Lamps for Public Lighting

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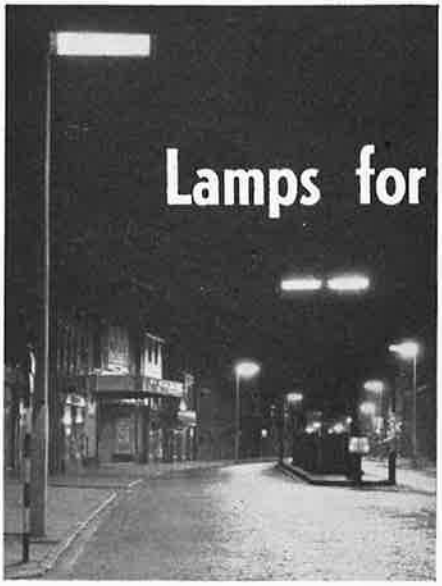

Natural fluorescent 2 ft 40 W and 5 ft 80 W tubes installed in the town centre, Preston, Lancashire

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Available Types for Different Purposes

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UNIQUE opportunities for the display of the science and art of the illuminating engineer will be afforded by the Festival of Britain. Not only will the interior decoration of the various pavilions be assisted by special lighting effects, but it is hoped that the occasion will also allow for the exhibition and display of the latest developments in public lighting for the benefit both of the public at home and our visitors from overseas. Not the least important of the scientific and industrial developments for which this country is justly famous are the many contributions of our lamp research and lighting engineers in the various fields of outdoor and indoor illumination.

For the assessment of the properties of the main types of light sources at present available for the production of large scale lighting effects, lamps may be classified in many ways. One method is to study the light source in relation to the means by which the light is produced and such a classification is most useful when considering lamp developments in relation to research. But from the point of view of the lighting engineer and the user it is surely more important to look at the matter from another aspect, namely, that of the function for which the lamp is required. With this in mind an appropriate grouping is street lighting; lighting of civic centres and the floodlighting of buildings; special exterior lighting effects; and lighting large interior areas.

Some of the sources considered are appropriate for use in any of these fields; others will find their greatest usefulness in far more specialized applications. This classification will be helpful to engineers concerned with large scale lighting projects such as those envisaged in connection with the 1951 Festival.

It can justly be claimed that this country has led the world in the development of improved street lighting techniques. In this field more perhaps than in any other economic considerations have always played a large part in determining the type of equipment which is installed.

On the other hand, more particularly in connection with the lighting of Class "A" roads and main traffic thoroughfares in towns, it is questionable whether it is true economy to restrict the quality of road illumination when one considers the disastrous annual toll of road accidents at night.

Factors of which account must be taken to determine the appropriate light source for any given street installation are long life, high efficiency, initial and maintenance costs and colour.

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The various discharge and fluorescent lamps have a long life and high efficiencies while the tungsten filament lamp is favoured on account of the colour of the light and the relatively low initial cost. The fluorescent lamp is also particularly suitable on account of its low brightness and good colour.

It is generally most economical to install the largest lamp size which can be arranged to produce the desired lighting effect. This is because with many types of electric lamp the higher the power the greater the efficiency. The effect is very significant in the case of tungsten filament lamps. For example, a given amount of light of about 20,000 lumens may be provided by one 1,000 W gasfilled lamp, but it would be necessary to install sixteen 100 W lamps to provide the same luminous flux.

It is true that for certain purposes light distribution requirements necessitate the use of a large number of small lamps rather than one large lamp, but the above example will show the advantages of higher power sources wherever it is feasible to install them. The same effect occurs with high-pressure mercury lamps, type MA, as the illumination produced by one 400 W mercury lamp would just be equalled by two 250 W mercury vapour lamps of the same type, the relative power consumptions in the two cases being 400 and 500 W.

The illustration on the opposite page shows the terrace face of the Houses of Parliament lighted with 30 kW of 1,500 W tungsten lamps

This interesting effect is not present in the case of the standard 40 and 80 W fluorescent lamps used for street lighting. Indeed the 40 W lamp is somewhat more efficient than the 80 W size. In the case of sodium lamps the efficiency differential is not present between the 85 W and the 100 W lamp, but makes itself felt when these lamps are compared with the 45 and 60 W ratings.

Maximum Wattage Desirable

In all cases, however, due to the effect of the cost of poles and lanterns and other ancillary equipment, it is additionally advisable to keep the wattage at each lighting point to the maximum providing that other factors, such as pole height and spacing, etc., allow of the production of the required lighting effect.

