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OPERATING MANUAL

ASTROSCOPE NIGHT VISION

Export limitations: Because the AstroScope 9350 modules utilize state-of-the-art image intensifier technology, it is unlawful to carry these devices out of the country or to export them without an approved U.S. State Department export license.



WARNING: TO REDUCE RISK OF FIRE, ELECTRIC SHOCK OR DAMAGE, DO NOT EXPOSE THIS PRODUCT TO CONTINUOUS RAIN OR MOISTURE.

TO REDUCE RISK OF SHOCK AND TO REDUCE ANNOYING INTERFERENCE, USE ONLY RECOMMENDED ACCESSORIES.



CAUTION: DO NOT REMOVE THE COVER. THERE ARE NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

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1 INTRODUCTION TO ASTROSCOPE NIGHT VISION

1.1 Purpose of This Manual

This manual provides basic information and instructions for operating the AstroScope 9350 products, as well as procedures for troubleshooting. We suggest that you read this manual carefully and retain the manual for future reference.

1.1.1 How This Guide Is Organized

Important Safeguards: Precautions to take before using the equipment.

How Intensifiers Work and the Benefits of the 9350: Overview of how Intensifiers operate, along with night vision advancements and advantages of the 9350 units.

Set-Up and Operation: Description of how to prepare the 9350 unit for use, including camera and exposure settings.

Troubleshooting: Solutions to common problems.

Maintenance: Information on how to clean and store the 9350 units.

Product Specification: Information on current draw and environmental specs.

Night Vision Terminology: A glossary of the basic terms used when dealing with night vision.

Additional Information: Includes warranty and contact information for repairs and service.

1.2 Important Safeguards

- 1) **Read Instructions** - All safety and operating instructions should be read before the product is operated. Keep the instruction manual for future reference.
- 2) **Heed Warnings** - Adhere to all warnings on the product and in the operating instructions.
- 3) **Servicing** - Do not dismantle or otherwise attempt to service this product or any of the accessories yourself. Refer all servicing to Electrophysics qualified service personnel. Opening this product or its accessories will void the warranty.

- 4) Intensifier Protection – In order to assure long-life and high sensitivity performance, do not use during daytime or bright ambient conditions. Do not look at the sun or extremely bright objects. Do not look at bright objects for long periods of time as this may cause the intensifier tube to develop insensitive areas.
- 5) Accessories - Use only accessories and attachments recommended by Electrophysics.
- 6) Water and Moisture – These products are NOT waterproof. They are only resistant to occasional small amounts of moisture. Do not operate in continuous rain conditions or in high moisture environments.
- 7) Heat - The product should be situated away from heat sources such as radiators, heat registers, stoves, or other sources of heat.
- 8) Power Sources - This product should be operated only from the type of power source indicated here.
- 9) Cleaning - Do not use unauthorized cleaning fluids and materials. See Section 5.2 for proper cleaning instructions
- 10) Replacement Parts – Use only manufacturer-approved replacement parts and accessories.

Damage Requiring Service – Refer servicing to Electrophysics qualified service personnel under the following conditions:

- 1) If liquid has been spilled, or objects have fallen into the product.
- 2) If the unit has been exposed to rain or water and is now not operating.
- 3) If the product does not operate normally by following the operating instructions.
- 4) If the product has been dropped or damaged in any way.
- 5) If the unit exhibits a distinct change in performance.

1.3 Reference Guide



Bracket Series – see pg 2-11



9350 Bracket Series

200mm Lens – see pg 3-1

BBA-C Adapter – see pg 2-17



C-Mount
Video
Cameras

200mm Lens – see pg 3-1

Pocket Scope – see pg 2-21



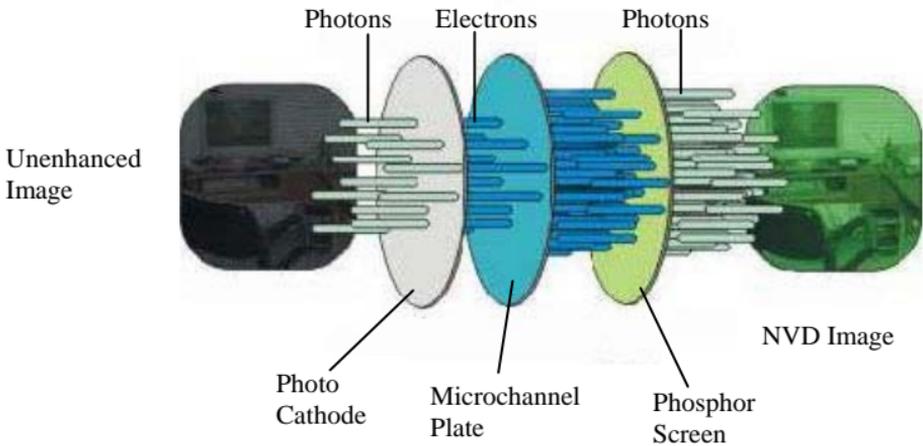
Eye Piece
Adapter

200mm Lens – see pg 3-1

1.4 How Image Intensifiers Work

Image intensifiers are predominant in night vision applications due to their ability to amplify low-light scenes at night, making them visible to the human eye and commercial cameras and camcorders. Unlike thermal images, image intensifiers can be used to read vehicle license tags and registration markings on boats and aircraft, as well as to recognize faces, which can be entered as evidence in criminal prosecutions.

