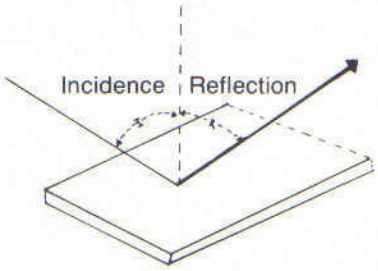
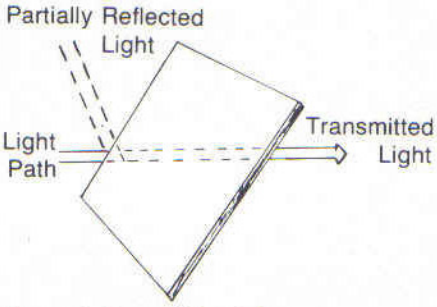
The Basic Laws of Reflection: the light's reflected angle (R) is always equal to that of the incidence light (I). The imaginary "normal plane" is at right angles to the reflecting surface, where the rays meet. The (I), (R), and "normal" always lie in the same plane. The reflected image appears laterally reversed, and is as far behind the reflecting surface as the subject is in front of it.[4] In addition to the complex dichroic coating on the prism, the majority of cameras employ trimming filters to attenuate the undesirable light characteristics generated by the dichroic coating.



Basic Law of Reflection

Trimming Filters: the trim filters are used to effectively remove the unwanted admixtures of light. The trim filters are also used to improve the spectral characteristics at the rise and cascade edges of the dichroic coating. This feature is designed in to improve the color reproduction characteristics of the camera. It thus becomes obvious that the prism assembly plays a significant role in determining the faithfulness of the color reproduction.

Transparency, Transmission of Light: since there is a great deal of glass with optical coatings in the light path and since that light must travel a relatively long distance to the photoconductive target it is imperative that the prism block be as optically transparent as possible. By transparent, I refer to passing almost as much light from its rear exit point to the photoconductive tubes as enters from the rearmost element of the lens. I have included a definition and diagram to further clarify the term transparency. In a transparent medium... as light meets a transparent material, some is reflected, a little is absorbed, most passes through. A colored medium transmits its own color, and absorbs all others. The proportion passed is its transmittance factor (transmittance). Transmission of 100% equals a transparency of 1. A glass to air surface transmits about 90% of incident light.[5]



Transmission of Materials

Flare: is caused by light being partially reflected as it tries to pass from air through the plane of a glass surface. This same principle applies to the optical glass in a television lens.

A television zoom lens contains many elements with specific refractive indices. As we know air and glass have different refractive indices. Thus, as light passes from air to glass, you get a degree of reflection in the neighbourhood of between 4 and 10% at each surface. This would ordinarily result in a considerable loss of light as the light passed from element to element within the zoom lens. To counteract this problem, and to eliminate flares and ghosting within the zoom lens, each lens element is coated with multiple layers that utilize interference properties to reduce reflection and increase light transmission.

The type of flare that we are accustomed to seeing in the craft of lighting is caused by stray light impinging on a lens surface at an angle that reflects the interior surfaces of the lens assembly down the optical path. It is the diffuse property of soft light that makes it "wrap around" objects and produce that wonderful quality that we've become accustomed to. It is also this diffuse quality that often gives rise to flare, as this soft light is difficult to restrict or flag off of objects that we don't want lit; such as a lens.

Spectral Characteristics: on occasion, most of us have been frustrated by a camera that seemed to be properly color balanced (e.g., all the correct electronic indicators) but the edges of the frame appeared to have a color cast. This is most likely a white shading problem caused by the properties of light. Since the angle of incidence at which light strikes the dichroic coating is different at the edge of the frame than it is at the center of the image, this can give rise to a magenta or a greenish color cast. The degree to which this phenomena occurs is related to the exit pupil of the lens. Taking into account the various angles of incidence that result in different light paths through the dichroic layers, it is reasonable to assume that there would be variations in the color separating characteristics. *Note*: as a rule of thumb, it should be noted that as the angle of incidence increases, the greater this characteristic shifts towards the direction of the shorter wavelengths. This is where the exit pupil comes into play.

Exit Pupil: refers to the virtual image of the diaphragm formed by the lenses behind the diaphragm (the exit pupil is located at a distance from the image plane either in front of or behind the image plane). As mentioned previously, a television lens is similar to a film camera photographic lens with several important exceptions. The most important difference in relation to the exit pupil is the prism block assembly which is coupled to the lens. The exit pupil is located in such a manner to counteract the phenomenon whereby; as the angle of incidence of light rays striking the dichroic coating on a prism changes direction the nearer the exit pupil is to the image plane, the greater are any shading problems. Even with the exit pupil properly located some degree of white shading is to be expected as previously mentioned. A beam of light rays leaving a zoom lens diverge from a point on the exit pupil. This directs the light rays to the upper and lower edges of the image, resulting in shading that creates a green or magenta cast at the bottom or the top of the raster. *Note*: manufacturers of cameras orient the spilt in the prism so that any shading which occurs at the top or bottom of the frame is less evident. Our eyes are less critical of shading errors if they are oriented so that magenta is at the top and green is at the