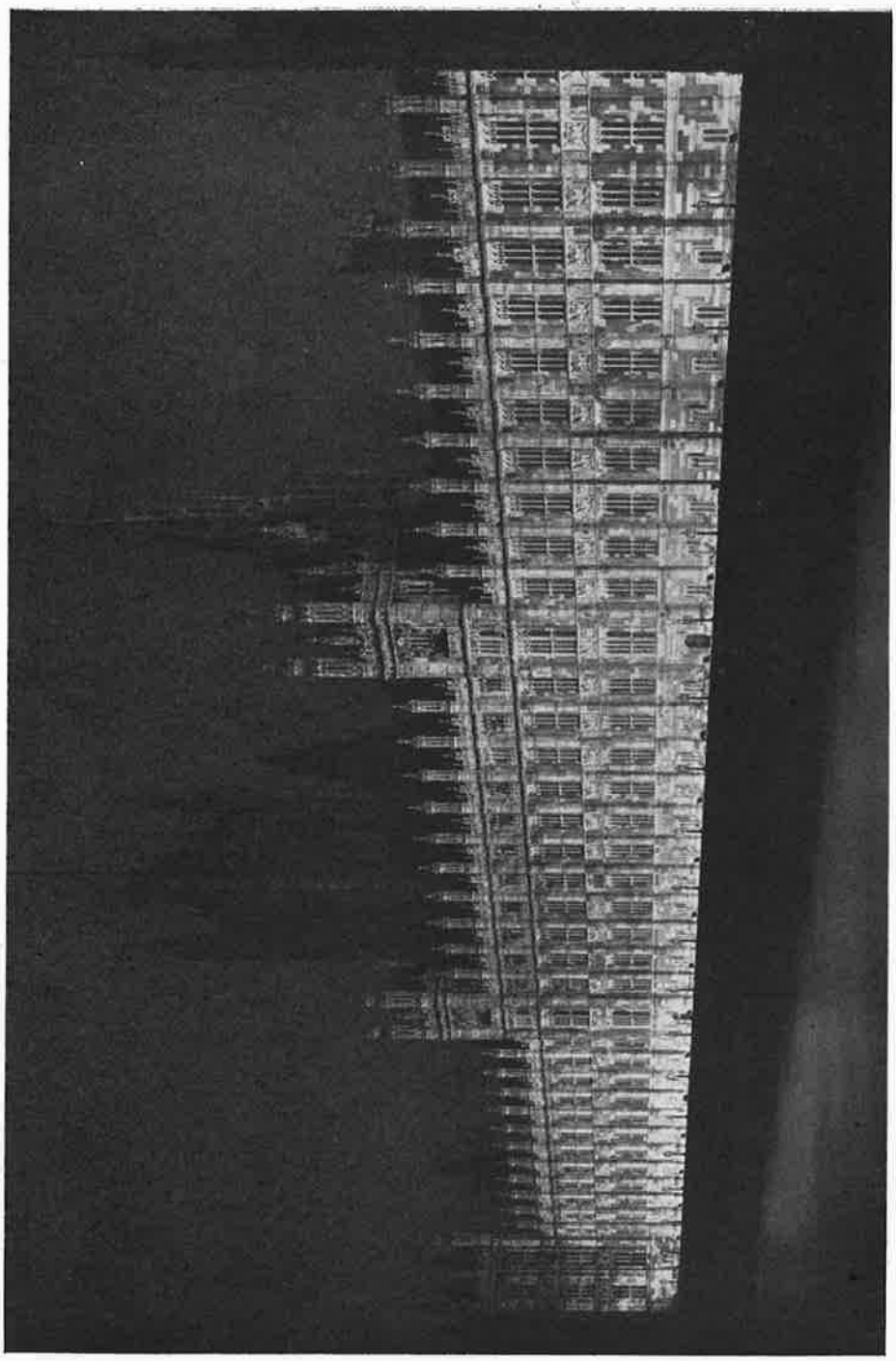
It is now generally agreed that for the lighting of arterial roads the maximum economy can be obtained by the use of mercury or sodium vapour lamps. Where, however, colour is important, and it is indeed important in shopping and town centres and in certain residential areas, then the light source should either be of the combined mercury and tungsten type, of which the dual lamp or blended light lamps are examples, or the lamps should be standard gasfilled tungsten filament bulbs or fluorescent tubes. (See illustration on page 3.)

Illuminating Civic Buildings

At civic centres it is likely that the façades of buildings will be floodlit as either a permanent or as a special feature. The treatment of the adjacent ground area therefore requires special consideration. It is particularly important that views of civic buildings, for example, are not obscured by bright light sources appearing between the observer's eyes and the illuminated object. This may be accomplished by the use of large diffusing fittings of low brightness for the ground area, or by area lighting from high points. The picture on pages 6 and 7 shows large diffusing lanterns in the foreground illuminating the ground areas adjacent to the principal buildings of the Swansea Town Hall. About 100 kW was used for the floodlighting of the building itself.

Particularly for high mounted lighting units, in addition to the lamps already mentioned, the admixture of tungsten and mercury lamps in suitable diffusing fittings should not be overlooked nor should the merits of the largest gasfilled lamps of the general lighting service class.