The sequence to image formation in an image intensifier is as follows: light is converted to electrons then converted back to light, making intensifiers very simple devices featuring very high resolution and extremely low power consumption.



A night vision system based on an image intensifier operates as follows:



1. The very dim light reflected by scenes at night (lower than 0.1 lux) is focused by an objective lens onto a highly sensitive

photocathode. This dim light consists of energy in both the visible and near-infrared portions of the electromagnetic spectrum.

2. When the light impinges on the photocathode (the light sensitive portion of the image intensifier) electrons are emitted with amplitude determined by the photocathode's spectral responsivity and the amount of light energy. Because of the image intensifier's internal electrical field, these electrons are accelerated toward the microchannel plate assembly, the image intensifier's amplification mechanism.

3. The microchannel plate is a glass plate with millions of tiny closely-spaced channels bored through it. The plate is coated with a special substance that produces secondary electron emission when impinged by an electron. Due to the potential difference across the plate, an incident electron enters a channel and frees other electrons from the channel wall. These electrons are accelerated along the channel in turn striking the channel surface again and again, giving rise to more and more electrons. Eventually this cascade process yields a cloud of several thousand electrons, which emerge from the rear of the plate.

4. Electrons exiting the microchannel plate strike a phosphor that emits light proportional to the amount of electrons hitting it. The image is green because the selected phosphor glows green when charged. The green color is selected because the human eye can differentiate more shades of green than any other color.

5. Because the image is inverted, a fiber optic "twister" is used to rotate the image 180°.

6. A special relay optic focuses the image properly to match the image plane requirements of video and 35mm SLR cameras.

Image intensifiers exhibit several key features designed to optimize their use, as follows:

Automatic Brightness Control (ABC): An electronic feature that automatically reduces voltages to the MCP to keep the image intensifier's brightness within optimal limits and protect the image intensifier. The effect of this can be seen when rapidly changing from low-light to high-light conditions; the image gets brighter and then after a momentary delay, suddenly dims to a constant level.

Bright-Source Protection (BSP): An electronic function that reduces the voltage to the photocathode when the image intensifier is exposed to bright light sources such as room lights or car lights. It protects the image intensifier from damage and enhances its life.

Equivalent Background Illumination (EBI): This describes the amount of light you see from the output of the image intensifier when there is no light input. It increases with increasing temperature. EBI is measured in lumens per square centimeters and determines the light level, which equals the image intensifier's noise level. Below this light level, objects will be masked by EBI. The lower value of EBI, the better.

1.5 Evolution of Image Intensifiers

The image intensifier tube has evolved substantially over the past few decades. This evolution is described by different generations ("Gen") of technology as follows:

Gen 1 – These are the first so-called night-vision devices and were introduced in the early 1960s and first fielded in Vietnam. These devices utilized a multi-alkali S-25 photocathode having a spectral response extending from visible to about 850nm. In order to have sufficient sensitivity for use in night vision applications, three Gen 1 image intensifier tubes needed to be cascaded, each producing some gain. The result, though highly sensitive, suffered from significant edge distortion as well as poor life expectancy (less than 1000 hours).

Gen 2 – By the 1970s, the microchannel plate was introduced that delivered high sensitivity imaging without the need to cascade three stages. As a result, night vision pocketscopes and night vision goggles emerged as viable products with improved operation life (2000-4000 hours).

Gen 2+ – More recently, improved Gen 2 devices have been developed (known as "SuperGen") that deliver improved sensitivity and improved lifetime (10,000 hours).

Gen 3 – By the early 1990s, image intensifiers became available with photocathodes made from gallium arsenide. This produced significantly more sensitivity and an extended near-infrared spectral responsivity range to 950nm.

Gen 3 Thin Film – Introduced in 2002, thin film image intensifiers incorporate a new manufacturing technique, which have made it possible to increase further the unit's sensitivity, improve signal-to-noise and contrast performance and reduce blooming due to viewing bright sources.

1.6 Benefits of AstroScope Night Vision

The AstroScope Night Vision System is a modular system incorporating a "common module" approach in which the image intensifier is integrated into an assembly consisting of a front lens adapter and a back body adapter. The AstroScope System delivers several important benefits over other night vision systems. These include:

- **Optimized Performance:** Because of the modular design and the accessibility to the image intensifier, optical adapters and interfaces can be designed so that each configuration delivers optimized performance. This is due to the accessibility to the photocathode as well as the phosphor image output.
- **Seamless Integration into Daylight Imaging Systems:** The AstroScope's component interfaces are both electrical (where electrical contacts connect components) and mechanical. This results in a seamless integration with daylight imaging systems. As

a result, surveillance operatives that have been trained with daylight imaging equipment may insert an optimally-configured night vision module into the daylight lens/camera system and operate the equipment in virtually the identical fashion at night as compared to the day.

