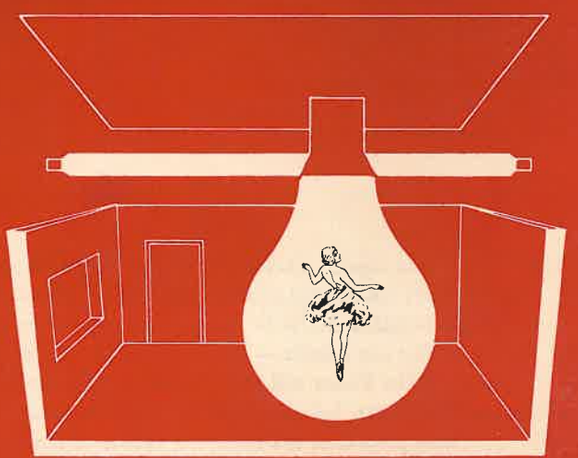
THE OUTSHINING LIGHT

THE MAZDA LIGHTING JOURNAL



VOLUME 2 NUMBER 1
ARCHITECTURAL ISSUE

THE OUTSHINING LIGHT

Cover picture shows a night view of the Vauxhall factory at Luton. Lines of fluorescent lighting, photographed in a disappearing perspective, guide the eye along the whole length of the highly glazed exterior.

Contents

Readers are asked to quote the relevant issue of The Outshining Light *when making enquiries regarding lighting installations or equipment described.*

Art or just a matter of mechanics ? When does design become important in the planning of a lighting installation — important, that is, in relation to economics and the provision of enough illumination ?

Architects, interior designers, lighting engineers and contractors not only have to ponder such questions when considering a new building or renovating an old one, they have to make decisions which stand or fall on their own definite and preconceived ideas. And these various authorities have notoriously divergent views about such matters. It is a good thing, of course, that divergent opinions should exist — otherwise we would be presented with a monotonous and possibly monstrous standardization in the design and application of lighting equipment, to say nothing of all the other features that make up the appearance of an interior. It becomes increasingly difficult to lay down specific rules of procedure when one can walk through half-a-dozen chain stores, all with similar characteristics and selling the same sort of merchandise, and find lighting schemes so different that no aspect of design or installation is common to any two of them.

What general principles can be stated when we are dealing with cathedral and factory, office and shop interiors, each requiring individual treatment? Perhaps we are reduced to the really fundamental requirement of *enough light for a given visual task at an economic cost*, adding, as a concession to those with discriminating tastes, that fittings should avoid the florid, the ostentatious and the deceptively decorative.

At any rate, if it is the privilege of the non-comformist to break the rules and regimentation of established theory, we seek to show that there is a right and a wrong way of doing so.

Fleet Street's own church, St. Bride's, stands defiantly over one of London's bombed and largely devastated corners. Its charred shell, silhouetted against the evening sky and the light from nearby Reuters' windows, reminds us that there is much building still to be done — many gracious landmarks of the London scene yet to be restored. Restored, did we say ? Why not rebuilt — Of one thing we can be sure, whatever course the architect adopts, indignant letters to the editor of The Times will point angrily to glaring examples of bad taste, sacrilege and mutilation. The problems confronting architects, interior designers and engineers are not only concerned with aesthetic or practical matters. Public taste and prejudice, the changing values of the centuries, will be the final arbiters. In the following pages are set out some of the problems of lighting interiors — an important aspect of building. The difficulties in deciding upon style and design of fittings and methods of installation can be as great as in planning a whole building.

THE CONTEMPORARY APPROACH

By

D. Dewar-Mills ARIBA

The architectural attitude to artificial illumination has greatly changed since the days when the centre-of-the-ceiling fitting was considered not only sufficient but essential. Lighting has grown in status to become a very important component of the modern interior for both functional and decorative purposes. The architect, with an increasing realization that constant developments in this field are offering him a most co-operative henchman, calls on lighting to give him many of his effects—some subtle, some forthright—thus helping to define and enhance the spaces which he has created. To-day lighting has reached a position where it strongly influences —and in some cases determines—interior design.

Along with increased interest in the potentialities of lighting has come increased consumption of expensive — and sometimes scarce — power. For this reason alone fluorescent lighting, despite a strong dislike for it in many quarters, has come to stay. It is possible that much of this distaste springs from the time of its first major appearance during the war when it spread suddenly, like a cold blue rash across the country and when little or no thought could be given to subtleties or refinements in its use.

With such associations in the minds of its detractors it is understandable that the very word " fluorescent " brings a grimace of distaste, for it must be admitted that over-lavish, insensitive use of the direct tube can produce cold and soulless interiors. And this effect does not end there, because unscreened windows become part of the street scene, often contrasting unfavourably with those belonging to rooms lit by the warm glow of tungsten lamps : any town street can provide ample illustrations of this. It should also be remembered that, although this cheaper form of artificial lighting has made possible higher levels of illumination, the provision of large amounts of light by insensitive methods does not necessarily lead to improvements in visual comfort. Also, the average size of the most common type — the suspended fitting — is, of necessity, large and frequently difficult to incorporate within a pre-determined design. Lit, or unlit, such fittings tend to be over assertive and, when scattered over a large area the visual result can be both distracting and boring. Large factories are often an exception to this last criticism when a myriad of regularly spaced strips of light sparkle out against the dark maze of the roof and march, in ordered multiplicity, into seeming infinity.

Due to the unavoidably assertive qualities of many fittings — especially those which are suspended — the tendency to " style " the basic forms is to be deplored. This practice, which happily shows some signs of abating, was particularly rampant immediately after the war when the " stylists " had obviously found a brand-new peg on which to hang their streamlined ideas. This self-concious form of gilding the lily increases the already assertive quality of the fitting out of all proportion to its importance and is, alas, too frequently pretentious and more in the vernacular of the American car — which at least *has* to move through the air — than in the static and considered language of architecture.

Courtaulds Ltd., Carrickfergus

" . . . . . a myriad of regularly spaced strips . . . "

The architect, having carefully considered his spacial relationships, surfaces and components is often lothe to cut his conception to ribbons with a maze of suspended troughs or strips, but where he should wish, or be economically forced, to do so then his job is made no easier or more palatable when he finds that the stylist has been there before him and has spread a decorative veneer over the fitting which is totally out of sympathy with the architect's design. It would seem that, ideally, the most satisfactory use for the fluorescent tube lies in the realms of concealed and diffused lighting, for it is here that the tube achieves a personality of its own, paying no lip service to the traditional point sources of light. It can provide an even output of light along any length, something the individual bulb cannot do except at great expense, and even then not perfectly.