Very high power tungsten filament lamps of the type designed primarily for aerial beacons and lighthouses may also be found useful where they can be mounted at a considerable height above the ground surface. Such lamps are available up to 10 kW, but the most generally used sizes are 3 kW and 5 kW. The designed life is of the order of 800 hours and it is suggested that consideration be given to the use of such lamps in connection with the Festival of Britain for the demonstration of large



area illumination from high towers or other structures.

It is of the utmost importance in this connection to arrange that the colour of the ground area illuminants is either the same as, or blends satisfactorily with, the colour of the light used for floodlighting buildings' façades. If care is not exercised on this point unsatisfactory results may be obtained by reason of the effect known as simultaneous colour contrast. For example, in the absence of any other coloured light source in the field of vision an outdoor area illuminated with tungsten filament lamps will appear a good white colour and adjacent buildings floodlit with tungsten will have a natural appearance. If, however, the buildings are floodlit with mercury and the ground area is subject to illumination with tungsten filament lamps these lamps will appear a reddish yellow and the general effect will be less satisfactory than it might have been.

It is important, particularly for historic buildings, to avoid using coloured sources which will produce an entirely different appearance from that in normal daylight. On the other hand a modern building might appropriately with the consent of the architect be colour floodlit with some pastel tint to produce pleasing effects.

For the production of special effects many varied themes are possible, on the one hand by the use of a multiplicity of small lamps, or on the other projector lamps of the searchlight class. There is no doubt, however, that the fluorescent lamp has hardly yet been exploited in this field, having in mind its potentialities as a highly efficient coloured light source.

Coloured Fluorescent Lighting

Fluorescent lamps can be made in a wide variety of colours and, when available, they will undoubtedly become rivals of the colour sprayed and natural coloured glass tungsten filament lamps, the use of which is seen to good effect in such northern resorts as Blackpool and Morecambe. These lamps will be particularly valuable for producing general colour displays of the type in which adjacent surfaces have to be floodlit with colour. Where they are used to associate the primary effect with water reflections very pleasing results are obtained owing to the large area of the source and its relatively low brightness added to the scintillating reflections.

For the production of high intensity white and coloured beams of light the

Diffusing lanterns illuminate the ground surrounding the Swansea Town Hall, with 100 kW of floodlighting

M.E. range of lamps of 250, 500 and 1,000 W rating are very suitable. They are convenient alternatives to the carbon arc for such purposes, more particularly because they can be allowed to burn unattended and because with coloured filters violet, green and yellow beams can be obtained which are very useful for special "accent" lighting or for aerial effects. The characteristics of this range of lamp are given in the table.

Hot-cathode neon floodlighting tubes and high-pressure mercury vapour lamps are excellent sources for producing concealed lighting effects in gardens and parklands. Care is, however, needed in the use of these heterochromatic sources to avoid abrupt changes in colour unrelated to the natural hues of the flowers and foliage. Very beautiful results are obtainable and there is no doubt, also, that in this field fluorescent lamps will have a useful function.

The treatment of large interior areas is largely a matter of illuminating engineering and particularly for the interiors of pavilions opportunities will exist for large scale lighting effects of a type which are only rarely met with in the day-to-day work of the illuminating engineer. It is probable that in many cases attention will be given to "washing" large areas with light of both daylight colour and in various pastel tints, the combined general atmosphere of illumination thus produced being balanced to give good colour rendering on objects displayed in the pavilion and on the human complexion.

CHARACTERISTICS OF THE M.E. RANGE OF LAMPS

Class	ME/D	ME/D	ME/D
Rating, lamp wattage	250	500	1,000
Supply voltage, a.c. or d.c.	200/250	200/250	200/250
Normal operating position	Vertical base down	—	Vertical flange down
Average life, hours	500	500	500
Initial efficiency, L/W	45–50	45–50	50–55
Nominal initial lumens	11,250	22,500	50,000
Initial max. brightness, stilbs	20,000	20,000	40,000

At the same time the relatively new internally mirrored reflector lamps will be used for "accent" lighting and the architect and the lighting engineer will together have a unique opportunity of showing the inter-relatedness of their respective contributions.

There is a growing appreciation of the need to reduce the brightness contrast within the field of view of the observer and, therefore, it is hoped that the light sources themselves will in general be mounted behind translucent or diffusing materials, or in fittings designed to have a relatively low surface brightness in relation to the background brightness against which they are viewed.

The Exhibition will provide many opportunities for the display of architectural lighting, not only as pure decoration, but for providing general illumination in an artistic manner. It is of the utmost importance both with regard to the provision of luminous elements forming a part of the structural and decorative details of the building that full attention be given to the æsthetic value of the finished result. Many architectural surface effects in the past have been criticized because the positioning of the light sources added to existing buildings has produced a reversal of the normal shadows and, therefore, material alteration of the character of the architectural features. This effect can be a help rather than a hindrance if the architectural lighting is considered as an integral part of the building design.

directed upon the front and sides of the building itself

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