- **Reduced Technology Obsolescence:** Because of the AstroScope's modular design, this night vision system is never obsolete. As new cameras are introduced, new adapters can be designed that deliver optimal night-time imaging performance without the need to purchase an additional image intensifier. In addition, as new image intensifiers become available because of technology improvements, these image intensifiers can be purchased to deliver even higher performance with the existing adapters and camera equipment.
- **Fully Accessorized:** Adapters have been designed for optimized use on Canon EOS and Nikon digital and SLR cameras, as well as a wide range of Camcorders including the Canon XL1S, Sony PC-110, 120, and 330, C-mount CCD/CMOS cameras and as a viewer using an eye piece adapter.
- **Future Accessory Availability:** Electrophysics continues to lead the way in developing new and useful components and adapters for night-time surveillance applications.

2 ASTROSCOPE CONFIGURATION, SET-UP, AND OPERATION

2.1 Removable-Lens Camera and Camcorder Operation



This section describes the configuration set-up and operation of AstroScope Night Vision on removable-lens cameras and camcorders, such as Nikon SLR/Digital Cameras, Canon EOS type SLR/Digital Cameras and Canon XL Camcorders.

2.1.1 Required Components

The Nikon, EOS, and XL adapters pairs are pictured below. Handle each part carefully. If any of the optics becomes dirty, refer to the Maintenance section of this manual for cleaning instructions.

2.1.1.1 Nikon Components



9350NIK BBA side for Nikon Cameras.



9350NIK FLA side for Nikon Cameras.

2.1.1.2 Canon EOS Components



9350EOS BBA for Canon Cameras



9350EOS FLA for Canon Cameras

2.1.1.3 Canon XL Components



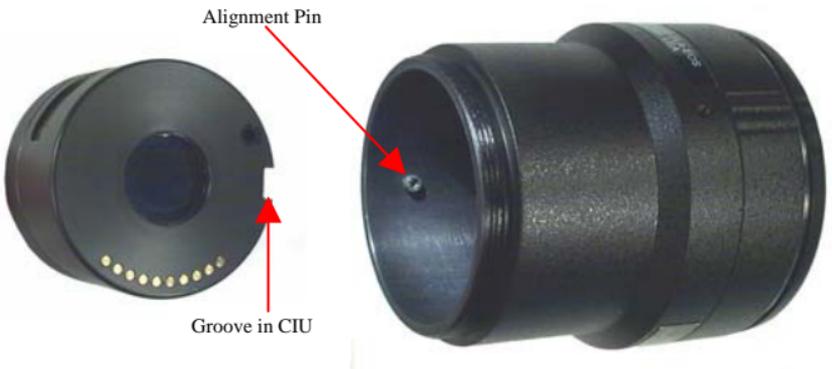
9350XL BBA for Canon XL Camcorders



9350XL FLA for Canon XL Camcorders

2.1.2 Assembly

The Front Lens Adapter (FLA) has an alignment pin on the inside wall. Align the pin with the groove on the side of the CIU and slide the CIU into the FLA.



The Back Body Adapter (BBA) has a silver alignment pin on the inside. Align this pin with the hole in the CIU and thread the BBA to the FLA.



2.1.3 Notes on Optimal Use

2.1.3.1 Use on Nikon Digital Cameras

1. In the “Shooting Menu,” select and set the ISO to 1600 or a comparable fast ISO setting. Some cameras limit the ISO to 800 while others allow up to 6400.
2. In the “Custom Functions” menu, select ISO Auto and turn it off.
3. In the “Custom Functions Menu”, select AF Assist and turn it off. This will prevent the focus assist light from turning on and helping the camera focus or give your position away.
4. The camera should be set in a “Manual Exposure Mode”, not Aperture, Shutter, or Program mode.
5. The lens iris should be set to its widest open position (f/1.4 as an example).
6. The shutter speed should start off at 1/30th of a second, as this is the slowest shutter speed you can hand-hold the camera. This can be adjusted to a faster shutter speed if directed by the camera’s meter.
7. Using the camera’s meter, you can adjust the shutter speed as required for a perfect exposure.
8. In extreme low-light conditions, you may want to adjust the “exposure compensation” to a +2 stop.

2.1.3.2 Use on Canon Digital Cameras

Note: To prevent the camera from making any noise, flashing, and illuminating the LCD panel, it is suggested to set the camera as follows:

1. Turn the dial on the top left to the “M” position.
2. Press the “Menu” button once.
3. Red-eye On/Off – Set to “Off”.
4. AEB – Set to “0”.
5. ISO – Set to a minimum of “1000”.
6. Beep – Set to “Off”.

