TEATRO

LIGHT YOUR SPACE

Selected reading

The Stage Lighting Handbook (4th Edition)
Francis Reid, A & C Black, ISBN 0 7136 3439 1

Stage Lighting for Theatre Designers
Nigel H. Morgan, The Herbert Press Ltd, ISBN:1 871569 71 0

Lighting by Design
Brian Fitt & Joe Thornley, Focal Press, ISBN 0 240 51440 8

and, to be published in July 1996,
Stage Lighting Design - the Art, the Craft and the Life
Richard Pilbrow, Drama Books Publishers

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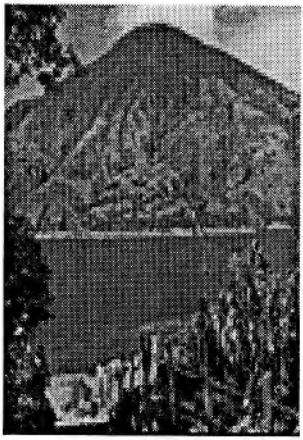
LIGHT YOUR SPACE

The benefits of good lighting



Since the earliest times, when firelight extended the period of natural daylight, artificial light has become an integral part of our lives.

But since the days of oil lamps, candles and gas, electric light has developed to give two main benefits to our living and working conditions: **functional illumination** so we can see what we are doing, and **display illumination** so that we can view an object or our environment when there is insufficient natural light from the sun.

Unlike artificial light sources, the sun also delivers warmth; it provides light of varying intensity, colour and direction, factors which combine to 'condition' our subconscious mind. Conditioning results in predictable changes in our feelings under different lighting conditions. For example, we feel happier on sunny days, and apprehensive on overcast days. Creative lighting is the technique of reproducing the characteristics of natural lighting in order to stimulate specific subconscious feelings.

A theatre audience will subconsciously sense a dramatic moment by virtue of the atmosphere created by lighting. A comfortably-lit restaurant will attract more custom than a fluorescent-lit café. A creatively-lit village hall will be better utilised than one which is only functionally-lit.

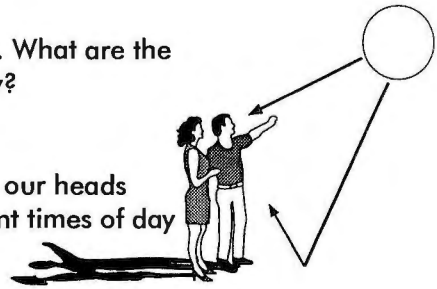
The benefits of creative lighting are not restricted to theatres. But an understanding of theatre lighting, its techniques and equipment, can make everyone's lives more enjoyable and bring added benefits to a wide range of experiences and locations.

This Teatro booklet explains how *your* space may benefit from good lighting practice.

I. LEARNING FROM NATURE

Sunshine

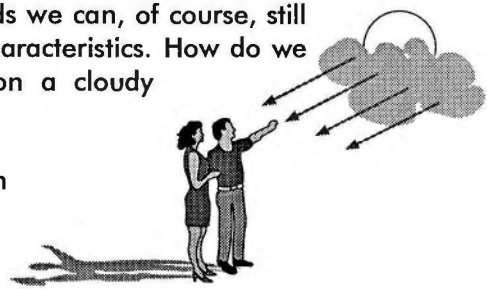
Sunlight is our main form of illumination. What are the characteristics of daylight on a sunny day?



- sunlight is bright
- it originates from a single point above our heads
- it exhibits a range of colours at different times of day
- it makes us warm
- it makes us feel happy and extrovert
- it gives us confidence
- it creates shadows which change in length during the day
- it is reflected from the surfaces it illuminates

Overcast sky

When the sun is obscured by clouds we can, of course, still see, but the light takes on new characteristics. How do we describe the effects of daylight on a cloudy day?



- overcast daylight has no direction
- it has no single source
- it makes things look dull
- it doesn't create shadows
- it makes us feel ill-tempered, introspective, subdued, sad
- it makes us feel nervous

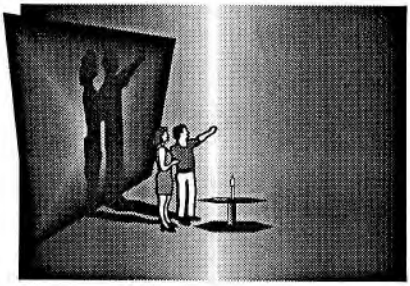
Although we are never aware of the process, our brain is constantly responding to sunlight from the moment we are born and is storing this information, which our subconscious subsequently uses to enhance other stimuli to the brain.