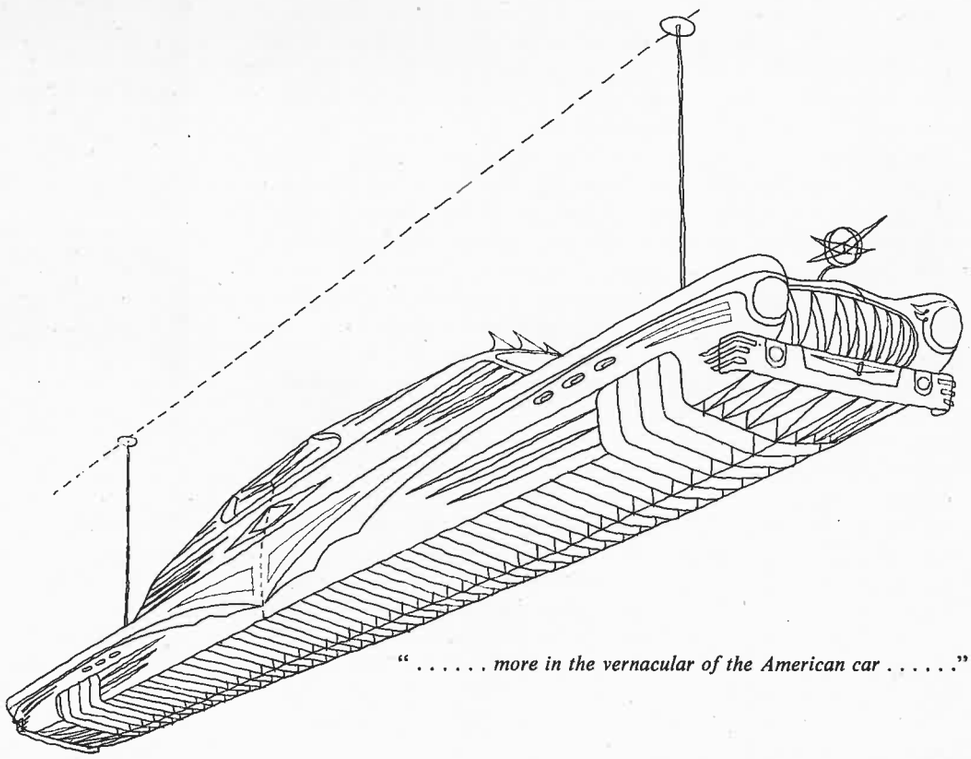
Vauxhalls Ltd., Luton

" . . . . . in ordered multiplicity, into seeming infinity."

But, out of economy and necessity, the suspended or direct ceiling fitting will continue to be the most prevalent use of the tube and one hopes that the designers of such fittings will give earnest and serious attention to the new forms which modern architecture is producing, and not be satisfied to ring the changes on a few " modernistic " cliches with which they hope to capture the will-of-the-wisp attention of the public. Interior lighting is part of interior design.

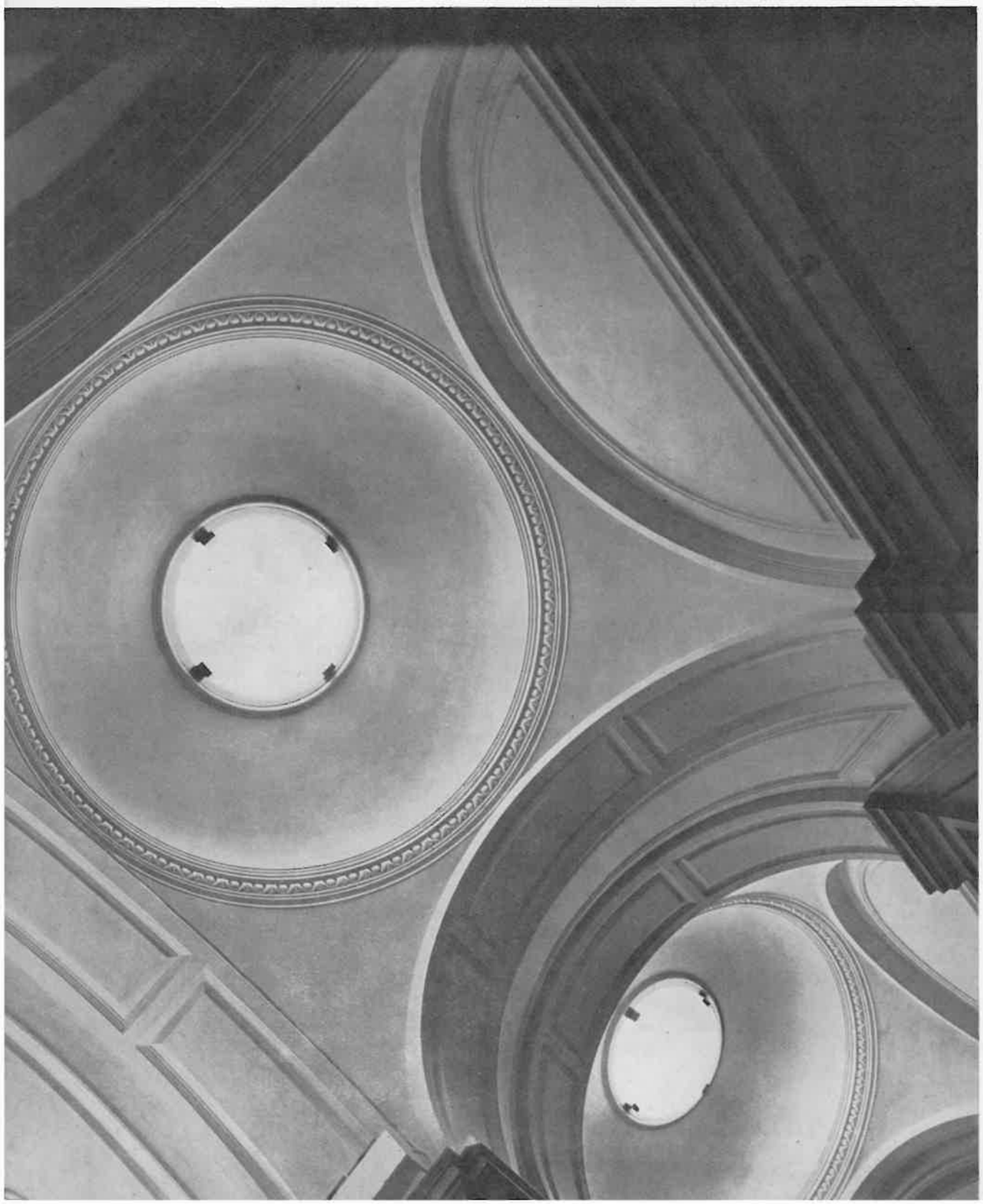
Saint Teresa's Maternity Hospital

" . . . . . here the tube achieves a personality of its own . . . . . "



" . . . . . more in the vernacular of the American car . . . . . "

CORRELATING LIGHT AND ARCHITECTURE.....



A fluorescent lighting

(1) **The Saucer Domes are illuminated by four 2 ft. fluorescent lamps built into existing lantern lights. The auxiliary gear is accessible by way of the hinged " Perspex " panels. These domes also shed light on to the landings, illuminating portraits and busts of famous past fellows including the founder of the Society, Charles II.**

J. C. WHIPP

Among the most famous of scientific institutions, The Royal Society of London provides an interesting challenge to the modern designer and architect. It is the home of a famous scientific library, of great ceremonial functions and meetings of eminent scientists from every part of the world. The rooms are in the severe style of late Georgian architecture although built in 1872 after the designs of Banks and Barry, who were responsible for the present Houses of Parliament. In this article, Mr. J. C. Whipp describes the lighting scheme which was introduced into this building towards the end of the war. The old tungsten lighting was replaced by fluorescent fittings and lamps supplied by The British Thomson-Houston Company with results which, despite many practical and aesthetic problems and many early doubts, have gained wide praise and approval.

scheme at the

ROYAL SOCIETY

One of the earliest attempts in this country to apply fluorescent lighting on a large scale to classical period rooms was made in the apartments of the Royal Society during 1945.

The installation was intended to demonstrate to this famous scientific body the progress that had been made in fluorescent lighting during the war years when, in its utilitarian garb, it contributed vitally to the national effort, and to prove the possibilities of its wider application to illumination conceived on architectural lines in classical interiors.