7. Review – Set to “Off”.
8. File numbering – Set to “Continuous”.
9. Video system – Set to “NTSC”.
10. Custom Function (C.Fn) –
 - a. Press the center button. On the Canon D30, scroll down to number 5 and press the button again. Set to “Off” and press the button a third time. Press the “Menu” button twice and the display will turn off.
 - b. Night time exposure. On the Canon D60, scroll to number 5 and press the button again. Set to 1. It will not emit/Fire. Press the button a third time, press the “Menu” button twice, and the display will turn off.
11. To increase the ISO setting on the D60, with the camera in “M” manual mode, press and hold the “*” button on the upper right back part of the camera and turn the thumb wheel located just behind the shutter button until the bar is under the 2+. The ISO is now increased from 1000 to 4000.

Looking through the viewfinder, exposure information will be displayed on the bottom. The left number is the shutter speed. To the right of the shutter speed is the aperture. The three dots can be disregarded. “-1 2 ▼ 1 2+” is the exposure guide.

1. There is a wheel just behind the shutter release button. Turn the wheel until the shutter speed displayed in the viewfinder reads “30.”
2. On the back of the camera above the large thumb wheel is another On/Off switch. Turn it to “On.” The large thumb wheel will now change the aperture. Looking through the viewfinder, adjust the wheel until the 2.8 or the lowest number appears next to the shutter speed.
3. To the far right of that display is a “-1 2 ▼ 1 2+.” The best exposure is when the moving line is directly under the “▼.” To the left of the center arrow will produce a dark image and to the right will produce a bright image.
4. If there is too much light, use the wheel on the top of the camera to increase the shutter speed (60, 90, 125, 180...)

Shutter Speed Note: Never use a shutter speed slower than 1/30 sec. or the image will become blurred.

2.1.3.3 Use on Canon XL Camcorders

1. Secure the BBA side of the 9350XL to the Camcorder.
2. Secure the Lens to the FLA side of the 9350XL.
3. Turn the Camcorder on to the “M”, Manual mode.
4. Turn the Neutral Density filter on the lens “Off”.
5. Set the white balance in the “auto” position.
6. Adjust the aperture (iris) to f/1.6. As you zoom, the aperture will move to f/2.6. You will have to readjust the iris when you zoom out.
7. Adjust the shutter speed * to either 1/30 or 1/60 second.

8. Gain: The XL-1 has a maximum gain of +12db and the XL-1S has a maximum of +30db. As you increase the gain, the image quality decreases. Try and limit the gain to no more than +6db on the XL-1 and between 12-18db on the XL-1S.

**See the Canon operating instructions.*

2.1.3.3.1 EOS to XL Adapter

You can use the full line of Canon EOS lenses on the Canon XL-1S Camcorder with the use of the Canon XL-EOS Adapter. There is a magnification increase of 7.2x the focal length of the EOS lens (for example a 400mm EOS lens translates to a 2880mm lens on the XL-1S). You can use the XL-EOS Adapter with the AstroScope night vision system ONLY with the 9350EOS-Pair. The 9350XL-Pair will not function in conjunction with the XL-EOS Adapter.



Canon XL-EOS Adapter

2.1.3.4 Use on Film Cameras

1. Select a fast film with an ISO of at least 1000. The user can decide on black & white or color film, as both will provide excellent imaging. Black & white films have greater latitude and will produce a higher contrast image. Color films will provide the green images.
2. Turn the "auto-focus" switch to manual focus. The auto-focus cameras available today use a variance of contrast to attain sharp focus. At low-light levels contrast is not typically high enough for the auto-focus to operate effectively, therefore manual focus generally is faster and more accurate.
3. The camera should be set in the "manual exposure mode".
4. Adjust the lens to its widest aperture (e.g. f/1.4).
5. Adjust the shutter speed to 1/30 second as this is the minimum speed you can hand-hold the camera.

6. Using the camera's metering system, adjust the shutter speed to attain a correct exposure.

Note: All EOS and only Nikon Auto-S brand lenses may auto-focus with the AstroScope if there is enough light.

2.2 Non-Removable-Lens Camcorder Operation



This section describes the configuration set-up and operation of AstroScope Night Vision on non-removable lens camcorders.

2.2.1 Required Components

Below is a list of items included when you purchase a non-removable lens night vision camcorder. Handle each part carefully. If any of the optics become dirty, refer to the Maintenance section of this manual for cleaning instructions.



9350EPA



9350FLA-C



9350 Bracket (Actual Bracket may vary depending on camcorder)



9350 Camcorder Coupler (Actual Coupler may vary depending on camcorder)

lens ring until the object is in crisp, sharp focus. Only focus with the objective lens for crisp and sharp images.

NOTE: It is always best to select an objective lens that produces the desired magnification. Zooming with the camcorder objective lens will result in grainy, low contrast images.

