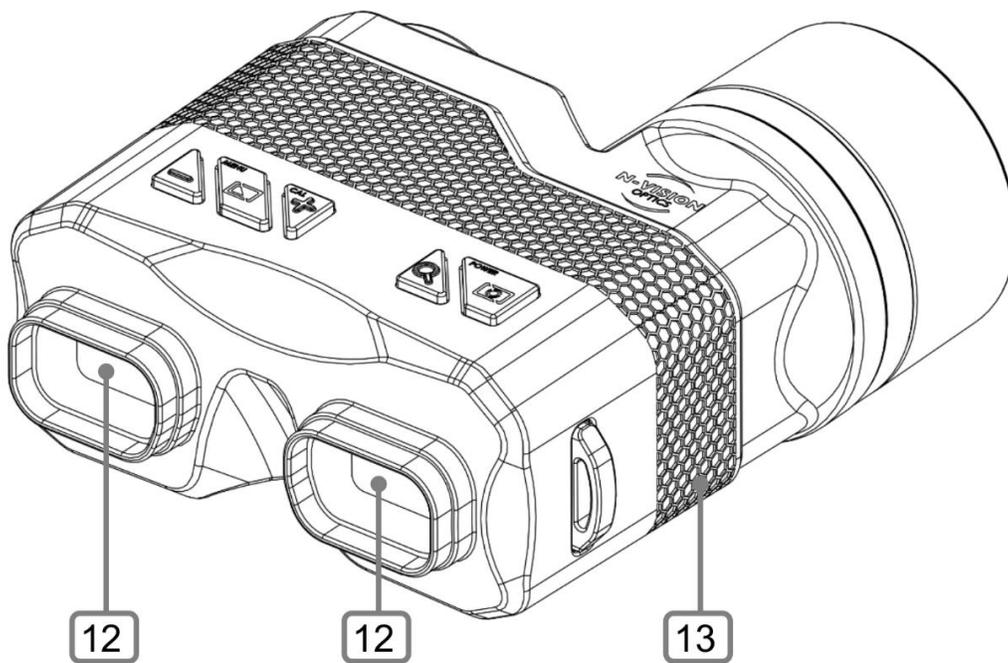
Figure 3. ATLAS Front View

Figure 4. ATLAS Rear View

Refer to Figures 3 and 4 to identify key components.

1. Objective Lens
2. Objective Lens Focusing Ring
3. ATLAS Housing
4. Power/Photo Switch
5. Zoom Switch
6. Contrast Enhancement (CE)+ / Cal Switch
7. Polarity/Menu/Select Switch
8. Contrast Enhancement (CE) - Switch
9. Battery Compartment Cover
10. Neck Strap Lug
11. Neck Strap Lug (not shown)
12. Eye Pieces
13. No-Slip Surface

Standard Kit

Standard ATLAS kit includes unit, carrying/storage case, lens cleaning paper, user manual, battery cartridge, three (3) CR123 (DL123) size batteries.

Operation

Refer to Figures 3 and 4 to identify components.

Installing Batteries

WARNINGS:

DO NOT MIX OLD AND NEW BATTERIES. DO NOT MIX BRANDS OF BATTERIES. DO NOT MIX DISPOSABLE AND RECHARGEABLE BATTERIES.

INSPECT BATTERIES FOR BULGING PRIOR TO USE. IF THE BATTERY SHOWS SIGNS OF BULGING, DO NOT USE.

DO NOT DAMAGE, PUNCTURE, SHORT CIRCUIT, ATTEMPT TO RECHARGE OR OTHERWISE TAMPER WITH BATTERIES. TURN OFF THE ATLAS IF THE BATTERY COMPARTMENT BECOMES TOO HOT. IF POSSIBLE, WAIT UNTIL IT COOLS DOWN BEFORE REMOVING BATTERIES.

ALWAYS REMOVE BATTERIES WHEN STORING OR SHIPPING THE ATLAS.