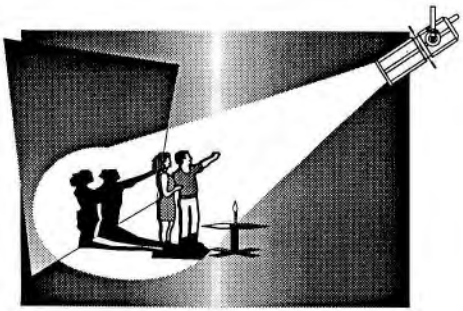
With all forms of artificial light, and especially stage lighting, we are seeking to replicate the effect of different types of lighting in order to make use of everyone's subconscious experiences. It is therefore valuable to understand the effects of light and to match these effects with the atmosphere you wish to create.

II. THE LANGUAGE OF LIGHT

Intensity

The intensity, or brightness, of light is relative to its surroundings. A candle in a darkened room will produce sufficient light by which to read. But when a table lamp is switched on in the room, or the curtains are opened to admit sunlight, the candle loses its effectiveness.

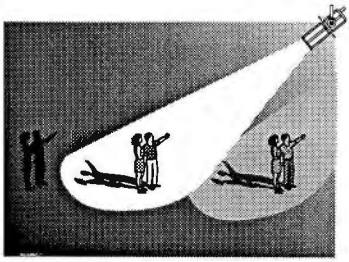




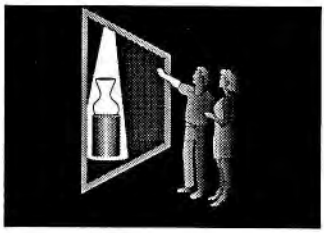
You do not need always need a powerful lighting source to create effects. It is relative intensity that is important. Intensity can be affected in one of two ways: by dimming, or by changing the distance from the source to the illuminated space.

Contrast

The contrasting effects of shadows and illumination will simultaneously emphasise and obscure objects of different importance, and hence draw the attention of the viewer to a specific point.



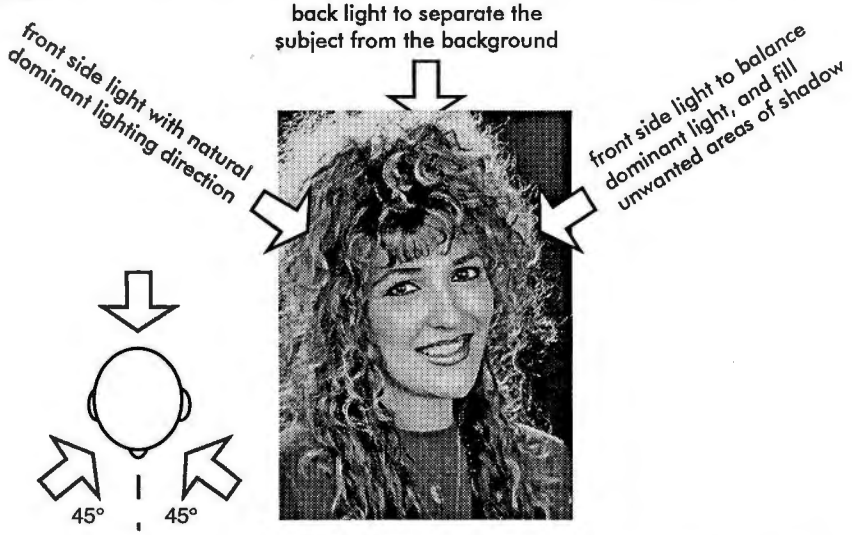
To the audience in a theatre, the stage is the most brightly lit area during a play, and within the stage area there are some spaces which are brighter than others and thus command most attention.



In a restaurant the tables are generally the most brightly lit spaces, in contrast to the kitchen door and toilet entrance! The same technique is used for highlighting merchandise in shop windows.

Direction

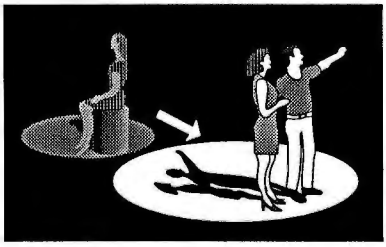
Nature conditions our response to the direction of light. As we are so accustomed to sunlight, artificial light shining from above appears natural when compared with illumination from below, as produced by theatre footlights.