2.3 C-Mount Camera Operation



This section describes the configuration set-up and operation of the AstroScope Night Vision C-Mount Cameras.

2.3.1 Required Components

The adapter pair for C-Mount Cameras is pictured below. Handle each part carefully. If any of the optics becomes dirty, refer to the Maintenance section of this manual for cleaning instructions.



9350BBA-C - The rear module consisting of a 1" C-Mount thread, detachable power cable and plug cap.



9350FLA-C - This is the C-Mount device into which the objective lens is threaded to.

2.3.2 Assembly

1. The FLA-C has an alignment pin on the inside wall. Align the pin with the groove on the side of the CIU and slide the CIU into the FLA-C.

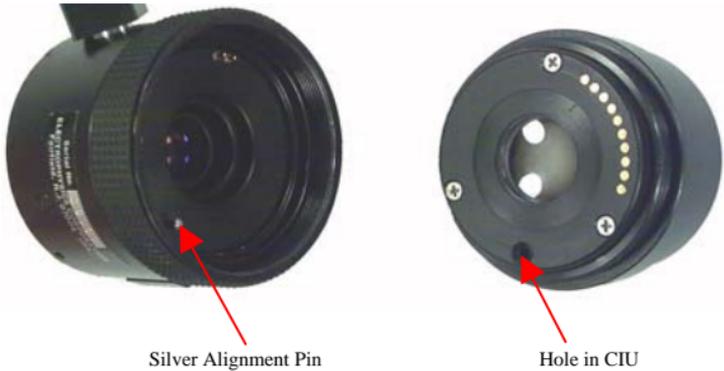


Groove in CIU



Alignment Pin

2. There is a silver alignment pin on the inside of the BBA-C. Align this pin with the hole in the CIU and thread the BBA-C to the FLA-C.



3. Attach the assembly to your c-mount camera.



4. Attach an objective lens to the front of the assembly.



5. Power the unit through the cable provided with 3 to 15 volts DC. The wire with the white stripe is positive.
6. Set the focus on the objective lens to a subject 15 feet (5 meters) away. While looking at a monitor, loosen the back focus lens locking screw to adjust the white plastic focus wheel on the BBA-C housing until the best image is obtained. This operation may need to be repeated to get the best image. Re-tighten the lens locking screw after satisfactory focus is obtained
7. Thereafter, only the objective lens needs refocusing to accommodate objects at different distances.

8. If desired, attach the plug protective cap to prevent inadvertent removal of the power plug from the unit.
9. If you wish to reorient the 9350BBA-C with the tripod mount at the bottom and the focus wheel on top, simply loosen knurled thumb screw located at the back side of the chassis and rotate the 9350 assembly with respect to video camera to the desired position.



2.4 Pocket Scope Operation



This section describes the configuration set-up and operation the AstroScope Night Vision Pocket Scope.

2.4.1 Required Components

Below is a list of items included with the unit. Handle each part carefully. If any of the optics becomes dirty, refer to the Maintenance section of this manual for cleaning instructions.



9350EPA



9350FLA-C



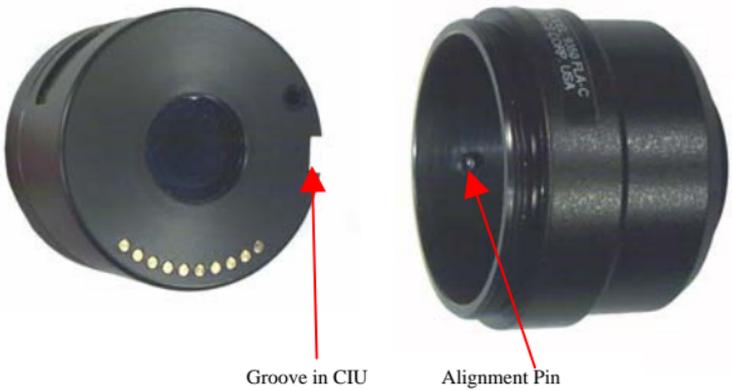
Eyepiece

2.4.2 Assembly

1. Loosen the battery door release to open the door. Insert two AAA batteries into the EPA, oriented as shown on the internal diagram. Close the door and secure the Battery Door release.



2. The FLA-C has an alignment pin on the inside wall. Align the pin with the groove on the side of the CIU and slide the CIU into the FLA-C.



3. The 9350EPA has a silver alignment pin on the inside. Align this pin with the hole in the CIU and thread it to the FLA-C



4. Thread the Eyepiece to the back of the 9350EPA about half way.



5. Thread the Objective Lens to the FLA-C.



6. Power the unit by turning the switch on the 9350EPA to the "On" position.
7. Set the lens at infinity and adjust the eyepiece for your vision.

3 ASTROSCOPE ACCESSORIES SET-UP AND OPERATION

3.1 200 mm Low-Light Telephoto Lens



3.1.1 Required Components

Below is a list of items included with the unit. Handle each part carefully. If any of the optics become dirty, refer to the Maintenance section of this manual for cleaning instructions.