THE USE OF REPUTABLE BRAND NAME, HIGH QUALITY BATTERIES IS RECOMMENDED. BATTERIES OF LESSER QUALITY MAY HAVE SIGNIFICANTLY SHORTER LIFE.
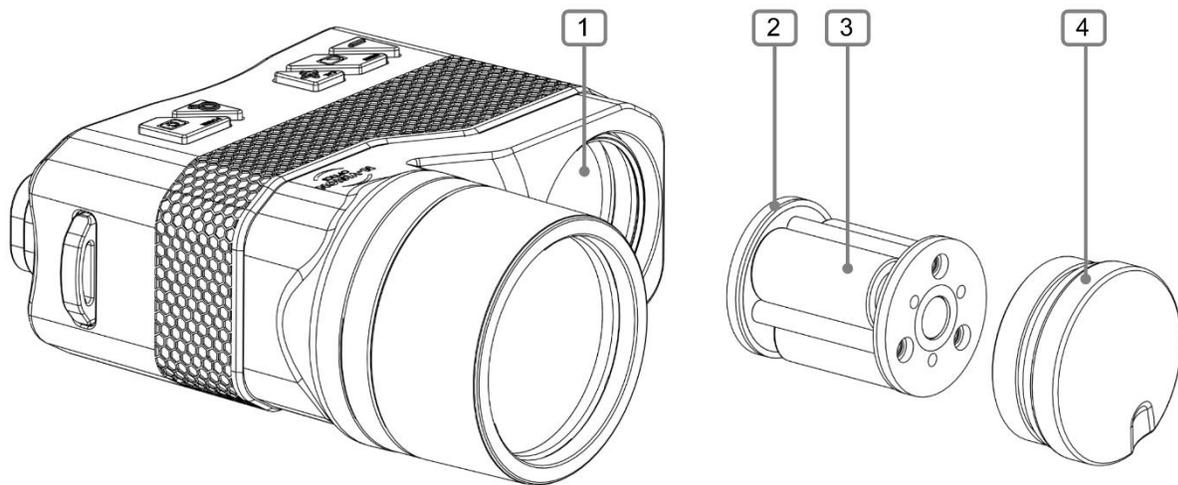
Figure 5. ATLAS with Removed Battery Cartridge
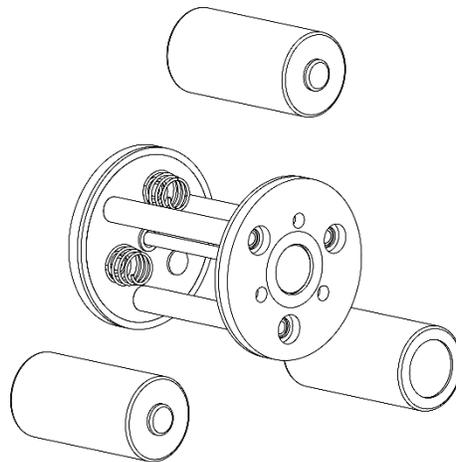
Figure 6. Inserting Batteries Into Batteries Cartridge

Refer to Figures 5 and 6 to identify components related to the battery compartment.

NOTE: Batteries in the ATLAS are placed in the Battery Cartridge (2). Battery Cartridge can be inserted in the Battery Compartment either side forward.