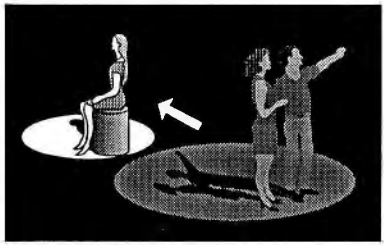


The recommended direction when lighting for theatre, TV or display purposes is from the front at 45° elevation, and 45° from the side.

Movement

Another conditioned response is movement. Our attention is attracted by movement, even within the area of our 'peripheral' vision. Obviously it is possible to give light movement by using a followspot, or an automated light.



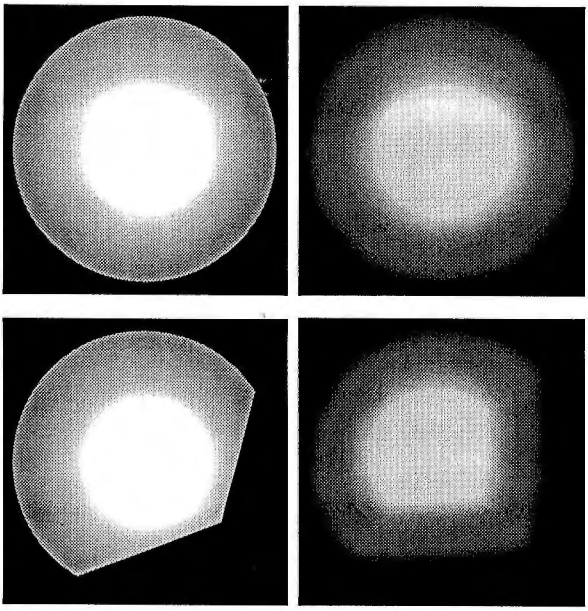


However, the effect can be achieved easily by selective dimming, to shift emphasis from one object to another. In an otherwise dark environment, fading up one area as another area dims moves the audience's attention to the most brightly lit space.

Shape

The beam projected from a spotlight is generally circular. However, it may be altered in diameter (from 'spot' to 'flood') or given a shape by obscuring part of the beam with barndoors, shutters or a gobo, to provide beams with defined edges or patterns.

Simple spotlights, like the Fresnel and PC, are limited in the shapes they can project, and rely on barndoors to provide a straight edge to the beam of light.

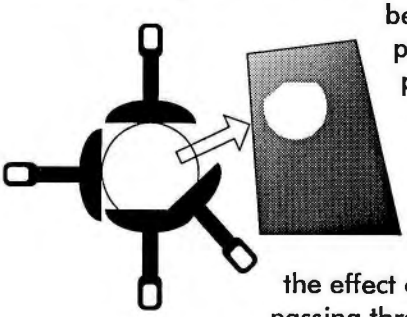


Clockwise, from top left: Sharp edged profile spot; soft-edged spot of a Fresnel; 'rough' shaping of Fresnel with a barndoor; the precise shaping of a profile beam using shutter blades.

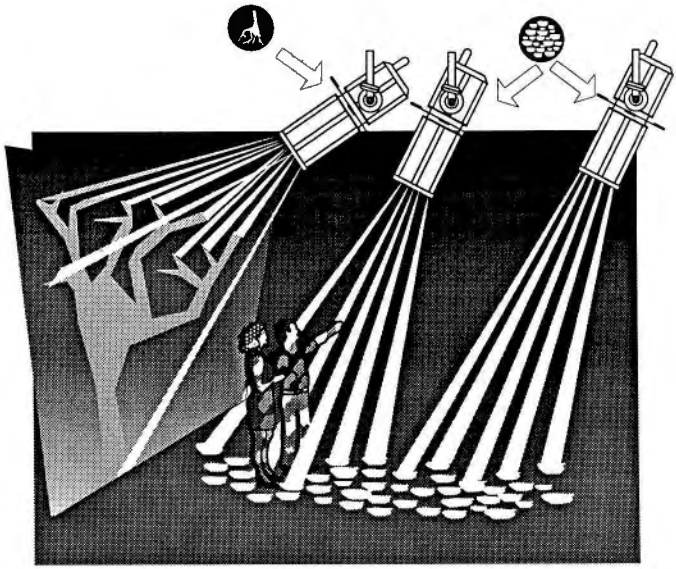
Texture

A Fresnel spotlight produces a distinctive beam of light with a 'soft' diffused edge to the beam, with correspondingly soft-edged shadows. Profile spotlights are designed to project patterns of light.

