

See without being seen:
special requirements of lighting for the military



Information for the Petzl sales force

1. Stealth: the absolute priority

1A. Stealth and signs

The greatest concern of a soldier during an operation is to secure his position. To avoid being found by the enemy, he needs to avoid any signs that might give him away.

- audible: manipulation of a weapon, radio, voice
- visible: lighting/flashings, reflection
- olfactory: tobacco, food, fire, gas

To create the STRIX line of tactical headlamps, Petzl therefore put the emphasis on this goal of maximum stealth. The motto: **see without being seen.**

• Audible signs:

- turning the knobs produces no sound
- rotation of the headlamp on the two axes (body and head) is also silent: no risk of creating audible "tilts"

• Visible signs:

- lighting functions are secured to limit possible risk of inadvertently signaling one's position
- several functions for setting lighting to the bare minimum
- use of matte color materials to limit reflection

1B. "Visible" and "infrared" lighting

The STRIX offers two types of lighting:

- **visible to the naked eye:** white or color (red, green, blue)
- **infrared:** invisible to the naked eye. It is used for night operations where soldiers need to see in the dark without giving away their position with visible lighting: reading a map, moving around, route-finding...

Sequence of modes: from most discreet to least discreet

"Visible" and "infrared" lighting always sequence from least visible to most visible

- visible lighting: colors => low white => strong white
- infrared: low mode => strong mode => blinking (IFF)

1C. Zoom on infrared

The design of the STRIX headlamp has a major security requirement: to limit the risk of improper manipulation as much as possible for the user. For example, it should be nearly impossible for the user to confuse an infrared mode change with turning on the visible lighting.

• Limited risk of involuntary manipulation:

- Infrared is controlled by a different knob than the one for visible lighting => limits the risk of confusion during manipulations
- It has absolute priority: it instantly turns off visible lighting if it is turned on
- When the STRIX IR is in infrared mode, visible light will not operate even if the button is rotated: no risk of operator error

• Control of infrared status

Since infrared rays are invisible to the naked eye, it is impossible to "see" whether the STRIX IR's infrared is turned on: the infrared control knob has a ridge that allows the user to visually or manually check whether the infrared is in the "OFF" position

1D. Zoom on visible lighting

- **Rapid shut off:**

- For any mode used, a simple backwards rotation of the knob instantly turns off the headlamp. No need to go through all the modes. "Scan" function: when a soldier needs visible lighting for a very short time (e.g., to get a visual of the terrain), he can access the desired mode and hold the button down; when he releases it, the headlamp returns to its previous setting

- **Limited risk of involuntary manipulation:**

- "Lock" function: locks the button in the chosen mode and thus prevents turning it on, or an accidental mode change. However, rapid shutoff is always possible
- This function also guarantees that the STRIX remains turned off during transport or storage

2. Understanding the functioning of night vision equipment

2A. How do night vision goggles work?

In order to see at night without being located, soldiers use Night Vision Goggles (NVG). These are equipped with a light amplifier that amplifies ambient light (moonlight, stars, city lights) thousands of times.

- When this ambient luminosity is sufficient, the goggles are used in «**passive mode**». They do not emit any light since they only take advantage of existing light. This mode ensures greater stealth since even if the enemy is also equipped with NVGs, he will not perceive any light coming from the soldier
- When ambient light is not sufficient (cave, underground, dark night...), NVGs can be used in «**active mode**». The soldier turns on an LED that is integrated in the product which emits infrared. This extra light greatly improves the quality and precision of the image

The quality of vision depends primarily on the generation of goggles since this technology is constantly evolving. The American forces and their allies always have the most sophisticated equipment. They therefore maintain an advantage over other forces, which are more and more frequently equipped with these types of goggles, particularly due to equipment seized in conflict zones.

2B. Why use an infrared headlamp with night vision goggles?

To minimize weight, most NVGs function with only one AA or CR123 battery. Therefore, the integrated LED emits a very low light in order to limit energy consumption.

When the integrated infrared lighting is insufficient for ensuring comfortable night vision, the soldier uses an additional infrared source: a headlamp.

2C. Why is vision through night vision goggles green?

There are several reasons:

- This is the color the eye is most sensitive to. It allows the eye to easily readjust to the nocturnal environment when the soldier removes his NVGs
- It is a less aggressive color for the eye
- The green allows the soldier to distinguish many nuances, providing more precision to the observation