The problems set the architectural adviser and lighting consultants in the application of fluorescent lamps and fittings to this classical building were indeed exacting. Some of the most severe handicaps were due to restrictions still prevailing and the limited range of gear and lamps available and to the fact that no alterations whatsoever, whether affecting the structure or the existing decorations, could be contemplated.

That it was yet possible to demonstrate to this highly critical body of scientists that the new form of lighting need be in no way incongruous to architectural surroundings of past periods, clearly establishing its adaptability when handled with consideration and care, was an encouraging step forward, opening many possibilities for the lighting of similar institutions and public buildings.

The demonstration installation was eventually, after general approval, made permanent in 1949, and other important rooms incorporated in the general scheme. In the arrangement of the lighting lay-out, special consideration had to be given to the most diverse requirements of the various rooms and assembly spaces, giving ample flexibility to serve the pensive reader and searcher, the small and large committees, scientific demonstrations and great ceremonial functions. Over accentuation of light, so easily tending to garishness, was carefully avoided, and illumination levels were measured at every stage to preserve the architectural values and dignity appropriate to these apartments.

All reflectors and fittings were specially designed to form an integral part of the architectural alignment, but lighting was the primary consideration and not, as is often the case, the fittings themselves. Where deeply recessed alcoves made fittings unavoidable, these were kept as unobtrusive as possible and totally enclosed in lightly mottled or satin finished " Perspex," built up as practically frameless units. Some of these were of the pendant type, in no way representing a hankering after the Victorian chandelier but a perfectly functional application of the light source to deeply recessed

(2) A bust of Charles II on the first half-landing keeps watch over visiting scientists as they make their way to Council Room and Libraries to transact that business for which the enlightened monarch provided a charter in 1663. Here the lighting is the same as for the entrance hall with the addition of illumination from the two saucer domes above the intermediate landings.

ceiling spaces or domes, giving an even illumination, not only to the ceiling panel but to the beam soffits as well, a problem otherwise often difficult to solve.

Mains voltage Mazda Warm-White fluorescent lamps were used, except in the Council Room where for demonstration purposes an 18 ft. diameter circle of 30 m/m high-voltage tubing of the same colour was installed in the centre ceiling panel. Filament lamps were incorporated in some of the fittings in rooms used for receptions and ceremonial functions to provide added warmth and to give emphasis to the many orders, decorations and colourful uniforms worn on such occasions. They also serve as pilot lights when these rooms are not in use.

To guard against any possibility of disturbing noises, all control gear, apart from the starter switches, was assembled in batteries in convenient positions outside the apartments. Although this entailed some extra wiring, the arrangement makes for easy access and for the elimination of any possible fire risks, an important consideration in an old building of this nature with its valuable and irreplaceable contents.

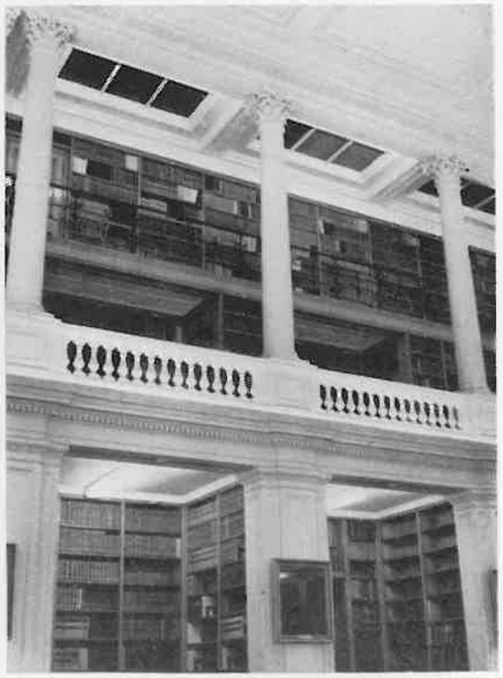
Special consideration had to be given to the design and positioning of the light sources in various rooms, where the many glazed portraits of past Presidents and Fellows adorn the walls, to guard against specular reflections. Probably for the first time these oil paintings now receive adequate illumination. The bust of King

(3) The main entrance hall gives an immediate impression of the soft, unobtrusive lighting which is found throughout the apartments. Illumination comes principally from fluorescent lamps in two continuous concealed troughs adjoining the two end elevations. Moulded plastic fittings in two large ceiling panels provide shadowless supplementary lighting and act as pilot lights.

(4) and (5) The Council Room with its Corinthian columns supporting a richly modelled entablature and cornice, and deeply recessed ceiling panels of circular design, presented a formidable lighting problem. A continuous luminous trough contains two rows of fluorescent lamps with additional intermediate lamps over the columns. A circular high-voltage lamp takes care of the large central ceiling panel. Cornice lighting is controlled by six circuits permitting gradual stepping-up from pilot to full ceremonial illumination, giving at each stage architecturally balanced lighting.

6

7



(6) Largest and perhaps most magnificent of the Society's rooms is the main library. Measuring 56 feet by 42 feet and rising in three tiers to a height of 34 feet, it contains a vast and valuable collection of scientific books and manuscripts. Principal lighting is provided by fluorescent lamps in a continuous trough at balustrade level.

(7) The uppermost balconies are illuminated by concealed lamps at cornice level. In addition, three glazed ceiling panels, each screening a combination of fluorescent and tungsten filament lamps in a star-shaped reflector, illuminate the centre of the library. The ten readers' bays on each side of the two lower levels are illuminated by separately controlled fluorescent fittings.

(8) General illumination in the large Conference Room is provided by a pendant fitting in the circular ceiling panel, supplemented by light from concealed fluorescent lamps. From the picture nearest the door the attentive face of Faraday, without whose work neither artificial light nor many other present-day amenities would be possible, looks upon the bright and impressive scene.

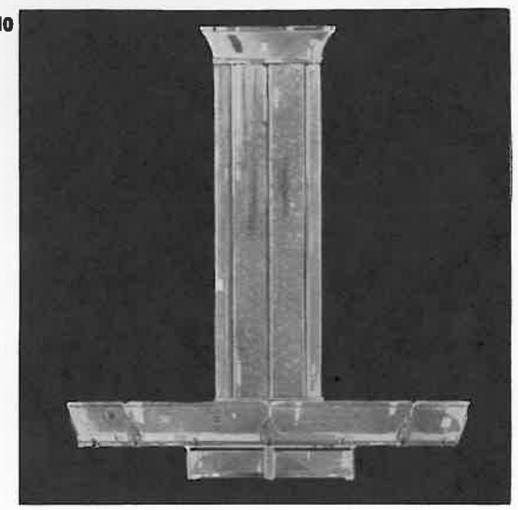
(9) The small Committee Room has a specially constructed fluorescent fitting over the tables. The fitting is 11 feet long, contains six 5 ft. lamps and is constructed of satin-finished "Perspex" which ensures clear, shadowless lighting.

(10) The pendant fitting specially designed for the large Conference Room. It contains twelve 40-watt, 4 ft. fluorescent lamps in its stem and the same number of filament lamps in the bowl. An additional high wattage filament lamp is situated in the base to give added sparkle to the lighting on ceremonial occasions. All panels of the fitting are easily removable for access to lamps and starter switches.

8

9

10



Charles II, the founder of the Society, on the main staircase, and other sculptures in the main hall and elsewhere, are now given new interest and animation.