Shutters, placed in the gate of a profile spotlight, give a very sharp edge to the beam. A gobo, also situated in the gate, will obscure sections of the beam and project the remainder as a crisp pattern of light. Gobos are available to project a simple picture, such as a city skyline onto the backcloth of a stage set, or a company logo or advertising message in a shopping mall, or alternatively, random pattern gobos may be used to 'break up' the beam to give the effect of light filtering through Venetian blinds, or passing through foliage.



A profile spotlight can be focused to produce a beam with a razor-sharp edge, and the resulting 'hard' light provides hard-edged shadows. The differences in these beams can be described in terms of their texture.



Break-up gobos also add texture to the light, and the combination of hard, soft and patterned light is used by lighting designers to give visual interest to a subject.

Colour

Although it seems that daylight has no intrinsic colour, the subtle shift in colour from the redness of sunlight in the morning to the blueness of an overcast sky can dramatically alter our perception of what we see, and the way in which we respond to our environment.

Colour may be used naturalistically, with a pale blue colour giving a 'cool' effect, and a pale salmon or pale straw colour giving a 'warm' feeling. Colour may also be used for a special effect, with greens and golds used with leaf-effect gobos to represent sunlight passing through foliage.

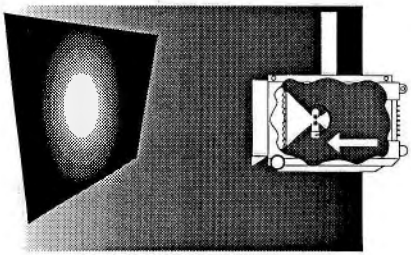
To maximise the effects possible with colour, it is usual to focus pairs of spotlights to cover each area of the space. One of the pair will have a warm colour and the other a cool colour. The atmosphere of the setting can be altered by fading between the two colours.

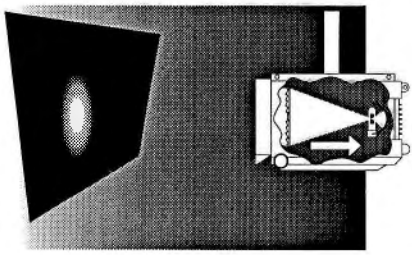
Alternatively, a colour change device (such as a Colourbox-2) may be employed with a selection of colours that may be used individually, or mixed together, to give the light a wide range of hues.

III. BASIC TOOLS

Fresnel & PC spotlights

These spotlights have a spherical reflector and lens combination which collects the light from the lamp filament as its source. The beam is a projection of the filament and is wider (flood position) when the

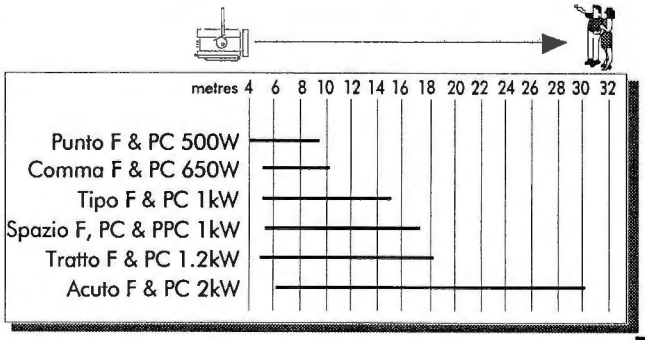




lamp/reflector is moved towards the lens, and narrower (spot position) when moved away from the lens.

The names PC, PPC and Fresnel refer to the type of lens fitted. A PC (Prism Convex) lens has a slightly textured rear surface which provides a soft edge beam. The PPC (Polished Plano Convex) has an optically clear lens, which provides maximum intensity, and a sharp edge beam. The popular Fresnel spotlight has a stepped lens (thinner and therefore lighter in weight) which gives a softer edge spot than the PC.

This group of spotlights is designed for lighting 'acting areas' on stage from positions above the actors, or for display lighting where non-defined shapes are acceptable. They are not often used in positions in the auditorium of a theatre, as the softness of the beam can produce distracting peripheral illumination.



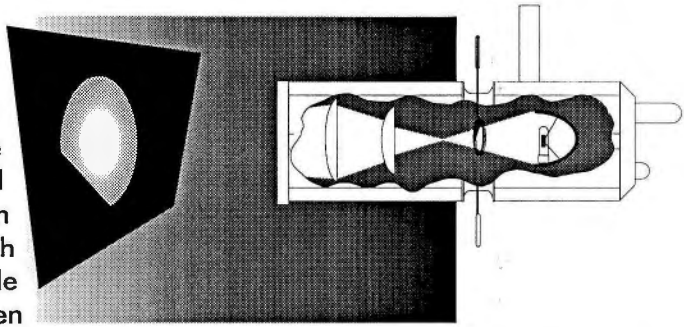
Barndoors may be added to a PC, PPC or Fresnel to give a straight edge to any part of the circular beam.