Unscrew the Battery Compartment Cover (4) that is holding the Batteries Cartridge. Pull Battery Cartridge (2) from the Battery Compartment Cover (4). Install three CR123 batteries (3) as shown on Figure 6 into the Battery Cartridge (2). Inspect the rubber O-ring of the Battery Compartment Cover (4) for damage. Replace if necessary. Slide Battery Cartridge (2) with installed batteries into the Battery Compartment Cover (4). Screw Battery Compartment Cover (4) with Battery Cartridge (2) holding batteries back into the Battery Compartment (1).
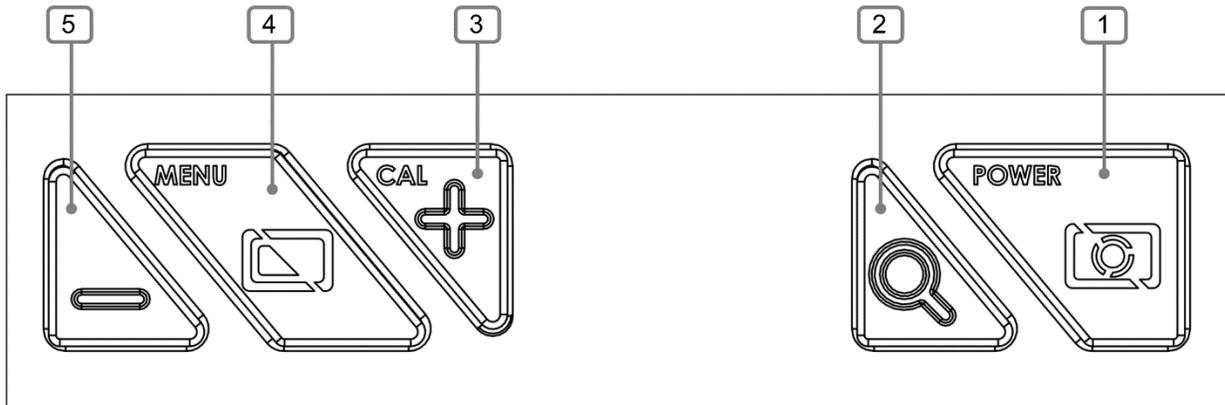
Figure 7. ATLAS Control Switches

For the following sections refer to the Figure 7 above.

Switching the Unit ON and OFF

To switch ATLAS on, press and hold Power/Photo switch (1) for three seconds. In order to turn the unit off, press and hold Power/Photo switch (1) for approximately two seconds.

Thermal Calibration

ATLAS requires calibration before each use (after powering unit up), if image becomes sub-optimal, or after significant change in ambient temperature. To calibrate the system, press and hold the CE+ / Cal Switch (3) for approximately two seconds.

ATLAS supports two calibration modes Blade and Scene. Desired calibration mode is selectable via the System Settings Menu (see below). At the factory, calibration mode is set to Blade. In Blade mode, calibration at startup is performed automatically without any user input by briefly closing the shutter located between image sensor and objective lens. The calibration in Blade mode occurs automatically when system determines that calibration is necessary but user can force calibration by pressing and holding CE+ / Cal Switch (3) for approximately two seconds.

NOTE: Blade calibration, while very convenient and automatic, does not take into effect the influence of the objective lens. In most cases it is not necessary, but if it appears that Blade calibration does not produce sufficient results it may be necessary to switch ATLAS to Scene calibration mode.

Scene calibration mode does not occur automatically and requires user to perform it manually. To do Scene calibration (if enabled in System Settings Menu) press and hold the CE+ / Cal Switch (3) for approximately two seconds while the objective lens is completely covered with objective lens cover, a hand, etc.

Focusing

To focus objective lens on the object of interest, rotate Objective Lens Focusing Ring (2) on

Figure 3 until image is sharp.

Diopter Adjustment

NOTE: The Ocular (eyepiece) lens of the ATLAS is a fixed focus lens and does not require any adjustments. It is set to zero diopters and can be used while wearing prescription eyewear or contact lenses.

Operating Modes and Menus

ATLAS binocular has the following operating modes:

Normal Mode

Normal Mode is used for observation with ATLAS. When the user powers up the ATLAS thermal binocular, Normal Mode is the default setting for the system.

Menu Mode

Menu Mode allows the user to conduct system configuration (choice of reticle, color, brightness, etc.) and review some of the system's parameters (part number and software version).

USB Mode

ATLAS will enter USB Mode when it is connected to the USB port of a Personal Computer (PC) with an optional USB cable. When ATLAS is connected to the USB port of a PC, its core electronics power up automatically, but the rest of the system remains off and there is no image displayed through eyepieces. In this mode it is possible, using appropriate software on the PC, to download images to the PC from the ATLAS unit and delete them from the ATLAS memory.

NOTE: It is possible to power up ATLAS using power from the computer's USB port and start the ATLAS in Normal Mode. In order to prevent ATLAS from going into USB Mode and, instead, power up in Normal Mode, press down and hold Power button while connecting ATLAS to the USB port. In this case it is still possible to download images to PC and delete them from the ATLAS but image is visible through the eyepieces and device can be operated as normal.