200mm Lens



200mm Lens Hood



Tripod Mount



9350BBA EOS-N - * Supplied only when the EOS model is ordered.

3.1.2 Assembly

1. The 200mm Catadioptric Lens is shipped with the lens hood in the stowed position. *Note: The hood has a bayonet design, which allows you to remove it and reverse it, so that the lens can be stored in a compact form.*



2. To remove the hood, twist counter clockwise to unlock. Slide hood off to remove.



3. Reverse the hood and align the pins with the slots in the lens. Twist clockwise to lock in place.



3.1.2.1 Using the Tripod Mount

Note: The Tripod Mount is only required when using a tripod. The tripod mount is not used on units that include the 9350EPA, which already have an integral tripod mount.

1. The Tripod Mount has a flange on the inner part of the Clamping mount.



2. Install the Tripod Mount onto the back of the lens so that it touches the flange. Secure by tightening the knob screw.



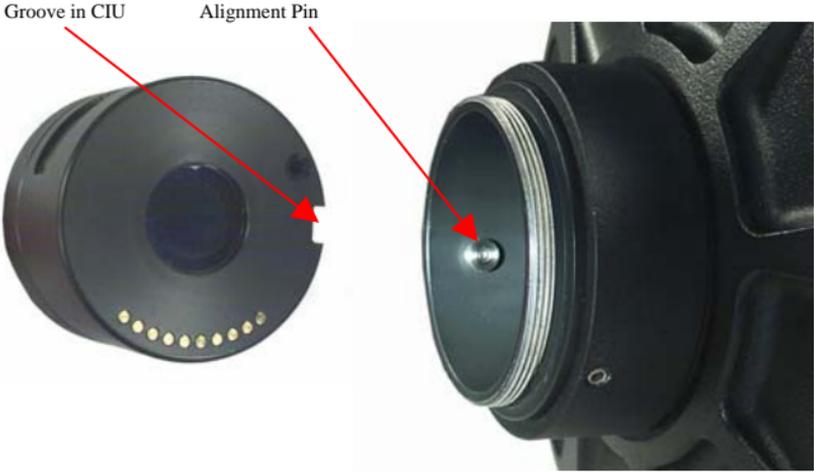
3. Secure the Tripod Mount to the tripod using one of the three holes on the bottom until the system is balanced.

**The Tripod Mount base can be reversed if necessary to balance a heavy camera system as follows: Remove the three screws from the bottom and rotate the base 180°. Secure the three screws back to the base and re-secure the Tripod Mount to the 200mm Lens.*

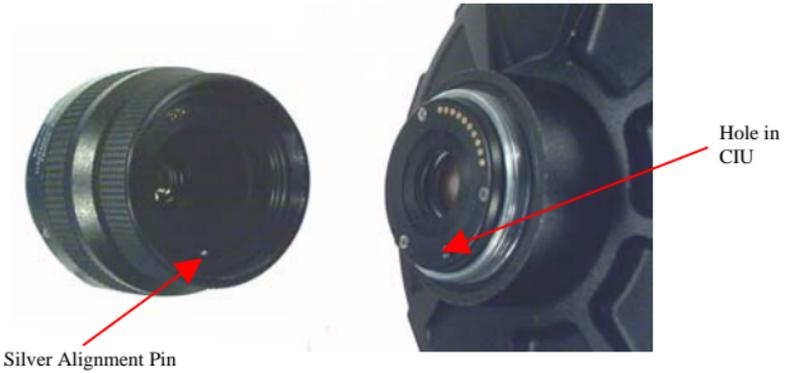


3.1.2.2 Installing the CIU

1. There is an alignment pin on the inside of the back end of the 200mm lens. Align groove in the side of the CIU with the pin, and slide the CIU into the 200mm Lens.



2. There is a silver alignment pin on the inside of the back body adapter. Align this pin with the hole in the CIU and secure the BBA to the 200mm Lens.



3.1.3 Notes on Optimal Use

3.1.3.1 Nikon

The AstroScope 200mm Catadioptric Lens has a fixed aperture of F1.3. Since there is no electronic communication between the camera and lens, the camera's automatic settings cannot be used. However, the CIU includes an internal automatic gain control feature so that a constant light output is maintained from the intensifier for most light levels. Consequently, we recommend adjusting the Nikon camera settings as follows:

1. Set the ISO to 1000 or higher. When using photographic film, use high speed film only, ISO1000 minimum
2. Set the camera to "Manual Exposure" mode.
3. Set the shutter to 1/30 second as a minimum speed.

4. Focus the objective lens as needed to optimize the image sharpness.

3.1.3.2 Canon EOS

The AstroScope 200mm Catadioptric lens has no aperture. It is permanently fixed at f/1.3. Since the camera has no electronic communication with this lens, you must manually set the camera's electronics to f/1.8 to attain correct exposure metering.