Many of the difficulties encountered in this pioneer installation would be greatly simplified to-day now that a wider range of lamps and gear is available. As one of the first steps forward in the evolution of fluorescent lighting conceived on architectural lines the installation at the Royal Society is, however, of great interest and value. It shows that efficient lighting of a modern kind can be made compatible with interior design of the most severe period style, a lesson which has regrettably still to be learned by many responsible authorities. Few approaches are more disastrous than imitation of period style or the haphazard employment of modern fittings. The installation at the Royal Society proves that neither extreme is necessary, without itself being a mere compromise.

THE BUILDING CENTRE

The Building Centre, recently moved to new premises, offers facilities for manufacturers to exhibit materials used in the construction of buildings and for architects, builders and members of the public to view these materials. Lighting for the building was installed by Troughton and Young Ltd., and Mazda fluorescent fittings are used extensively.

The attractive entrance to the new premises, illuminated by tungsten spotlights and louvered fluorescent fittings supplied by Courtney Pope (Electrical) Ltd.

No. 26, STORE STREET, LONDON

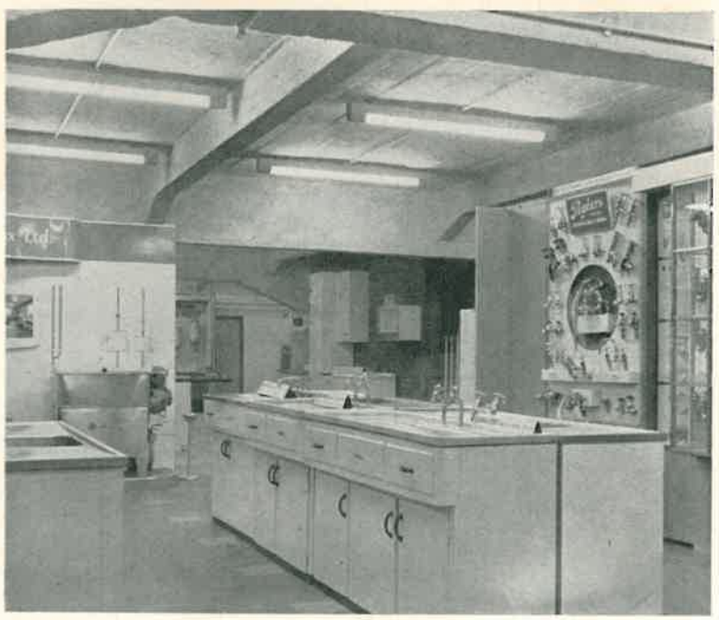
Step through the reinforced glass doors of 26 Store Street and you are in the utilitarian world of the Building Centre. There are linoleum patterns by the score and wallpaper designs for the kitchen, bedroom, palace or office. Floorings and ceilings, heating and lighting fittings, tiles, beams, coat hooks and cradle rails contribute to a list which is seemingly inexhaustible.

These premises, previously a motor car showroom, have been converted into a modern display centre of contemporary building design, and the liberal use which the architects have made of vertical and horizontal features, cutting across each other to give an impression of depth and three dimensional perspective, unmistakably emphasizes the *modern*. It should not, however, be imagined that the Building Centre looks uncompromisingly to a gay and unimpeded future of building development. With somewhat pessimistic foresight the official press guide states, " When taken over, the basement was equipped as a public air-raid shelter .....some blast walls have been retained so that a shelter adequate for the building could easily be reformed." More hopeful characteristics of the new building have been conditioned by existing architectural features.

Lighting is one of the most impressive things in the Centre. An attractive combination of tungsten-spot and louvered fluorescent fittings inside the main entrance sets a very high standard in functional and unobtrusive display lighting. The whole area of the entrance and information section is illuminated in this way, making it the main focal point when viewed from the street after dark. General lighting throughout the building is provided by Mazda fluorescent fittings of the single-lamp F 1050 type. The distribution of illumination is remarkably even and shows up the many different products from tiles and linoleum to iron frameworks clearly and without shadow or colour distortion.

Except for the false-ceiling in the entrance hall, ceiling surfaces and beam structures have not been altered, so that the arrangement of the fluorescent fittings has been largely determined by considerations other than those directly connected with lighting. Yet, the lines of fittings are a prominent and impressive night-time feature, carrying the eye from the entrance along the extensively glazed exterior and when viewed from inside the building they in no way intrude upon the layout or presentation of displays. More important, they carry out efficiently the function of illuminating the many products, ranging through the entire practice of building, which are on show.

There is much for the building worker and layman to see and learn. As far as lighting is concerned, the Building Centre shows that good functional illumination can be achieved without fuss and flamboyancy. The lighting installation forms an integral part of the Electrical Section which is intended to provide a survey of methods of electrically equipping a building. Methods of installation and wiring are indicated in detail. The authorities have taken full advantage of the opportunities offered by the new Building Centre, both with regard to lighting and the many other aspects of building which it portrays.



These pictures show the various types of lighting used in the Centre. In the area of the main entrance " Contralux " fittings supplied by Courtney Pope (Electrical) Ltd. provide impressive illumination. General illumination throughout the Centre is provided by Mazda fluorescent fittings which are mounted flush to the ceiling. These single-lamp units give a high level of lighting, evenly distributed over the exhibits and surrounding areas.

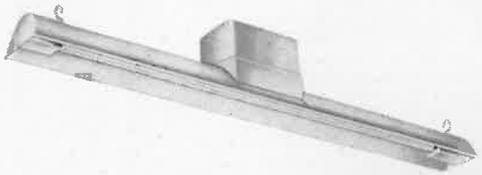
THE DEVELOPMENT OF FLUORESCENT FITTINGS

Fluorescent lamps are in such general use nowadays that it is sometimes hard to realise that the fluorescent lighting industry is less than twelve years old. When one also remembers that the early development of fluorescent lamps occurred extensively during the war years, with all the restrictions then in force, it is quite remarkable that design has progressed in such a satisfactory manner.

There have been growing pains which have shown up in the form of badly applied equipment. Also the urgent demand of some five or six years ago, far exceeding the supply capabilities of the more reputable manufacturers, led to the introduction of equipment which had been inadequately designed and tested. Furthermore, the higher capital cost of fluorescent lighting compared with lighting by filament lamps resulted in a tendency to reduce the fitting to the merest skeleton, disregarding the well established lighting principles of controlled brightness distribution.

A basic problem

From the beginning the basic problem in the design of fluorescent fittings was the housing of the auxiliary gear to ensure freedom from noise and adequate heat dissipation and, at the same time, to provide the fitting with reasonably balanced proportions. Auxiliary gear design, particularly in the case of chokes, tended to proceed as a separate problem from the design of the fitting. For instance, the need to dissipate the heat generated in the choke by direct contact of the major surface of the choke with the fitting materially increased the noise emission from the whole unit.



1 An early fluorescent fitting produced by BTH.

Light distribution

Most of the initial applications during the early days of the war were in factories where the fluorescent lamp reintroduced " daylight " lighting to replace the natural light excluded by hasty blackout methods. A typical industrial fitting of the early war years is shown in fig. 1.

It was soon realized that using normal mounting height/spacing ratios, a single-lamp 80-watt fitting could only provide an illumination level of approximately 12-15 lumens per square foot and very soon the demand for illumination levels of the order of 20-25 lumens per square foot resulted in the introduction of two-lamp fittings. In practice, two-lamp fittings were found to have a performance lower than estimated, which brought out the fact that the individual lamps in a two-lamp fitting must be spaced a reasonable distance apart to avoid overheating between the lamps and consequent lowering of light output.

