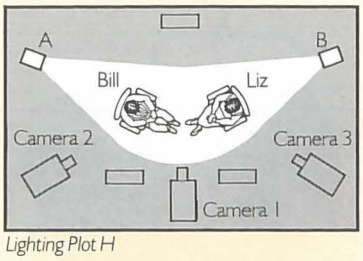
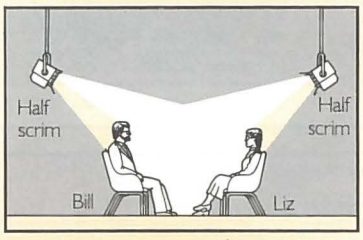
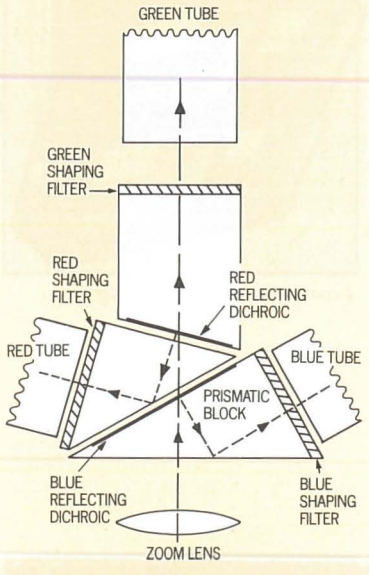


Lighting Plot H





Having lit one person, it is now possible, with a little modification, to light two people in a fairly typical TV situation – the two-way interview.

Cameras 2 and 3 give cross shots of the subjects and camera 1 gives the wide shot. As can be seen in Plot H, 'A' is Liz's key and acts as Bill's backlight. 'B' is Bill's key and Liz's backlight. The two softlights are used for filler and the background is generally illuminated.

STUDIO OPERATIONS

In colour studio operations the incident lighting levels tend to be between 1000 to 2000 lux. Generally a figure of 1500 lux incident is considered adequate for most purposes and dependent upon the lighting level, it is normal for cameras to work at about f2 to f4. The general height for luminaires is 3 to 4 metres from the studio floor level and plotted at 3.5 to 4.5 metres horizontal (around 4 to 5 metres actual distance).
When single point suspension, i.e. monopoles or pantographs on track, are used, then each luminaire is independent for setting of its position. For flexibility when using barrels with two luminaires suspended they are rigged with their own pantographs so that differential heights can be easily achieved.
The luminaires are generally used in the flood mode which gives the coverage required. However, by varying the focus (spot/flood) the light output is changed and this can be a method of controlling the light beam without the dimmer and has the added advantage of not changing the colour temperature.
Dimmers used in television studios normally have a square law light output which means the square of the fader setting from 1-10 gives the percentage light output, i.e., level '6' = 36%. The tungsten lamps used in television studios have a colour temperature of approximately 3200K at full voltage. It is normal when using the television lighting dimmer system to align the channel controllers to position '7' which means the dimmer supplies current to operate the lamp at 49% output, with a colour temperature of approximately 2950K. The reasons for this are that in normal operating conditions a tolerance of plus or minus one stop about the mean gives satisfactory control of light level, i.e. level '5' = 25%, level 10 = 100%. It has also been found that the +/− 200K colour temperature variation is acceptable in the majority of cases. It must be pointed out, however, that this variation when applied to the human face may be less; much depends on the texture and colour of the skin. This means, in practical lighting terms that the lighting can be varied, from its maximum to as low as 2750K (approximately 25% light output), without noticeable colour picture change; thus enabling a wide range of control to allow balancing between the light sources giving optimum results to the transmitted picture.
In the example shown, it is clearly impossible to balance for Liz's backlight without reducing Bill's key. To reduce the light falling on Liz it is usual to use a scrim, which is fitted in front of the lower half of the lens. This has the effect of attenuating the lower portion of the light beam. The effect within a luminaire's light beam with respect to fall-off can be likened to the depth of field of a lens. As we go further away from the source so the relative intensity levels over set distances become less variable. When close to the luminaire the changes of intensity are rapid and dramatic. A luminaire produces 2000 lux at 4m distance; to go from 4m to 3m changes the light level from 2000 lux to 3550 lux, a difference of **1550 lux for 1m distance change**. When we go to 5m we get a light level of 1280 lux which is a difference of **720 lux for a 1m distance change**.
It can therefore be seen that it is much better to use slightly more powerful wattage luminaires over a reasonable distance to achieve a certain light level than to use lower powered luminaires closer to the subject. Although this latter technique can produce high light levels the rate of change of light is exaggerated by the movements of the subjects.