ATLAS Control Switches
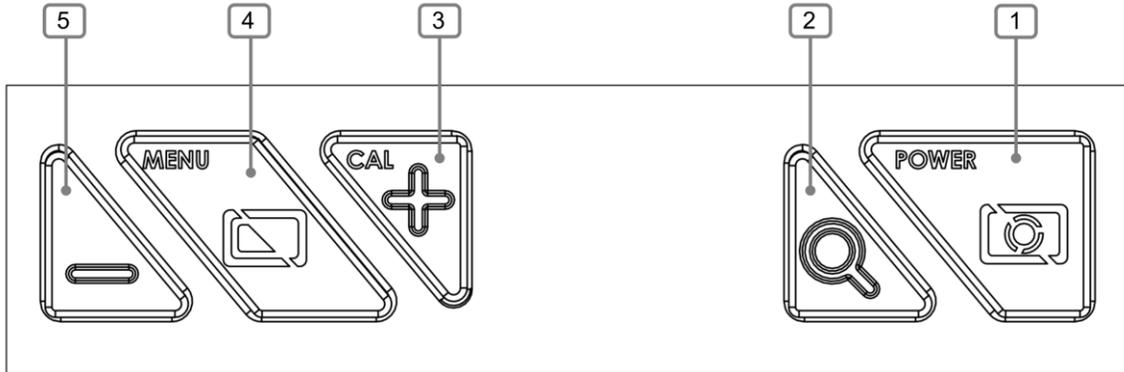
Figure 8. ATLAS Control Switches

Table 2 below provides descriptions of the switch functionality in different modes. Refer to Figure 12 above to identify the switches.

Table 2 Functionality of Switches in Different Modes

Normal Mode		
Individual Functions		
Switch	**Function (Marking)**	**Description**
1	Power / Photo (POWER)	Powers unit up if pressed and held for three seconds. Powers unit down if pressed and held for two seconds. Takes picture if pressed and released quickly. This only works if Enable Photo in Normal Mode is set to YES in Settings.
2	Digital Zoom (Magnifying Glass)	Cycles digital zoom settings (1X, 2X, 4X).
3	CE+ / Cal Switch (**+**)	Increases the Contrast Enhancement (CE) level of the image if pressed and released. Performs calibration if pressed and held down for 3 seconds
4	Black/White Hot, Color/ Edge Detection / Menu (**MENU**)	Changes White Hot/Black Hot, Color mode, Edge Detection mode if pressed and released. **NOTE**: Color mode and Edge Detection mode can be enabled or disabled in Video Settings Menu. Enters Menu Mode if pressed and held down for 3 seconds.
5	CE- (**-**)	Decreases the Contrast Enhancement (CE) level of

Switch	Function	Description
		the image if pressed and released.
Menu Mode		
Switch	**Function**	**Description**
Switch 1	Not Used	
Switch 2	Not Used	
Switch 3	Move	Move to the previous menu item
Switch 4	Select/Save	Select menu item to move to submenu or upper level menu or make item changeable. Save changed menu item.
Switch 5	Move	Move to the next menu item
Photo Mode		
Switch 1	Takes picture	Pressing and releasing Switch (1) will take a picture and save it to internal memory. Saved pictures later can be downloaded to a computer using the USB Mode.
Note about taking pictures: If Enable Photo is set to Yes in the SYSTEM SETTINGS MENU, pressing and releasing Switch (1) in the Normal Mode will take picture and save it to internal memory. It is recommended to set Enable Photo to No in order to prevent accidental picture taking in Normal Mode.		
USB Mode		
No switches are active in USB Mode unless Switch (1) was pressed and held down while unit was connected to the USB port of a PC. If Switch (1) was pressed and held down while unit was being connected to the USB port of a PC, all switches will function as in Normal Mode.		

Normal Mode Description

Normal Mode is used for observation with ATLAS. When the user powers up ATLAS, it always starts in Normal Mode. For controls available in Normal Mode see Table 2 above.