Wartime economy

Experience always showed that a degree of upward light was needed to provide a reasonable brightness distribution and the now familiar " upward light slot " in industrial reflectors was introduced.

During the middle war years many interesting designs of fittings were produced primarily to conserve raw materials and installation manpower. An ingenious design of fitting, produced for installation in underground caves at Corsham which were used as a natural bombproof aircraft factory, is shown in fig. 2. The fitting could be installed in the shortest time with unskilled labour, but of course it is ugly judged by todays standards. The war time shortage of conduit and of installation labour also led to the development of fittings designed to provide a continuous line of light with a minimum number of suspensions and cable entry at one end only (fig. 3).

2 Another early Mazda fitting, with lamp control gear held in chain suspension, was installed during the war in underground caves at Corsham where a vast aircraft factory was located.

3 Fittings mounted in continuous lines with minimum of suspensions and cable entry at one end only. This installation, at the Napier works, Acton, was among the first to employ fluorescent fittings in continuous formation.

Post-war design

Soon after the ending of the war, engineers became free to approach the design of the components in a fluorescent lamp circuit from the point of view of the all round requirement of the complete fitting. The first outcome of this activity was a range of chokes with a smaller cross section and with the noise problem solved by the design of the choke itself rather than by its method of installation in the fitting. Ease of replacing the starter switch was considered and the original type of starter gave way to the modern design of starter switch and socket.

In more recent times the starterless circuit, using a combined choke and transformer, has become relatively common and this has had its impact on the design of the fitting. Whereas initially the circuit components — starter switch, starter socket, choke and capacitator — were treated as individual items which the fittings designer had to incorporate as best he could, bearing in mind the conflicting problems of noise, heat dissipation, installation and maintenance, the tendency nowadays is towards one control component which can be made and assembled on mass produced lines, resulting in a single power unit around which the fittings designer can build with considerable flexibility.

Channel design

The varied experience resulting from the first decade of fluorescent lighting has led fittings designers to concentrate on a channel or backbone which provides a housing for auxiliary gear, a means of suspension, and end-plates which incorporate ways of linking fitttings together in line. Varying designs of fittings for different applications can then be obtained by attaching reflectors and diffusers to the main backbone.

In any well designed channel, provision should be made for conduit or chain suspension by knockouts at two points. For direct on ceiling mounting two sets of screw holes, for attachment to standard conduit boxes, should be located on the centre line of each knockout. In addition, for general convenience there should be a cable entry knockout or rubber-bushed hole at the centre of the channel. For ceiling mounting from the centre fixing only, provision should be made for a further set of screw holes. It is desirable that the end-plates should be strong enough to support the channel when it is set on end during storage or just prior to installation and these end-plates should be provided with knockouts and some simple means to ensure that they interlock accurately when fittings are mounted end-to-end.

Accommodating the auxiliary gear

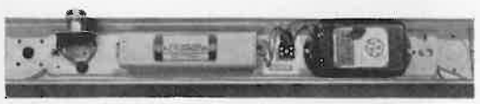
The housing of the auxiliary gear inside the channel calls for very considerable thought and it is most undesirable that this gear should be screwed directly to the underside of the channel.

Such an arrangement has three disadvantages ; it is unsightly, the screw head may hold the channel away from the ceiling, and when ceiling mounting is employed the whole fitting has to be removed to replace any part of the auxiliary gear which may fail.

The ideal arrangement is to mount the auxiliary gear on a tray which is held by bolts, permanently locked to the channel. Such an arrangement provides a complete power pack which can very conveniently be sub-assembled and put into the fitting in a neat and reliable manner.

A terminal block should be anchored firmly to the gear tray, with a nearby earth connection clearly marked (fig. 4). The internal cables employed should be to an approved specification and should be neatly cleated with extra protection for the cable at the cleating points.

4 The interior of a present-day Mazda fluorescent fitting showing auxiliary gear mounted on a tray.



By C. W. M. Phillips, A.M.I.E.E.

End-boxes
Much effort has gone into improving the end appearance of the fluorescent fitting and a variety of end-boxes, some good and some bad have been introduced. The essential features of an end-box are that it should be captive and should be removable with the minimum of damage to the paint work. However, the ideal solution is a fixed lampholder.

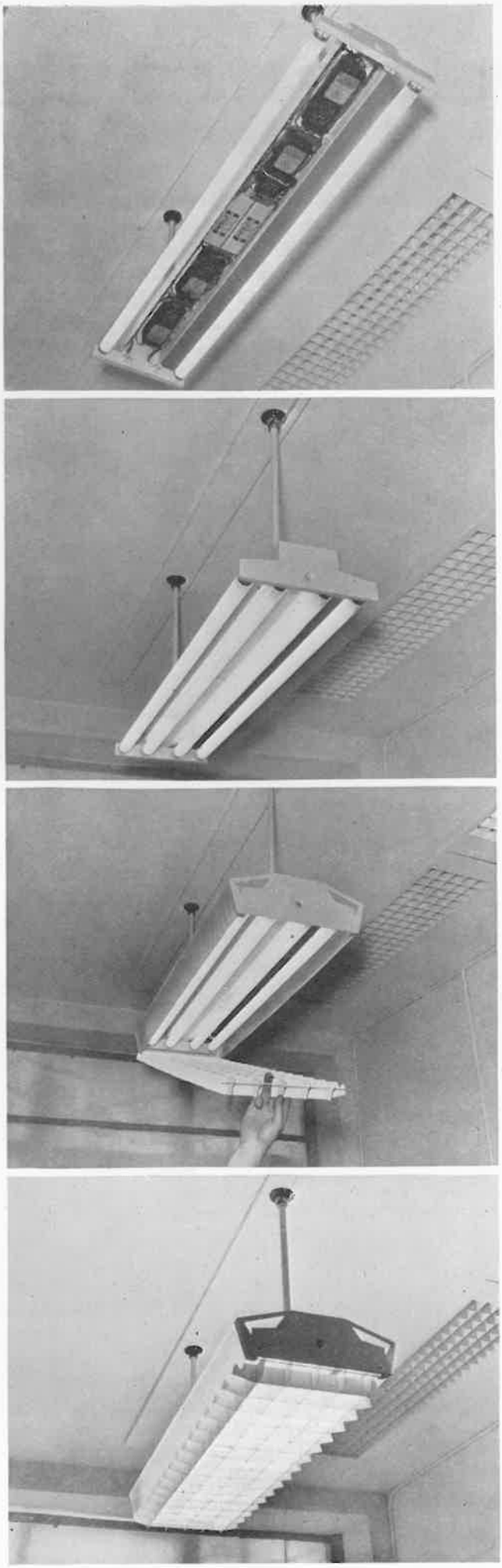
The starter switch
Considerable controversy has raged over the years about the ideal position for the starter switch and at one stage it was usually hidden underneath the lamp. There were objections to this arrangement however, as the lamp always had to be removed to replace a defective starter, and the modern tendency is to withdraw the starter switch through the side of the channel. Attention to design detail can avoid such an arrangement becoming unsightly. Incidentally, when metal canister starter switches are used it is desirable to ensure that they are automatically earthed.

Reflectors
Still the most popular use for fluorescent lamps is in industrial lighting and for this application a reflector quickly and simply detached from the channel unit is needed. Initially such reflectors were finished in air-dried cellulose enamels, but most modern fittings employ white stoved-enamel reflectors usually with upward light slots and preferably degreased and bonderized before painting. The very acute shortage of the necessary quality steel has prevented the widespread use of vitreous-enamel finishes, but if steel were readily available it is questionable whether vitreous-enamel reflectors would become the accepted standard, since they are susceptible to irreparable damage through careless handling.

