

Appendix A - Television camera lens sensitivity

Television camera sensitivity depends on two factors: the efficiency of the light sensitive area (Charge Coupled Device or CCD) that converts light energy into an electrical signal; and the amount of light that the lens transmits from the scene. As the CCD sensitivity is fixed, the only method of altering the camera's response to varying scene illumination is to adjust the amount of light entering the lens. This is achieved by means of an iris-diaphragm in the light path. This opens and closes like the iris in a human eye and increases or reduces the effective aperture through which light can enter the lens. The position of the diaphragm is indicated by f-numbers. Typical values will cover the range f2.8 – f22. The lower the f number the more light is passed.

One consequence of opening up the lens aperture to provide more light and thus more sensitivity is that the depth of field reduces. Depth of field is the depth of the image in sharp focus. In other words if a lens is focused on a person's eyes, at its minimum aperture, typically f22, the eyes, the nose, in fact the whole body and most likely the background as well will all be in sharp focus but the lens will only be passing a small amount of light. The scene would therefore need to be very bright to produce an acceptable camera image. If the lens is opened up to f2.8 (a typical maximum value) to pass more light then the eyes alone may remain in sharp focus but all the rest even the nose may be rendered fuzzy or defocused. There is thus a trade off between lens sensitivity and depth of field.

Most cameras control the iris automatically to optimise image quality for the available light. It is important to realise, however, that in low light conditions as the iris is opened up to compensate there will be less depth of field, and the resultant picture overall may not appear to be in sharp focus

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