1. Install the 200mm Catadioptric Lens with EOS-N onto the camera.
2. Set the ISO to 1000 or higher.
3. Set the camera to "Manual Exposure" mode.
4. Set the aperture to f/1.8.
5. Set the shutter to 1/30 as a minimum speed.
6. Use the camera's metering to attain the correct exposure.
7. Focus the lens as needed.

3.1.3.3 9350 Bracket Series

1. Install the 200mm Catadioptric lens directly onto the EPA along with the CIU.
2. Focus the lens as needed.

3.1.3.4 Canon XL-1S

The Canon XL-1S camcorder can use the 200mm Catadioptric lens. The EOS-N adapter is required along with the Canon XL-EOS Adapter. The AstroScope XL pair is not used.

1. Remove the Canon 16x zoom lens from the camcorder.
2. Install the Canon XL-EOS adapter on to the camcorder.
3. Install the EOS-N adapter on to the 200mm Lens along with a CIU.
4. Secure the Lens and EOS-N to the XL-EOS adapter.
5. Set the camcorder to "Manual Exposure" mode.
6. Set the aperture to f/1.6.
7. Set the shutter speed to 1/30 second.
8. Focus the Lens as needed.

3.1.3.5 9350BBA-C Relay Lens Adapter

1. Install the 200mm Catadioptric Lens directly onto the BBA-C along with a CIU.
2. Focus the lens as needed.

3.1.3.6 9350 Pocket Scope

1. Install the 200mm Catadioptric Lens directly onto the EPA along with a CIU.
2. Turn the EPA on.
3. Focus the lens as needed.

4 TROUBLESHOOTING GUIDE

Symptom	Suggested Remedy
Vignetted Images	Using 35mm Nikon or Canon film cameras it is normal for some vignetting to occur on the left and right side of the image. Using Nikon or Canon Digital cameras having a sensor size of 5 Meg or larger can expect some vignetting. Smaller sensors will produce full frame imaging. Using Sony and other non-removable lens cameras will experience a vignetted image when the camcorder zoom is at its widest position. Zoom the camera until the image fills the screen.
Image is out of Focus	Using SLR type camera, focus normally using the cameras lenses. Using Sony and other non-removable lens camcorders require the camera to be set in the manual focus mode. Set the objective lens at a known distance (5 meters) and turn the camera lens ring until the image is sharp. You do NOT need to adjust the camera focus ring again. Focus only with the objective lens.
Image is too Dark	It is important to understand that all night vision devices amplify the available light. If the ambient lighting conditions are very low, it may be difficult to obtain a satisfactory shutter speed to hand hold the camera. Make sure the lens aperture is set to its widest position (ex. F/1.4). In conditions where the camera wants to shoot at slower than 1/30 second you should check the ISO setting. Film cameras require a film with at least and ISO of 1000 and digital camera require a minimum ISO of 800. You should increase the ISO on digital cameras when needed to shoot at 1/30 second.
Auto Focus Not Operating	The auto-focus systems on most cameras use a variance of contrast to focus. In low-light conditions, the contrast level is very low and the auto-focus systems may not operate efficiently. On Nikon camera only, the Auto-S lenses may auto-focus, non-Auto-S lenses will not auto-focus under any condition. Canon EOS lenses may auto-focus and the Canon XL 16X lens will auto-focus. It is generally faster to manually focus these cameras.

<p>No Information in the Viewfinder</p>	<p>Nikon cameras operated in the manual mode only, will provide accurate exposure information. Canon EOS camera operated in the manual mode will provide accurate exposure information. Nikon cameras using the 200mm Electrophysics lens will provide no information in the viewfinder. Canon XL camcorders provide complete information in the viewfinder regardless of the operating mode.</p>
<p>Flashing “No Lens” on the Canon XL Camcorder</p>	<p>Check to make sure the 16x lens is securely attached to the 9350FLA, the 9350BBA is securely attached to the camcorder and a CIU is properly installed inside the adapter pair.</p>
<p>No Power Using 9350BRAC Adapters</p>	<p>The 9350EPS requires two AAA batteries to power the CIU. If the batteries are dead, you will not see the green image in the viewfinder. The camcorder must be turned on as well.</p>
<p>No Power Using the Pocket Scope adapter</p>	<p>The 9350EPA requires two AAA batteries to power the CIU. If the batteries are dead, you will not see the green image in the eyepiece.</p>
<p>No Power Using the 9350BBA-C adapter</p>	<p>The 9350BBA-C requires a power source of 3-12 volts to operate. You will not see the green image if the power connection is not made.</p>
<p>Problems Using the 200mm Catadioptric Lens on a Canon EOS Camera</p>	<p>You must use the special EOS-N Back Body Adapter when using a Canon EOS camera. Set the camera to f/1.8 to interface with the lens. The standard EOS Back Body Adapter will NOT operate with this lens.</p>
<p>Non-uniform Image</p>	<p>Sometimes an intensifier tub exhibits a faint hexagonal pattern (honeycomb). This is a result of the manufacturing process.</p> <p><i>Note: Do not be concerned if you see this feature. It is an inherent characteristic found in light amplification night vision systems that incorporate a microchannel plate in the intensifier.</i></p>
<p>Dark Spots in Image</p>	<p>A few black spots throughout the image area are also inherent characteristics of all night vision technology. These spots will remain constant and should not increase in size or number.</p>