THE TELEVISION CAMERA

The camera has to analyse the reflected light from a scene which is a mixture of **Red**, **Green** and **Blue**, the primary colours, in some combination:
Magenta (Purple), **Red+Blue**; **Yellow**, **Red+Green**; **Cyan** (Turquoise), **Blue+Green**.
The above combinations are the more straightforward ones and obviously others are more complex. However, all coloured surfaces can be broken down into the three component parts. Colour distortion can take place when the scene is illuminated with a source of light either deficient in some colour or with an excess e.g. fluorescents have a high green spectral component.

At present no commercially available professional quality camera tube is capable of producing the three separate signals required for colour television. It is thus a fundamental requirement that three separate tubes be employed. The use of three colour tubes and the consequent splitting of light that must occur makes the colour camera optically more complex.
Basic requirements of the colour separation system:
i) Light falling on the three tubes must have a common entrance pupil, i.e., each tube face must 'see' exactly the same scene in order to avoid parallax problems.
ii) Division of light must be affected with minimum loss, thus avoiding either excessive lighting levels in the studio or 'noisy' pictures produced by low light levels on the camera tubes photosensitive surface.
The camera pick up tube has a sensitivity which requires a certain amount of light just as the film in our still camera requires an amount to satisfy its ASA (ISO) rating. Below this level, noise (under-exposure in film) will become apparent. Above this level, over-exposure will occur. In both cases we control the amount of light entering and hence the exposure with an iris.
These requirements led to the development of special optical systems for colour cameras. The most obvious one being the use of zoom lenses to ensure a single path from the viewed scene to the camera electronics.
In television the aperture of the iris in the studio has been generally determined by the depth of field commensurate with production requirements. Camera iris settings in the range of f2 to f4 with today's cameras, require an incident scene light level of 1000 to 2000 lux so that the camera's basic sensitivity is satisfied and good quality, relatively noise free pictures are produced.

OUTSIDE BROADCAST LIGHTING

Lighting for outside broadcasts falls into two categories:
i) Large scale floodlighting of sports events, church interiors, etc., generally achieved by discharge luminaires;
ii) light entertainment and music programmes where the lighting is required to be the same as the studio.
In the early days of outside broadcast lighting, very simple rigs were employed, using a few luminaires on temporary scaffolding. The luminaires, which were powered directly from the mains supply either singly or sometimes switched in groups, were generally cumbersome and heavy. Carbon arcs were used but created rigging problems and so manufacturers were encouraged to look for alternatives. The breakthrough came with CSI and HMI discharge lamps which enabled smaller luminaires to be used with high light outputs. Although useful in many situations, such as (i), the fact that these sources cannot be dimmed successfully sometimes limits their use.
Outside broadcasts have become extremely complex and lighting directors now expect light sources of all types, capable of being dimmed, together with sophisticated lighting consoles to cater for outside broadcasts as in (ii).
In recent years, due to the complexity of the lighting rigs and to improve safety a British Standard (BS 5550) on location lighting was introduced which covers both the film and television industries.
Today our lights are as small as possible, supplied from sophisticated dimmers and distribution systems, complete with all known safety features. The consoles are generally portable derivatives of studio types, capable of dealing with all lighting situations up to and including large scale productions such as the Eurovision Song Contest, etc.