Bare-lamp fittings
Bare-lamp units, though undesirable from a lighting point of view, except in limited applications, are in fact extensively used, but the increasing use of louvers clipped on to a lamp in a bare-lamp fitting indicates a practical interest by the user in the need to control glare from even low brightness sources. Bare-lamp fittings can be most conveniently produced by applying a cover plate to the basic channel unit instead of the industrial reflector.

Decorative fittings
Fittings of the decorative type have to be designed with particular regard to appearance as well as to electrical, mechanical and optical properties. But the sound engineering principles which should govern the design of industrial fittings are equally applicable to decorative fittings. This result is best achieved by building the fitting around a soundly constructed channel unit, but the precise cross section and length of the channel unit may differ from that of a fitting intended for industrial applications. A modern unit combining simplicity of construction with attractiveness and efficiency, now in the development stage, is illustrated in fig. 5.

Industrial fittings have to a considerable extent now achieved a stable form, and individual designs generally differ from one another only in points of detail. Although no characteristic school of design has yet emerged for fluorescent fittings, the growing tendency for design to proceed as a team effort involving industrial art designers, and electrical, mechanical and production engineers, should lead to interesting future development in fittings of the so called commercial and decorative types.



5 The modern trend in the design of decorative fittings is exemplified by this prototype fitting now in the development stage. Simplicity of design and installation and lighting efficiency are the chief features of the contemporary approach.

CORNICE LIGHTING

By P. D. FIGGIS★

An attractive alternative to the more stereotyped lighting methods using standard pendant fittings is provided by the employment of cornice lighting. Advantage is at once gained in a neater appearance where units follow an existing architectural feature, and in many cases installation and maintenance are simplified since the lighting units are more accessible. It may not be possible with cornice lighting to achieve a degree of general diffusion of illumination over the working plane comparable with a layout of standard fittings conforming to the accepted mounting height/spacing ratios. However, such uniformity may not be necessary or even desirable in many instances. Where a serious fall off in lighting intensity would be indicated (perhaps to the centre of large square rooms with low ceilings) it is normally possible to supplement with ceiling mounted or suspended units, or by the extension of cornice lighting applied to existing or false cross beams. The subject may be considered under the two headings : Indirect Lighting and Translucent Lighting.

Indirect fluorescent cornice lighting in Grand Hotel, Scarborough.

INDIRECT

With this method, all the light output is directed upwards to illuminate the upper walls and ceiling which then act as reflectors and become secondary large-area light sources. For this system, an obvious requirement is that the light be spread fairly evenly over the ceiling and adjacent walls.

The distribution and, therefore, brightness control, will naturally vary with the design of cornice unit and shape of ceiling but, in general, practice has shown that satisfactory results can be achieved, without recourse to special reflectors when the distance down from the ceiling is not less than $\frac{1}{3}$ of the width of the room for continuous lighting each side, or $\frac{1}{4}$ for lighting one side only.

Where these figures cannot be achieved cornice lighting may still be possible by varying the angle of distribution of the lighting unit to reduce the illumination immediately above the unit and to

★ *BTH Lighting Advisory Service, Registered Lighting Engineer, I.E.S.*

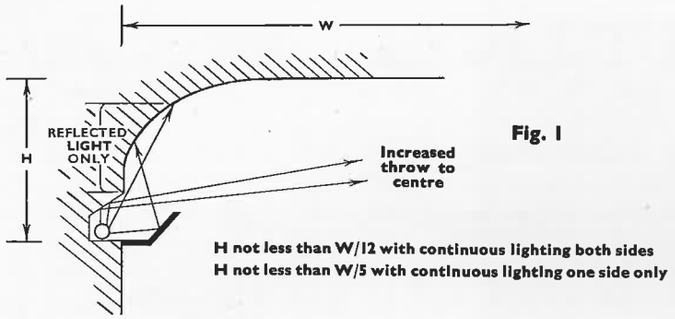


Fig. 1

increase the throw to the room centre either by specially designed reflectors or by construction of a cover (fig. 1). It is seldom safe to exceed figures of $\frac{1}{12}$ or $\frac{1}{5}$ (double or single rows) or a halo effect may result.

For greater distances, lighting from the side walls by itself will be insufficient and consideration must then be given to the best method of supplementing the lighting. This may be achieved by units either pendant from, applied to, or built into the ceiling structure — whichever is indicated by the architecture of the room.

In general, indirect cornice lighting on its own may be found rather uninteresting by reason of its flatness and the resultant lack of modelling inherent in large-area source lighting. It is, therefore, wise to combine some form of direct lighting feature, no matter how small in output, to act as a focal point. A judicious mingling of indirect cornice lighting with period fittings, such as candelabra can be very effective.

Fluorescent lamps as line sources are ideal for this form of lighting but, even so, care must be exercised to avoid shadow streaks on the walls caused by lampholders. In this respect, the 4 ft. 40 watt fluorescent lamp with its bi-pin lampholders which can be butted end-to-end with little discontinuance of light source, or cold cathode lamps with electrodes bent parallel, may be preferred. It is always possible, however, to arrange for an overlap of lamp ends if the 80 watt 5 ft. lamp, with its greater lumen output, is required.

TRANSLUCENT

With this method, the greater proportion of the illumination on the working plane will be derived from the direct component.

The normal ratios of spacing/mounting height will therefore apply to give even distribution. A ratio of 2 : 1 has been found satisfactory for units of a general diffusing character and the co-efficient of utilization method for calculating average intensity will give a good indication of the values to be obtained using published figures appropriate to the room dimensions and light distribution of the fittings.

Translucent screens can be incorporated in the lighting fittings to form complete units which can then be mounted either singly or

Cornice lighting with fluorescent lamps concealed by a wooden pelmet in the Wallpaper Stores Ltd. Oldham.

end-to-end to form a continuous run. Alternatively the screens can be mounted independently of the lighting units but so arranged that the lamps are screened from all angles of view. This would be achieved by the mounting of brackets at suitable intervals to secure the diffusing screen. It is usually necessary to ensure that the positions

Translucent cornice lighting with fluorescent lamps in the Town Hall, Maidenhead.

of the brackets coincide with, or overlap, the lamp ends, so that lampholders are not noticeable. Brackets can be designed in various sizes and shapes and they may also be used to secure the lamps if it is desired that the associated control gear should be located remote from the fittings (figs. 2 and 3).

With this form of lighting, close attention should also be given to the decoration for not only is the efficiency dependent on the colour and reflectivity of the ceiling and walls, but the texture is also important. A matt finish should always be provided otherwise specular reflections of the lamps will be visible.

Frequently, translucent screens can be mounted as an extension of some existing cornice and in this way the lighting units follow an existing architectural line and not only are they inconspicuous but they also become an integral part of the building structure.

It is only with the advent of the fluorescent lamp, be it cold cathode or mains voltage type, that cornice lighting has become a practical and economical proposition. The long line source with its much greater efficiency over its tungsten forerunner makes possible illumination levels, employing either direct or translucent methods, which would otherwise be impossible. Furthermore, a vastly increased loading would result from the use of tungsten lamps. Dirt streaks would quickly become apparent due to the convection currents from the heat generated by these lamps, whereas with the relatively cool fluorescent sources a much greater interval of time elapses before re-decoration becomes necessary.

