

# LIGHT Education

## Television

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**Topic:** Educational Lighting Site

In a television studio, when a few telecameras are used, general lighting is used, and in order to attenuate the contrast of a scene, lights are added to reinforce and/or substitute the filling light.

### PHOTOGRAPHY

The classic configuration based on the three points of lights is the basis of lighting for photography.

It is thanks to the evolution of this system that the lighting systems for television and cinema were created.

The key-light is the primary source of lighting; its main characteristic is to illuminate the subject or the area of interest with a “hard” light, e.g. sun light.

In a conventional situation, this light corresponds to a beacon positioned horizontally within a 45° angle either on the right- or on the left hand-side of the camera, and not beyond 45° on the vertical plane. The photographer interprets the subject on the basis of the characteristics of this type of light and of the position of the chosen key-light.

The filling light is the secondary source of light whose characteristic is to diffuse a “soft” light, in order to fill up the blind areas created by the key-light; moreover, it has the function of diminishing the contrast field, in order to allow the exposition of blind areas on the film. The filling light is usually positioned on the opposite side of the key-light and on the same plane of the camera.

According to the desired contrast or the depth of field, the quantity of filling light will be equal to that of the key-light (little contrast, little depth of field) or null (maximum contrast, maximum depth of field).

The conventional ratio between secondary and primary light is 1:4.

The third light source is the false light, whose function is that of separating the subject from the background, thus creating the illusion of third dimension.

In general, it is a beacon positioned so that it does not glare the photocamera. The angle is approximately 45° in vertical position, except for special effects, and along the horizontal axis of the camera.

Thanks to its angle, the false light does not influence much exposition: intensity values are approximately those related to the key-light. When the subject is over/underexposed, it is common practice to change the lens aperture; then the luminosity of the beacon causing this effect is either attenuated or increased. It is thus necessary to find the right exposition for the subject and to reduce overexposed areas.

For wide lens apertures (f-2) the camera accepts low levels of light, but the depth of field is minimum; for small lens apertures (f-16) the depth of field is noticeably greater, but a stronger light intensity is required.

If we close the lens aperture, e.g., from (f-4) to (f-8); it is necessary to increase by four times the range of light in order to maintain the same exposition.

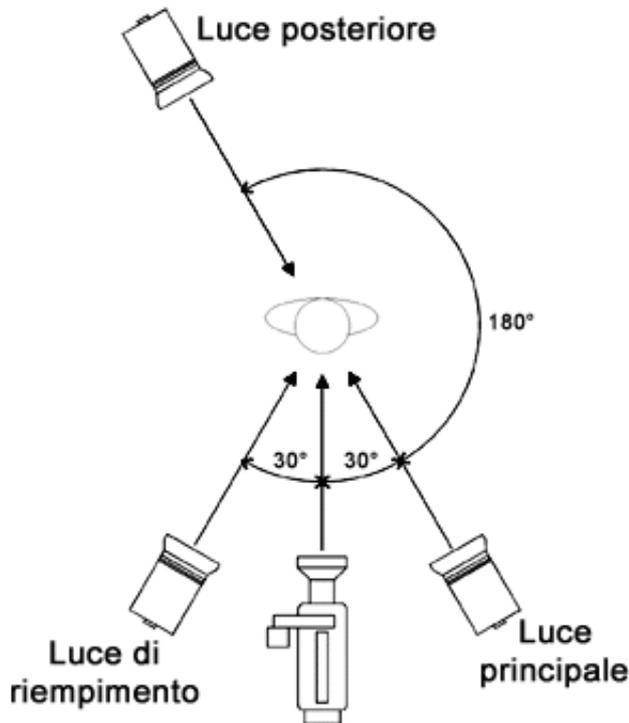
### TELEVISION

In a television studio, when a few telecameras are used, general lighting is used, and in

order to attenuate the contrast of a scene, lights are added to reinforce and/or substitute the filling light.

Generally speaking, this light comes from above to avoid problems related to the movements of the telecameras.

In order to balance the effect of the primary light, a supplementary key-light can be used when the subject is filmed by few telecameras. The intensity of this light must be accurately checked, so that the modelling characteristics of the primary light are not ruined.



The quantity of light necessary to illuminate the face of the subject amounts to about 2700 lux, the colour temperature to 3200K. For other areas of the studio a quantity ranging from 1100 to 2200 lux and a colour temperature between 2800 and 3200K will be sufficient.

Those values provide an acceptable tolerance for general lighting.

Sudden changes of the level of lighting and of the colour temperature in any area of the studio are not desirable, the ratio between front light and false light is 1:1.

In order to create both key-light and false light, it is possible to use beacons with Fresnel lens or beacons without lens, which have been opportunely positioned in closer proximity to the subject.

This closer proximity compensates for the difference related to quality of light or the characteristics of the light ray. The beacons used for the background or for stage elements can be relatively smaller; however, they must produce wide and uniform rays in order to correctly illuminate the background, so as to avoid unwanted shadows.

It is possible to obtain a softer light by inserting a diffusion disk in front of the above-mentioned beacons.

Let us consider now another instance of television-making, the sporting event. The lighting necessary for TV shootings of sporting events amounts to 1100-1300 lux, both for indoor and outdoor shootings.

However, we must take into consideration the fact that, when there is a considerable distance between the telecamera and the field, the TV operator will use a zoom lens for close-ups.

In this case, the light for the telecamera will be substantially increased to obtain a better image.

It is a good rule that the difference between the level of the lowest and the highest lighting of the field does not exceed 5 percentage points every 3 meters. Most sporting events begin in daylight and end at nighttime under artificial light.

Light sources that provide a colour temperature of about 5000 k (metal halide lamps, etc.), bridge the gap created by the passage from daylight to twilight (6000-4500K), thus avoiding the operator the problem of rebalancing the colour temperature. For shootings of sporting events the rules of uniform lighting apply: they minimize glares, there is no variation of either the luminosity or the position of the beacons during the sporting event.

For colour telecameras, the signal-noise (S/N) ratio, measured in decibel (dB), establishes a minimum level of lighting necessary for the television shooting. In general, 40-45 dB are needed, in order to obtain an acceptable quality of the image.

Below is shown a reference table of the dei values related to the aperture of the lens and illumination-lux.

Exposition

f/stop-lux f/2 f/2,8 f/4 f/5, f/8

1/50 sec 325 650 1300 2600 5200

1/100 sec 650 1300 2600 520 10400

N.R. In black and white, or monochrome television, only one telecamera is used which transmits an electric signal to the receiver that gets stronger the more intense is the luminosity of the point explored in the scene to be transmitted. intensity.

In colour television, the scene to be transmitted is shot with three telecameras, one is equipped with a red filter, one with a green one, one with a blue filter. Thus, the receiving station sends three simultaneous informations, which tell us how much red, green and blue is contained in each point of the image.

The receiving television is built so as to collect informations and transfer them to the three electronic beams. Each beam stimulates the relative phosphorous as in the additive synthesis. The synthesis takes place on the retina of the eye, provided that the distance from the screen is such as to combine the three stimulated phosphorous molecules into only one image.

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