A general guide to throw distances is shown here.

Profile spotlights

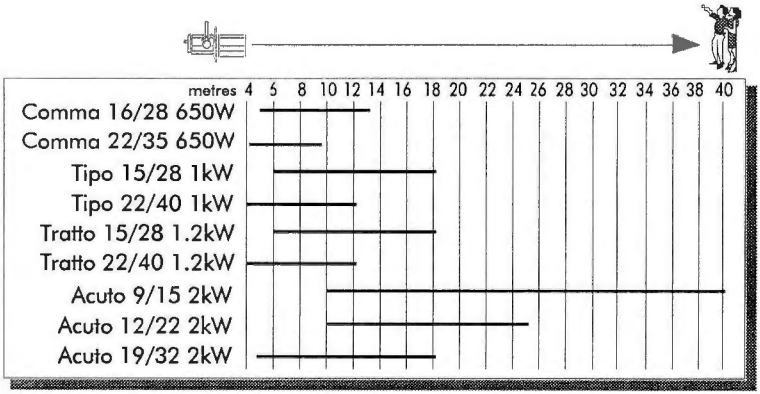
Profile spotlights incorporate an ellipsoidal reflector which projects the collected light through a circular 'gate' aperture. The gate becomes the source of light for the lenses, and any shape (or profile) that is placed at the gate is projected.

As the gate is circular, the beam of light is generally the same. When a straight-edge shutter is introduced, the beam has a straight edge. If a pattern gobo is placed in the gate, the pattern will be projected onto the desired surface.



Most modern profile spotlights have dual lens zoom optics, an added benefit which enables the beam angle to be altered between two fixed limits. For example, the beam angle of the Tipo 15/28 is variable between 15° and 28°, making the spotlight suitable for lighting the same area from different throw distances.

As with Fresnels and PCs, the version of spotlight used depends partly on the distance from the spotlight to the space being lit.

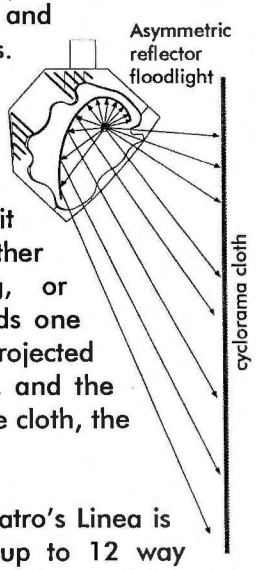


A general guide to profile spot throw distances is shown here.

A chart showing beam diameters for different throw distances is given on page 15.

Floodlights

Floodlights are used for illuminating large spaces. They incorporate a linear filament lamp which, when combined with a linear reflector, produces a wide, soft beam of light. In the theatre, floodlights are grouped together in 'battens' and are used for illuminating backcloths and scenery. Individual units are installed as working lights. In large architectural spaces, floodlights are often chosen to illuminate large expanses of wall surface.



Even though floodlight battens have simple optical characteristics, there are several options available to suit specific needs. Firstly, the reflectors can be either symmetric about the axis, for general lighting, or asymmetric, which provides increased intensity towards one edge of the beam. When an asymmetric beam is projected from the top of a backcloth or other vertical surface, and the brighter part of the beam is angled to the bottom of the cloth, the illumination appears evenly distributed.

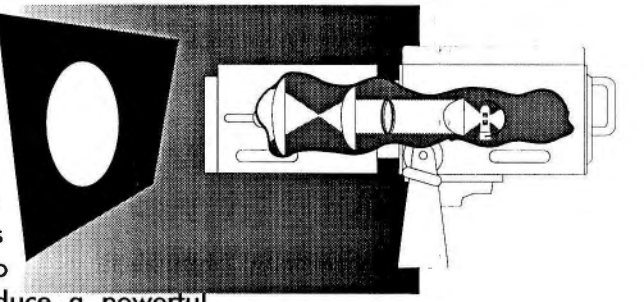
Floodlights are available in different power ratings. Teatro's Linea is a 300W system, available in single unit, 3, 4, or up to 12 way compartments, Linea is suitable for smaller stages, and has a lightweight extruded construction. The 500W Riga is the most cost-effective floodlighting system for the small to medium stage, and Diluvio, in 500W and 1000W versions, offers a unique, modular construction. Diluvio modules may be used individually, or linked together in a batten as required. If working lights are needed, a lower priced alternative to the theatrical range of floodlights is available. Wetlight is a simple 300W floodlight for either internal or external use.