Good lighting should be inconspicuous and as a means to this end cornice lighting offers great advantages, at little or no extra cost, over the use of pendants and should be seriously considered when planning the lighting requirements of town halls, conference and banqueting rooms, hotel lounges, domestic lounges and other interiors where the architecture and purpose of the room requires unobtrusive but reasonably efficient lighting.

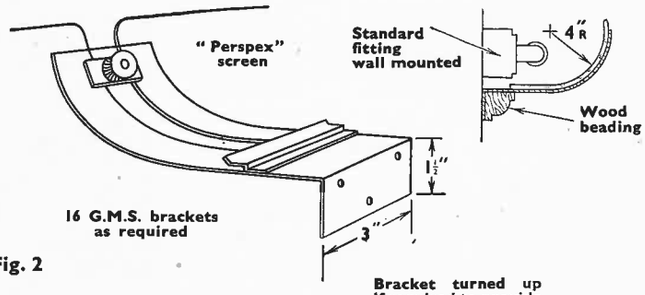


Fig. 2

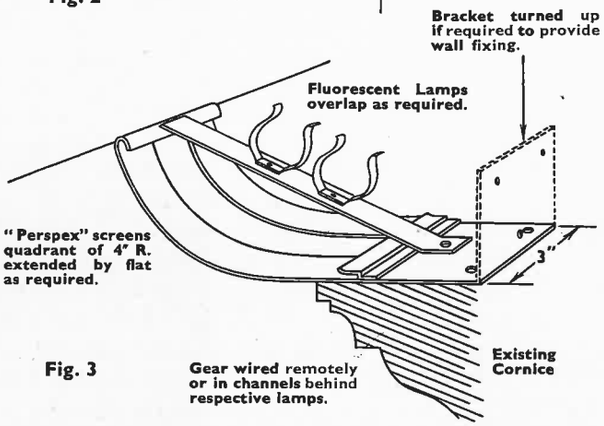
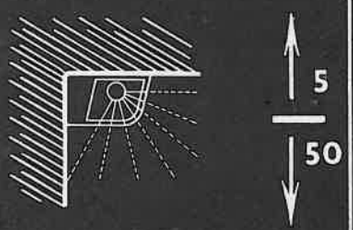
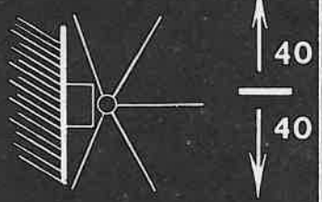
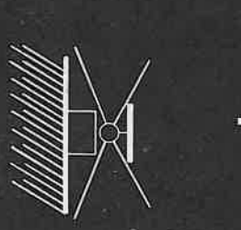
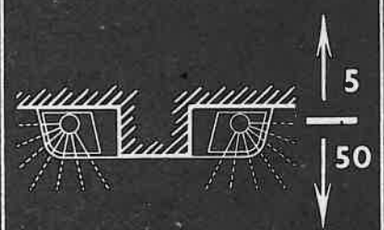
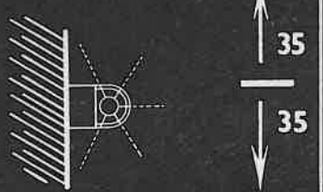
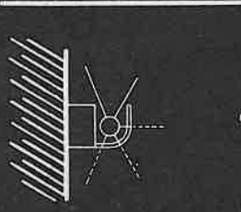
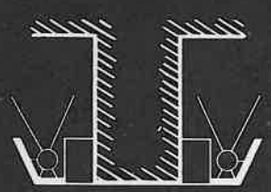
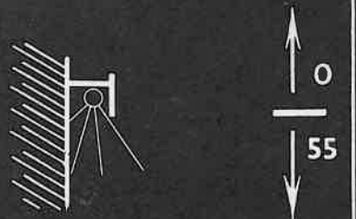
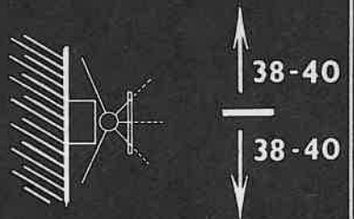
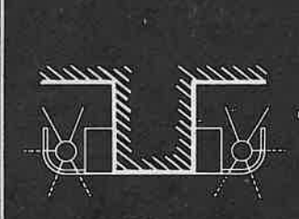
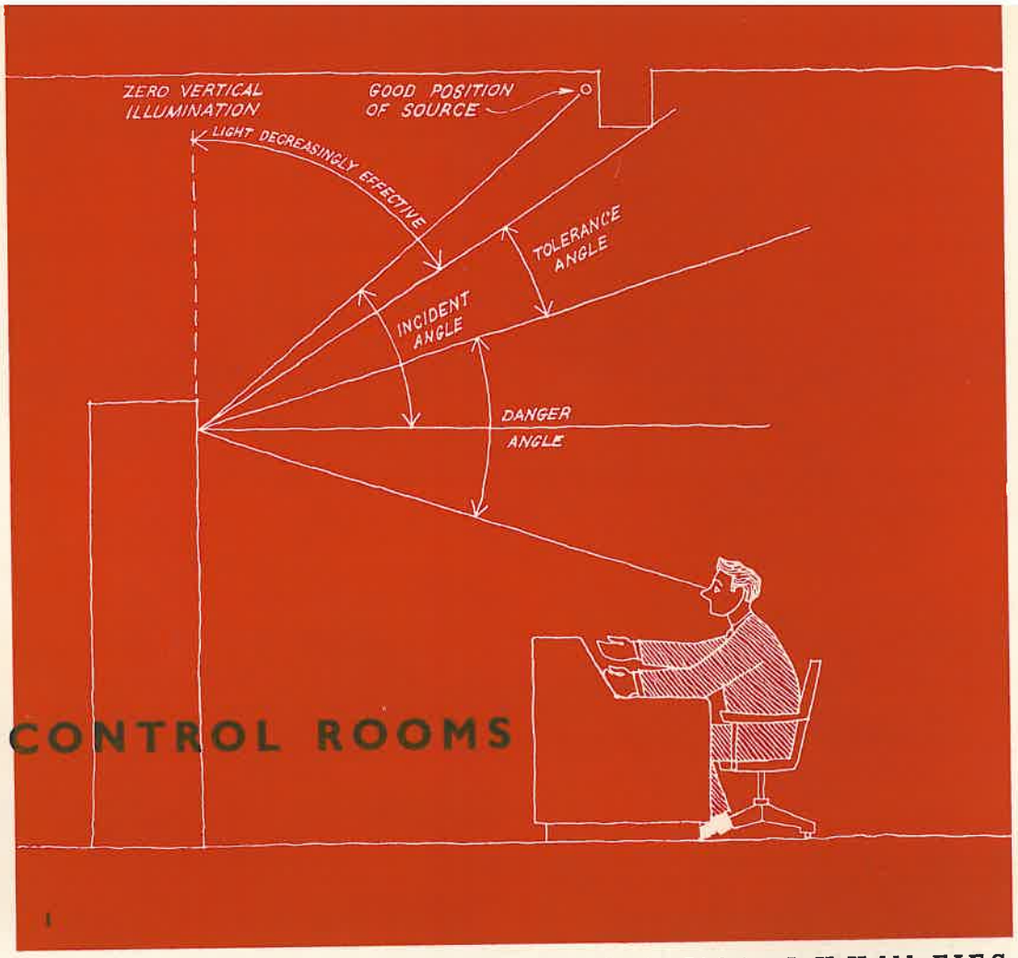


Fig. 3

Typical light distribution in upper and lower hemispheres (as percentage of total).