The following functions are supported in Normal Mode:

Taking Photos

Pressing and quickly releasing **Power / Photo** switch captures the image and saves it in the ATLAS memory. Saved pictures can be later viewed under Gallery in Menu Mode. Images can be downloaded later to a PC using the optional USB cable and software. Image Capture function is turned off by default. It can be enabled under the System Settings Menu in Menu Mode.

Zoom

The ATLAS features digital zoom (E-Zoom). E-Zoom is activated by pressing the switch marked with a magnifying glass symbol (Switch (2)). E-Zoom is used to magnify the center area of the image. The E-Zoom sequence allows the user to select multiple e-zoom factors. When the system is turned on, ATLAS will display images without any digital magnification. When the E-Zoom switch is pressed, ATLAS will sequence through 2X then 4X zoom then return to 1X. An indicator in the lower left corner of the display shows the current zoom setting.

Polarity

Black/White Hot, Color and Edge Detect modes

Pressing and releasing Switch (4) (marked **MENU** and corresponding icon) cycles through Black Hot, White Hot, Color and Edge Detect modes (in sequence).

Black Hot mode displays the heat sources as black. The cooler objects are displayed as increasingly lighter shades of gray while the coldest objects are displayed as white.

White Hot mode displays the heat sources as white. The cooler objects are displayed as darker shades of gray while the coldest objects are displayed as black.

NOTE: If preferred, Color mode and Edge Detect modes can be turned on and off under Video Settings Menu in Menu Mode.

Color mode assigns different colors to different temperatures and displays areas with different colors depending on their temperatures.

Edge Detect mode darkens areas of the image that are algorithmically not important and outlines objects that produce distinctive heat signature. This helps users stay focused for longer periods of time and quickly identify object of interest when it becomes visible.

Contrast Enhancement (CE) Adjustment

CE adjustment allows the user to increase or decrease algorithmic contrast adjustment of the image. CE adjustment changes parameters in a complicated gain and contrast adjustment logic that are tailored to make object(s) of interest appear as clear as possible.

NOTE 1: Different CE Adjustment settings maybe required for different observation conditions.

NOTE 2: CE Adjustment can be required when switching between radically different scenes, switching polarity of the image, etc.

Menu Mode Description

Refer to Figure 8.

Menu Mode allows user to conduct system configuration (choose brightness, contrast, enabled functionality, etc.) and review some of the system's parameters (part number and software revision). To enter the Menu Mode press and hold Switch (4) (**MENU**) for approximately three seconds.

Navigation in Menu Mode

To **move up** between menu items press Switch (3) (**+**).

To **move down** between menu items press Switch (5) (**-**).

NOTE: The triangular indicator on the left of a menu item shows which menu item is current.

Selecting a menu item: press Switch (4) (**MENU**). Selecting a menu option makes it possible to change its value or leads to immediate transition to upper or lower level menu.

NOTE: The triangular indicator on the left of a menu item switches color to **red** when the option is selected. When the indicator is red the corresponding setting can be changed.

Changing a menu item (if changeable): Use Switch (3) (**+**) to increase its value or Switch (5) (**-**) to decrease it.

To save the changed menu item press Switch (4) (**MENU**).

Main Menu

System Settings

Under this submenu, a user can change type of calibration, choose format of the output video signal (PAL or NTSC), turn analog video output off, and enable or disable taking pictures.

Video Settings

This submenu allows user to change display brightness and contrast, set contrast enhancement (CE) lever and image sharpness, turn on or off colorization and edge detection functionality.

System Info

In the System Info submenu a user can access the following information: software revision and model of the unit. There are no user modifiable parameters in this submenu.

Gallery

Gallery submenu allows user to review images that were saved to ATLAS memory.

Save and Exit

Selecting Save and Exit in the Main Menu brings the user back to the Normal Mode.

System Settings Menu

Calibration Type

This allows selection of Blade or Scene-type calibration.

NOTE 1: When Blade calibration is selected, the calibration is performed at startup automatically without any user input by briefly closing the internal shutter located between the image sensor and objective lens. When in Blade mode, calibration occurs automatically when the system determines that calibration is necessary but user can manually calibration the ATLAS by pressing and holding Switch (3) (**CAL**) for approximately three seconds.