Followspots

Followspots enable a performer to be independently illuminated while moving around the stage. This added intensity of light on a performer produces contrast with the surrounding lighting levels, and draws the audience's attention accordingly. The followspot is a versatile tool in the small performance space, as it provides additional lighting which is easy to reposition, refocus and colour.

Although a followspot resembles a regular profile spotlight, there are important differences. Whereas a stage profile has a beam with a central 'peak' intensity, enabling several pools of light to be overlapped to create an even coverage of light, the followspot is an independent light source, and the preferred beam distribution is flat across the beam. The condensor optical system is ideally suited to a followspot, and is an integral part of all Teatro followspots.

In a condensor system, a spherical reflector focuses light towards the filament (unlike a profile spotlight). An additional lens (the condensor lens) is focused on the filament, and produces near-parallel light through the gate. This provides a flat, even field of light, resulting in less blue 'fringing' to the beam. An added benefit is exceptionally clear gobo projection, which can produce a powerful advertising image when a logo is projected from a distance.



Followspots make an impression on the general lighting in one of two ways. They can be brighter than the ambient light, or they can have a contrasting colour temperature. Colour temperature is not the same thing as colour. By comparing the illumination of a table light and an overcast sky, you will see the table lamp looks 'warm', and a little 'orange' in comparison to the 'cool', or 'bluish' daylight. The intensity of illumination may be the same, however. Even a relatively low power 'daylight' followspot will appear 'brighter' on stage than a tungsten halogen version. This is because the higher colour temperature lamp is a compact arc, which is more optically efficient, and our conditioning also tells us daylight colour temperature must be brighter than artificial light.

The benefits of tungsten halogen spotlights are that they can be controlled by conventional dimmers, and they are less expensive than the alternative 'discharge' followspots. Teatro's Talento range of followspots includes tungsten halogen, MSR and HMI discharge versions, and the discharge range is supplied with internal mechanical dimmers.

IV. HOW TO LIGHT YOUR SPACE

Whether you are lighting a theatrical stage or the interior of a church, restaurant or shop, the principles of creative lighting are the same. The first question to ask is yourself is, "what is the purpose of the lighting?"

The answer lies in your need to illuminate selectively, to create or improve the atmosphere of the environment, to see what is important, and to hide what is not. In a theatre situation the play's script offers direction, since it frequently describes the location, time of day and emotional atmosphere of the scene. These indicators can then be discussed with the director and production team, and a style will be established.

If you are lighting a shop or restaurant, you will need to discuss the purpose of the lighting with the client. Does he or she want a warm, cosy appearance or a bright, high-tech dazzling interior? What should be accentuated, what should be de-emphasised?

Using a scale plan diagram of the space, mark the areas which are the most important to illuminate, and those which are the least important. Mark the existing lighting positions, and identify the best position from which to light each area. Gradually build up the lighting design, one spotlight or effect at a time. Points to note are:

- For theatre and display purposes, the principal lighting should be at an angle of 45° to each side, with an elevation of 45°
- Backlighting adds depth to the object or actor being lit
- Take account of glare in the eyes of the viewer, and move or mask the source of light accordingly.
- Take note of the shadows cast by the source of light. If it is intrusive, adjust the position as appropriate.

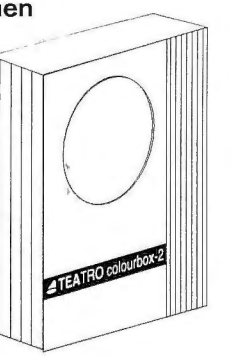
If creative lighting techniques are used, there will be no static lighting states. The lighting for one theatrical scene blends and changes into the next, giving the added dimensions of a change in location, time and atmosphere. In a restaurant, a range of lighting states provided by pre-set dimming circuits alters the ambience to reflect the time of day. Similarly, a church could select presets for different services, a baptism, a sermon or a concert, or to emphasise an important feature such as an altar or a painting.

V. LIGHTING EFFECTS

Colour

Colour is used to great effect in the theatre, and the atmosphere created by coloured light is equally successful in other spaces. Points to remember are:

Blue tints make the light cooler, and similar to daylight. Pink and gold tints enhance skin tones, make the light warmer and more cosy. Green should be avoided for facial lighting, but, if used with golds when projecting gobos, can create an interesting 'woodland' atmosphere or enhance a display of potted plants.

