RM QUIZ THERMAL WEAPON SIGHTS AND INTENSIFIERS

1. What do thermal sights use to function?

2. The TWS is composed of five functional groups:

3. Military grade weapon thermal weapon sights are designed with what advantages?

4. What is a major concern for effective use of thermal optics?

5. How do thermal optics work?

6. How do image intensifiers work?

7. Image intensifiers generally operate on the principles of convection, conduction, and radiation by:

8. What conditions create suboptimal function with thermal and image intensifiers?

9. Which situations can IR see better?

10. What are the disadvantages of using a thermal weapon sight?
11. Pointer/Illuminator/Laser. These aiming devices use either a laser beam, flood light, or other light to aim the weapon at the target. What three types of illuminators does the army use?

12. What are the basic two functions of PEQ systems?

13. What are AN/PEQ-2 aiming devices?

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15. How is the aiming light activated?

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1. What do thermal sights use to function?
    a. They use advanced forward- looking infrared technology that identify the infrared emitted radiation (heat) of a field of view, and translate those temperatures into a gray- or color-scaled image. The TWS is capable of target acquisition under conditions of limited visibility, such as darkness, smoke, fog, dust, and haze, and operates effectively during the day and night.
2. The TWS is composed of five functional groups:
    a. Objective lens - receives IR light emitting from an object and its surroundings. The objective lens magnifies and projects the IR light.
    b. Detector assembly - senses the IR light and coverts it to a video signal.
    c. Sensor assembly - the sensor electronics processes the video for display on the liquid crystal display (LCD) array in the field of view.
    d. LCD array/eyepiece - the LCD array provides the IR image along with the reticle selected. The light from the LCD array is at the eyepiece.
    e. User controls - the control electronics allows the user to interface with the device to adjust contrast, thermal gain, sensitivity, reticle display, and magnification.
3. Military grade weapon thermal weapon sights are designed with what advantages?
    a. Small and lightweight.
    b. Real-time imagery. Devices provide real-time video of the thermal scene immediately after power on.
    c. Long-lasting battery life. Low power consumption over time.
    d. Reliable. Long mean time between failures (MTBF).
    e. Quiet. The lack of a cooling element allows for a very low operating noise level.
    f. One optic fits on multiple weapons. The use of the ARS rail mounting bracket allows for the same optic to be used on other weapons.
    g. The F- and G-models attach in front of other aiming devices to improve their capabilities and eliminate the zeroing procedures for the device.
4. What is a major concern for effective use of thermal optics?
    a. Not only understanding how they function, but also what they can "see". Each device develops a digital representation of the scene or view it is observing based on what frequencies or wavelengths it can detect within the electromagnetic spectrum.
5. How do thermal optics work?
    a. This equipment operates in the mid- and far-wavelength of the infrared band, which is the farthest of the infrared wavelengths from visible light. Thermal optics cannot translate ("see") visible light. Thermal optics cannot "see" infrared equipment such as infrared (IR) strobe lights, IR chemical lights, illuminators, or laser pointers. They can only identify emitted radiation in the form of heat
6. How do image intensifiers work?
    a. This equipment, such as night vision devices, use the near area of the infrared spectrum closest to the frequencies of visible light, as well as visible light to create a digital picture of the scene. These systems cannot "see" or detect heat or heat sources.

7. Image intensifiers generally operate on the principles of convection, conduction, and radiation by:
    a. The sights "picking up" or translates the IR wavelength (or light) that is emitted from a target scene through one of those three methods.
8. What conditions create suboptimal function with thermal and image intensifiers?
    a. Rain - absorbs the IR emitted by the target, makes it difficult to see.
    b. Water - acts as a mirror and generally reflects IR, providing a false thermal
    c. scene.
    d. Glass - acts similar to water, interfering with the sensor's ability to accurately detect emitted radiation behind the glass.
9. Which situations can IR see better?
    a. Smoke - will not obscure a target unless the chemical obscurant is extremely hot and dense, or if the target is sitting on top of the smoke source.
    b. Dust - may interfere with the accurate detection of the emitted thermal
    c. signature due to dust and debris density between the sensor and the target
    d. scene. Dust typically does not obscure the IR signature unless its temperature
    e. is similar to the target's.
10. What are the disadvantages of using a thermal weapon sight?
    a. Cannot interpret ("see") multispectral infrared. These systems view a specific wavelength for emitted radiation (heat variations), and do not allow viewing of all aiming and marking devices at night.
    b. Reliance on rechargeable batteries and charging stations. Although the batteries are common and have a relatively long battery life, additional equipment is required to charge them. If common nonrechargeable (alkaline) batteries are used, a separate battery adapter is typically required.
    c. Cannot interpret thermal signatures behind glass or water effectively.
11. Pointer/Illuminator/Laser. These aiming devices use either a laser beam, flood light, or other light to aim the weapon at the target. What three types of illuminators does the army use?
    a. Advanced Target Pointer Illuminator Aiming Light (ATPIAL).
    b. Dual Beam Aiming Laser-Advanced (DBAL-A2).
    c. Illuminator, Integrated, Small Arms (STORM).
12. What are the basic two functions of PEQ systems?
    a. Pointer. When used as a pointer or aiming device, a small, pin-point beam is emitted from the device. The IR beam provides an infrared visible point when it strikes an object or target. The IR beam operates in the 400 to 800 nanometer wavelength and can only be seen by I2 optics, such as the AN-PVS-7 or -14 night vision devices.
    b. Illuminator. Typically used to illuminate a close quarters area as an infrared flood light. The illuminator provides a flood-light effect for the Soldier when used in conjunction with I2 night vision devices.
13. What are AN/PEQ-2 aiming devices?
    a. Class IIIb laser devices that emit a collimated beam of IR light for precise aiming and a separate IR beam for illumination of the target or target area (see figure

3-14 on page 3-21). Both beams can be independently zeroed to the weapon and to each other. The beams can be operated individually or in combination in both high and low power settings.

14. What are PEQ systems commonly used with?
    a. Night observation devices (NODs) and can be used as handheld illuminators/pointers or mounted on the weapon with the included brackets and accessory mounts. In the weapon-mounted mode, the aiming devices can be used to direct fire and to illuminate and designate targets.
15. How is the aiming light activated?
    a. Either switch connects power from two AA batteries to an internal electronic circuit which produces the infrared laser. Internal lenses focus the infrared light into a narrow beam. The direction of the beam is controlled by rotating the mechanical Adjusters with click detents. These adjusters are used to zero the aiming light to the weapon.
16. How do aiming lights work when zeroed to the weapon?
    a. The aiming light projects the beam along the line of fire of the weapon. The optical baffle prevents off-axis viewing of the aiming light beam by the enemy.