NOTE 2: Blade calibration while very convenient and automatic, does not take into effect influence of the objective lens. In most cases, it is not necessary but if it appears that Blade calibration does not produce sufficient results it may be necessary to switch ATLAS to Scene calibration mode.

NOTE 3: Scene calibration mode does not occur automatically and requires user to perform it manually. To do Scene calibration press and hold the Switch (3) (**CAL**) for approximately three seconds while the objective lens is completely covered with objective lens cover, a hand, etc.

Video Output

This menu item allows user to configure analog video output format by choosing between PAL and NTSC or turn it off completely.

NOTE: Setting Video Out to OFF when no external monitor is connected will reduce total power consumption and will preserve the battery life.

Enable Photo

If Enable Photo is set to Yes, pressing and releasing Switch (1) in Normal Mode will take photo and save it in the ATLAS memory. If Enable Photo is set to No this functionality is disabled.

Save and Exit

Selecting Save and Exit in Settings Menu brings the user back to the Main Menu.

Video Settings Menu

Brightness

Adjusts display brightness between 1 and 8.

Contrast

Adjusts display contrast between 1 and 8.

NOTE: Brightness and contrast settings are closely related. In order to achieve the best possible viewing experience it may be necessary to try different combinations of brightness and contrast settings.

CE Level

Changes Contrast Enhancement level between 0 and 12.

NOTE: The contrast enhancement level represents a tradeoff between image dynamic range and contrast. Higher enhancement level makes smaller emittance differences more discernable but reduces the visible dynamic range.

Sharpness

Changes image Sharpness between 0 and 4.

NOTE: Live imagery can be enhanced by either sharpening or introducing slight blurring. **0:** Introduces slight imagery blurring. **1:** Leaves imagery as is. **2 – 4:** Introduces progressive level of sharpening.

Colorization

Turns on (**Yes**) or off (**No**) color enhanced imagery when switching polarity with Switch (4) (**MENU / Polarity**) in Normal Mode.

NOTE: Instead of an image ranging between black and white to represent different infrared emittance levels, there is a "false color" option to instead have an imagery that ranges from blue to red. In all settings, blue represents black and red represents white.

Edge Detection

Turns on (**Yes**) or off (**No**) Edge Detection mode when switching polarity with Switch (4) (**MENU / Polarity**) in Normal Mode.

NOTE: In Edge Detection mode the ATLAS outlines regions of the image with similar infrared emittance named "edge". The Edge Detection mode does not allow switching between White-Hot and Black-Hot modes, and displays the majority of the image as black and outlines similar emittance regions in white.

Save and Exit

Selecting Save and Exit in Video Settings Menu brings the user back to the Main Menu.

System Info Menu

The System Info Menu does not have any user adjustable setting. It allows the user to review system information: unit's Software Revision and Model.

Exit

Exit in the System Info Menu brings the user back to the Main Menu.

Gallery

When in the Gallery, user can review images that were saved in the ATLAS internal memory. The following commands are available.

To see the next image press Switch (3) (**CAL / +)**
To see the previous image press switch 5 (**-**)
To exit from the Gallery to the Main Menu press Switch (4) (**MENU / Polarity**)

Maintenance Instructions

Introduction

The ATLAS binocular is designed to be used in diverse environments and rugged conditions. It is recommended that regular and simple maintenance is performed for optimal system performance.

Preparing for Maintenance

Before performing any maintenance or cleaning of the system, remove all power sources from ATLAS including batteries and/or external power supplies.

Cleaning the ATLAS

When necessary, use a moistened clean cloth to wipe the outside of the unit, EXCEPT FOR THE OPTICAL SURFACES. Be sure to wipe away excess dirt and dust that may restrict the performance or damage moving and mating parts. If needed, the use of a highly diluted detergent solution is permissible. Dry with a soft clean cloth, or allow unit to air-dry before storing it.