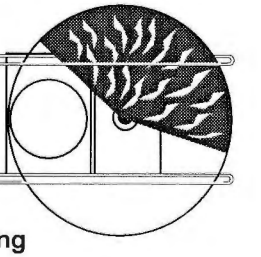


The Colourbox-2 is a new accessory which adds remote-control colour changing facilities to spotlights and floodlights. The Colourbox is equipped with six different filters which may be selected individually in any order, and mixed together as required to give a range of alternative colour combinations.

Gobo projection

Gobos are discs of stainless steel (or alternatively glass) which are etched or laser-cut to provide a pattern through which light passes when placed in the gate of a profile spotlight. There are two basic forms: those where the effect is seen when projected onto a surface, eg. a company logo, a cityscape outline; and the break-up gobo, which has a random pattern to transform the beam of light into smaller shafts, emulating light passing through leaves, or filtering through a window blind etc. Gobos can provide exciting and stimulating effects in shops, malls and hotels, especially when used with a combination of colours.

Moving effects

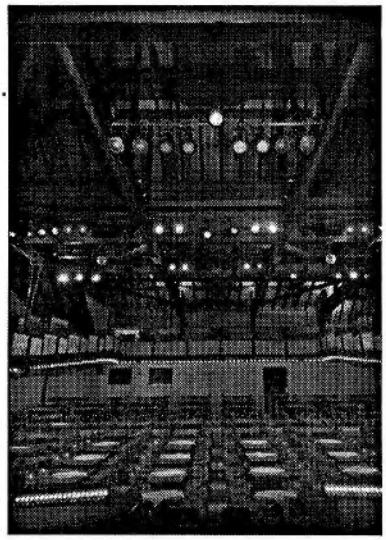


Until recently, moving effects - such as rain, smoke and clouds - have been prohibitively expensive. The new Teatro **Versa-Disc** is a simple 'colour wheel' type device which accepts any combination of colour or break-up pattern on its motor drive, and projects an image of the colour or moving effect. The combination of a colour, a pattern gobo and a rotating disc offers a limitless range of effects.

VI. DESIGNING A LIGHTING RIG

This involves the reverse technique to that of designing the lighting itself. This time instead of placing lights in existing positions, you are placing the positions for which you think the lights will be required. Hence there may be no obvious objective in mind when you begin planning the electrical installation and the rigging of lights in a small hall, or hotel. But it is vital to allow for flexibility of use, so how do you accommodate future requirements?.

Devise a clear idea of how the space may be used in the future. Ask yourself, what spaces have to be lit? How many changes in lighting might there be? How much electrical power is available? In a theatre, small hall or drama studio, remember the basic techniques of positioning the lights to give the 45° angle onto the subject. Subdivide the space to be lit into manageable squares, and light each one with two spotlights, one from each side. Throughout the process compromises will have to be made - lights cannot be positioned everywhere, and there may be restrictions imposed by the building.



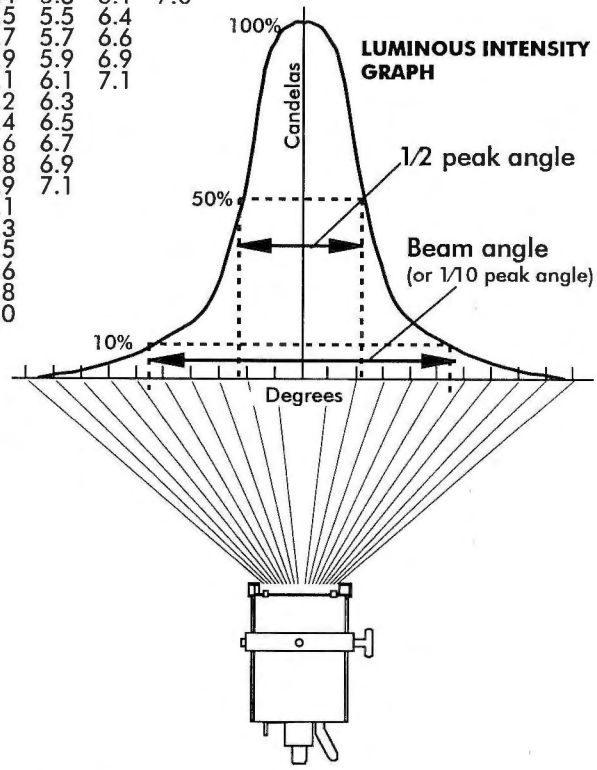
When the basic plan has been established, refine the lighting scheme by theoretically testing its capabilities with a variety of possible functions. For example, using the planned installation for a theatre, check how the lighting designer would cope with a musical as distinct from a play or a concert. In a hotel, will the lighting accommodate a banquet, a conference and a dance band at different times?

