

The effect of Lasers on Telescopic and Ring Sights

The laser produces a narrow, powerful, beam of monochromatic light either in visible or infra-red. This light is transmitted through the optical glass used in sights.

A telescopic sight has a black reticle in the focal plane so the laser beam is focussed onto it, through it and into the aiming eye being focussed again onto a spot on the retina. Damage can be caused to the reticle and to the retina. This damage can be reduced by absorbing or reflecting the laser beam. Absorption of the beam causes the target scene to be dimmed for the aiming eye and spoils low light performance. The dimming causes the pupil of the aiming eye to dilate so collecting more of the laser beam and offsetting the absorption. The laser beam can be reflected by a dichroic coating tuned to the laser frequency but if a variety of frequencies is used by the enemy it will be difficult to optimise the coating.

Increasing the magnification of the telescopic sight necessitates making the objective lens larger. This increases the likelihood that the laser beam will be intercepted and, if the laser beam is wider than the objective diameter, will increase the damage to the aiming eye.

A Ring Sight has a white reticle imaged at infinity, and superimposed on the target scene by a PDR (plano-doublet reflector). The PDR includes a beamsplitter surface to achieve this; this beamsplitter may be of aluminium transmitting 20 to 25% of the incident light (as a result the reticle pattern appears bright against the target scene). While the pupil of the aiming eye will dilate to offset the lower light level, this will not match the diminution of the power of the laser beam. So the aiming eye looking through a Ring Sight will be less exposed than a naked eye. In addition, since the Ring Sight is unit power, there is no damage caused by magnification.

Ring Sights can have dichroic beamsplitters; if red LED illumination of the reticle is used, the beamsplitter will preferentially reflect red and transmit the rest. So, provided that the laser beam is the red or infra-red, it will be reflected and the damage to the aiming eye reduced.

In Ring Sights the reticle is usually lit by ambient light. This light is not focussed on the reticle but is gathered over a significant angle. So a laser beam will fall all over the reticle at a low intensity (as it is not focussed as it is in a telescopic sight) and is unlikely to harm it. Since the reticle is mostly opaque, with quite thin lines forming the pattern, little laser light will penetrate it to be focussed by the PDR onto the retina of the aiming eye.

To summarise:-

Ring Sights are inherently less affected by lasers than conventional telescopic sights;

In Ring Sights much of the laser energy is reflected by the PDR and some is absorbed by it;

The laser beam is not artificially focussed onto the retina of aiming eye or onto the reticle.

The reticle is opaque reducing the risk of focussing the laser beam through it onto the retina;

The principle of Ring Sights makes them a better choice than telescopic sights if laser attacks are expected.