5 MAINTENANCE

5.1 Key Operational Parameters

5.1.1 Power:

<300mw (<50mA typical)

5.1.2 Environmental

Operating Temperature: -20° to 50 °C

Storage Temperature: -40° to 80°C

Water Resistance: Splash proof

Operating Humidity: 0-95%

5.2 Cleaning

Non-optical surfaces: The non-optical surfaces of the lens can be cleaned with water, mild detergents, and a soft cloth.

Optical Surfaces: The optical surfaces of the lens should only be cleaned when visible dirty. Care should be taken to avoid touching the exposed lens faces. Skin acid left behind with fingerprints can be damaging to coatings and lens substrates. First use a jet of air or blow across the surface to remove any sand or abrasive particles before cleaning. If oil, water spots, or fingerprints form on the optical surfaces, clean as soon as possible using a soft cotton cloth and mild neutral soap diluted with lukewarm distilled water (1 part soap to 100 parts water), followed by reagent grade isopropyl alcohol or acetone swab. Dust can be removed gently using alcohol or acetone swab.

Note: Avoid swabs that incorporate plastic stems, as some plastics will dissolve in alcohol or acetone.

6 WARRANTY

1. Electrophysics warrants that these products to be free from defects in material and workmanship. Any warranty described herein shall extend to the first ultimate user only for a period of one year from the date of shipment from our factory.
2. Electrophysics' obligation under this warranty shall be limited to furnishing a replacement for, or at our option, repairing any part which, to our satisfaction, proves defective, provided such part is returned to the Electrophysics service facilities in New Jersey, freight paid. No product may be returned without prior Electrophysics approval (see below).
3. Electrophysics shall not be responsible for installation costs. In no event will any claim for labor in removing or replacing defective parts or for incidental or consequential damages be allowed.
4. No warranty is made on products that have not been installed, operated or maintained in accordance with these instructions, or which have been subjected to misuse, abuse, accident or alteration or to improper or negligent use, maintenance, storage, transportation or handling.
5. Products not manufactured by Electrophysics which are sold by Electrophysics are covered exclusively by the original manufacturer's warranty and Electrophysics may, at its option, assign to Buyer its warranty claims against the original manufacturer of defective products in full settlement of Buyer's possible claims against Electrophysics with regard to such products.
6. Where Buyer is a distributor, financing company or similar entity acting for or on behalf of the initial user of the equipment, the warranty is transferable to the initial user only. In all other cases, the warranty is limited to the Buyer and is not transferable unless agreed to in writing by Electrophysics.
7. The Warranty contained herein is exclusive and expressly in lieu of all other warranties, written, oral, implied or statutory, including but not limited to expressed or implied warranties of merchantability or of fitness. In addition, Electrophysics shall not be liable for any loss, damage or injury of any nature, whether direct, indirect or consequential, in connection with or resulting from use of the products.

6.1 HOW TO RETURN PRODUCTS FOR WARRANTY REPAIR

1. Refer to the contact information for repairs and service.
2. A Return Authorization (RA) number will be assigned by the service department. This number must be marked clearly on the outside of the package being returned.
3. Service department will provide a shipping address.

4. The following information must be included on the packing slip:
 - A. Reason for return
 - B. Date and place of purchase
 - C. Installation date
 - D. Returned unit serial number
 - E. Description of problem
 - F. Return Authorization Number

6.2 HOW TO RETURN PRODUCTS FOR “OUT OF WARRANTY” REPAIR

Following expiration of the warranty period, the owner is financially obligated to pay for any repairs which are required. The owner may either return their product to their dealer and the dealer will take care of it, or, they may work with Electrophysics directly. If you choose to deal directly with Electrophysics, you may contact us through the phone number and address provided on the contact sheet at the end of this booklet.

You are required to provide the following information:

- 1) Model and serial number of product
- 2) Your shipping address
- 3) Your billing address (if different)
- 4) Your fax and telephone numbers
- 5) Description of the failure
- 6) Name of the point of contact

You will be asked for payment of an evaluation fee prior to beginning work. Following evaluation, when the extent of the repairs is known, someone will contact you and estimate the total cost of the repair. If you choose not to have the repair completed, you will still be liable for the evaluation fee. If you choose to authorize the repair, the equipment will be repaired and returned following receipt of payment.

7 CONTACT SHEET FOR REPAIRS AND SERVICE

Electrophysics Corporation
373 Route 46 West
Fairfield, New Jersey 07004
USA

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E-mail: service@electrophysics.com