In conclusion

Creative lighting begins with knowledge and experience of natural lighting, and how humans respond under different lighting conditions. Add to this the appropriate equipment, and a flexible installation, and the benefits are immediate. Space prevents us from going into further detail, but a selected reading list is provided on the back cover.

Beam Diameter Calculator

Beam Angle	Throw (in metres) 2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
4°							1.0	1.1	1.3	1.4	1.6	1.7	1.8	2.0	2.1
5°						1.1	1.2	1.4	1.6	1.8	1.9	2.1	2.3	2.5	2.7
6°					1.0	1.3	1.5	1.7	1.9	2.1	2.3	2.6	2.8	3.0	3.2
7°				1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.7	3.0	3.2	3.5	3.8
8°				1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3
9°				1.3	1.6	1.9	2.2	2.5	2.9	3.2	3.5	3.8	4.2	4.5	4.8
10°			1.0	1.4	1.7	2.1	2.5	2.8	3.2	3.5	3.9	4.3	4.6	5.0	5.4
11°			1.2	1.5	1.9	2.3	2.7	3.1	3.5	3.9	4.3	4.7	5.1	5.5	5.9
12°			1.3	1.7	2.1	2.5	2.9	3.4	3.8	4.2	4.7	5.1	5.5	6.0	6.4
13°			1.4	1.8	2.3	2.7	3.2	3.7	4.1	4.6	5.1	5.5	6.0	6.5	7.0
14°		1.0	1.5	2.0	2.4	2.9	3.4	3.9	4.4	4.9	5.4	6.0	6.5	7.0	
15°		1.0	1.6	2.1	2.6	3.2	3.7	4.2	4.8	5.3	5.8	6.4	6.9		
16°		1.1	1.7	2.2	2.8	3.4	3.9	4.5	5.1	5.6	6.2	6.8			
17°		1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2			
18°		1.3	1.9	2.5	3.1	3.8	4.4	5.1	5.7	6.3	7.0				
19°		1.3	2.0	2.7	3.3	4.0	4.7	5.3	6.0	6.7					
20°		1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.1					
21°		1.5	2.2	2.9	3.7	4.4	5.2	5.9	6.7						
22°		1.5	2.3	3.1	3.8	4.6	5.4	6.2	7.0						
23°		1.6	2.4	3.2	4.0	4.8	5.6	6.5							
24°		1.7	2.5	3.4	4.2	5.0	5.9	6.7							
25°		1.7	2.6	3.5	4.4	5.3	6.1	7.0							
26°		1.8	2.7	3.6	4.5	5.5	6.4								
27°		1.9	2.8	3.8	4.7	5.7	6.6								
28°	1.0	2.0	2.9	3.9	4.9	5.9	6.9								
29°	1.0	2.0	3.0	4.1	5.1	6.1	7.1								
30°	1.0	2.1	3.1	4.2	5.2	6.3									
31°	1.1	2.2	3.2	4.3	5.4	6.5									
32°	1.1	2.2	3.4	4.5	5.6	6.7									
33°	1.2	2.3	3.5	4.6	5.8	6.9									
34°	1.2	2.4	3.6	4.8	5.9	7.1									
35°	1.2	2.4	3.7	4.9	6.1										
36°	1.3	2.5	3.8	5.0	6.3										
37°	1.3	2.6	3.9	5.2	6.5										
38°	1.3	2.7	4.0	5.3	6.6										
39°	1.4	2.7	4.1	5.5	6.8										
40°	1.4	2.8	4.2	5.6	7.0										
41°	1.4	2.9	4.3	5.7											
42°	1.5	2.9	4.4	5.9											
43°	1.5	3.0	4.5	6.0											
44°	1.5	3.1	4.6	6.2											
45°	1.6	3.1	4.7	6.3											
46°	1.6	3.2	4.8	6.4											
47°	1.6	3.3	4.9	6.6											
48°	1.7	3.4	5.0	6.7											
49°	1.7	3.4	5.1	6.9											
50°	1.7	3.5	5.2	7.0											
51°	1.8	3.6	5.3												
52°	1.8	3.6	5.5												
53°	1.9	3.7	5.6												
54°	1.9	3.8	5.7												
55°	1.9	3.8	5.8												
56°	2.0	3.9	5.9												
57°	2.0	4.0	6.0												
58°	2.0	4.1	6.1												
59°	2.1	4.1	6.2												
60°	2.1	4.2	6.3												



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