Cleaning the Optics

When cleaning the lens is required, first blow any loose dirt or grit away from the surface of the lens. Use the supplied lens tissue, lightly moistened with water or lens cleaning fluid and lightly wipe the optical surfaces, using a circular motion. Discard each lens tissue after one use to avoid transferring grit or foreign matter onto the lens surface. If the lens remains dirty, use a cotton swab lightly moistened with lens cleaning fluid to remove the foreign matter from the lens. Dry with a clean, unused lens tissue.

Checking for Damage and Corrosion

As a general guideline, conduct an inspection of the ATLAS, accessories, and the case after every use. Look for heavy wear and cracks in rubber or plastic. Inspect for moisture or corrosion in the battery compartment. Check for scratches, condensation, and foreign matter on optical surfaces.

Description of Additional Functions

Electrical Interface

ATLAS is equipped with a 6-pin electrical connector (Hirose Electric Co Ltd 6 Positions Connector p/n HR30-6R-6P(71)) that is located on the bottom of the housing and is covered by a rubber push-in dust cup. The purpose of this connector is to provide the user with the ability to:

- Power the ATLAS from external USB power source
- Conduct observation using remote monitor
- Record video input from the ATLAS
- Download images from the ATLAS to PC
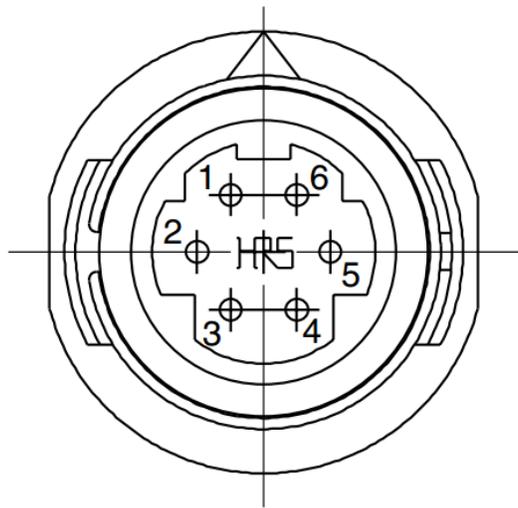
Figure 9. ATLAS Electrical Connector

Details for Electrical Connector pinout are provided in Table 3.

Per customer request, N-Vision Optics can provide the customer with electrical cables of different lengths and functionality. The customer may also make his/her own cable using the information from Table 4 and description below.

Figure 10 Optional ATLAS Cable

Table 3 6-Pin Electrical Connector

Pin	Function
1	Video Out
2	Video GND
3	USB VBUS
4	USB D (-)
5	USB D (+)
6	USB GND (-)

Video Out – Video Out – an analog TV video output signal in an SMPTE-170M / NTSC or PAL format with an output impedance of 75-Ohm. With the 75-Ohm termination, the output video is a 1 Volt peak-to-peak signal. Video Out must be terminated in order to get a video signal.

Video GND – output video ground reference; not to be used for any other ground than video.

NOTE: Most commercial displays / monitors will already contain internal terminations.

For advanced users only: USB_D (-), USB_D (+), USB_VBUS, USB Voltage Return – The TC is capable of communicating via a Universal Serial Bus. Please contact N-Vision Optics for details.

Troubleshooting

Refer to Table 4 below for troubleshooting instructions for most common problems. If the equipment malfunction is not listed or actions listed do not correct the fault, please contact N-Vision Optics.

Table 4 Troubleshooting Instructions

Malfunction	Test or Inspection	Corrective Action
Unit fails to turn ON.	Visually inspect. Check for defective, missing or improperly installed batteries.	Inspect Battery Compartment for damage. Replace battery or install correctly. Tighten Battery Compartment Cover.
Flickering image or unit turns off under light impact.	Visually inspect. Check for loose Battery Compartment Cover. Check battery charge level.	Tighten Battery Compartment Cover. Replace battery, if necessary.
The ATLAS is ON but there is no thermal image on the display	Visually inspect. Check if the Lens Cover is on or something else obstructs field of view.	Remove Lens Cover or other obstruction.
Poor image quality.	Visually inspect. Check for fogging or dirt on the Objective Lens or Ocular.	Clean optics. See maintenance section of this manual.

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