	DIRECT	GENERAL DIFFUSING	DIRECT—INDIRECT	INDIRECT
a	 5 / 50	 40 / 40	 30 / 30	 55 / 0
	ceiling wall angles	bare lamps horizontally fixed to walls	behind opaque pelmet	wall mounted with opaque screen
b	 5 / 50	 35 / 35	SEMI—INDIRECT  50 / 25	 55 / 0
	shallow beams	with enclosing diffusing screens	wall mounted screen	deep beams
c	 0 / 55	 38-40 / 38-40	 50 / 25	 55 / 0
	behind opaque pelmets	behind translucent pelmet	open topped	coves

LIGHTING FOR CONTROL ROOMS



1

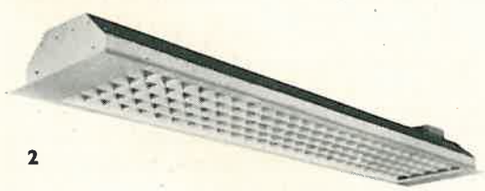
In the last of his series of articles devoted to Power Station Lighting, L. H. Hubble F.I.E.S. deals with the often complex problems set by the Control Room. The lighting of this important part of the Power Station calls for co-operation between architect, contractor and lighting engineer if it is to achieve the efficiency demanded.

The main visual task in a Control Room is that of reading and calibrating meters. Other visual tasks are quite secondary and are easily taken care of.

In order to render meters readable, little or no reflection of light sources should be visible to the eye from normal viewing angles. Although generally appreciated, this rule is more commonly applied only to artificial light sources and often only to the actual lamps themselves, whereas possibly the more frequent cause of visual disability in a control room arises from reflections of windows and natural laylights and lanterns.

Levels of illumination

A vertical illumination of 18-25 lumens per sq. ft. on the meter panels is today frequently specified and there does not appear to be any argument against such range of illumination. It is not altogether a simple matter, however, to achieve an illumination of this value without projecting the light more or less normally to the panels and such an arrangement would, of course, make reflections towards the eye from the meter panel inevitable. The usual procedure, therefore, is to lay off on a section of the control room the limiting angles of the normal field of view and to arrange the light sources which are to be employed for panel lighting as normal to the panels as possible without coming within what might be described as the danger angles (fig. 1). The general lighting in a modern control room is usually planned at about 25-30 lumens per sq. ft. and is best provided by some system of flush louvered fitting similar to that illustrated in fig. 2. By this method reflections from distant sources are reduced to a minimum.



2

Methods of approach

Theoretically, totally indirect lighting is the best method of eliminating annoying reflections but there are a number of very strong objections to this method.

In the first place, it is difficult to attain the required levels of illumination by indirect lighting owing to the inefficiency of this method. Secondly, indirect lighting makes the ceiling the brightest area in the field of view and the meter panels become relatively much less bright, which is the antithesis of good lighting practice in this instance. Thirdly, if modern standards of illumination are attempted by the indirect method and tungsten filament light sources are used, then the heat generated is a serious factor with which to contend. And if fluorescent lighting is used exclusively the capital cost becomes extremely high and is definitely not justified when a more direct method of illumination is possible.

A system using flush mounted fittings can, in most cases, be employed if the floor and the meter panels are fairly light in colour. It has been found that with a horizontal illumination of approximately 20 lumens per sq. ft. and a floor reflectivity (which is, of course, made up of all horizontal reflecting surfaces) in the order of 20-30 per cent, then the ceiling brightness becomes sufficiently high to avoid any suggestion of *tunnel* effect. This means that virtually any reasonably light granolithic floor will ensure that the ceiling is adequately brightened, even though no direct light from the fittings falls on to the ceiling.

In practice the architectural features sometimes call for a certain amount of deliberate cove lighting in addition to direct lighting. In this case the fittings would be designed to give sufficient upward spill light to achieve a brightness balance.

Many Control Rooms have little or no natural lighting and some consideration is necessary to ensure a reasonably pleasing environment for the engineers in charge. Much can be done to avoid a sense of confinement and although not of vital importance it is as well to keep this thought in mind when the question of lighting a control room is under review.

Control Room Layout

The lighting in a Control Room has to be so closely related to the positioning of the meter panels, and the angle of incidence plays such an important part in the vertical illumination on the meter panels, that no great divergence of geometrical layout can be permitted. For this reason it would be a good thing if the relationship between lighting and the meter panels were taken into consideration more frequently. Many Control Rooms are laid out in squares, rectangles, octagons, circles and ellipses according to the dictates of the engineer or architect concerned. Unfortunately, the architect will frequently design his beam structure, natural lighting and ornament without any relation of the control panels. Fig. 3 shows an elliptical layout of control panels in a room with a very typical rectangular beam structure and it will immediately be seen how the lighting problem is gravely complicated by failure to relate the panel layout to the ceiling (or conversely). Fig. 4 shows the Control Room at Staythorpe Power Station with coved ceiling treatment, designed specifically to take care of an exceptional case where boiler indicator panels are superimposed upon the normal distribution and control panels. In this particular case, theoretically, the danger angle does not leave any position on the ceiling at all for the light sources. But the coves are designed in such a manner that they are more or less evenly illuminated, and the light sources themselves are of a comparable order of brightness. In consequence, although the meters do actually reflect the light sources and there is a certain degree of disability glare, it is still possible to read them comfortably.

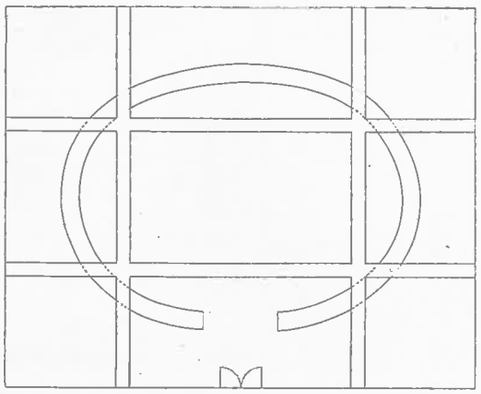
This last example made it necessary for the lighting engineers to prescribe the profile of the ceiling coves and also the mechanical fixings of the fittings, reflectors and glazing. " Hy-Rib " ceiling was used and it was clearly necessary that the design should be a co-operative effort between the architect and the lighting engineer. Another very successful control room lighting scheme was the result of a combined effort between the lighting engineer, the steel work contractors and the ventilation contractors working under the direction of the architect, and it can be seen that without such co-operation all the best methods of lighting control rooms are rendered impracticable.

The decorative aspect

In many control room designs submitted for lighting treatment a great deal of care is put into the architectural appearance and in several cases beams have been shown with considerable plaster ornament only to be covered subsequently by lighting fittings, usually of the translucent, angle type. In certain instances it has been possible to have the plaster work re-designed so that the fitting together with surrounding mouldings forms a composite design, and this again should be the objective in the early stages of design work.

Space does not permit a lengthy discussion of the decorative aspect of Control Room lighting but reference may be made to a novel treatment of emergency lighting which consists of permitting just over half of a pearl emergency lamp to protrude through a hole in the metalwork between luminous cornices. This may be seen at the corners of the octagonal feature in fig. 5 which shows the Control Room of Grangemouth Refinery. The result is not only to site the emergency lamps in their most effective positions and simplify their wiring, but to produce a decorative touch which enhances the general design, particularly when some spill light from inside the fitting makes the extinguished lamps slightly luminous.

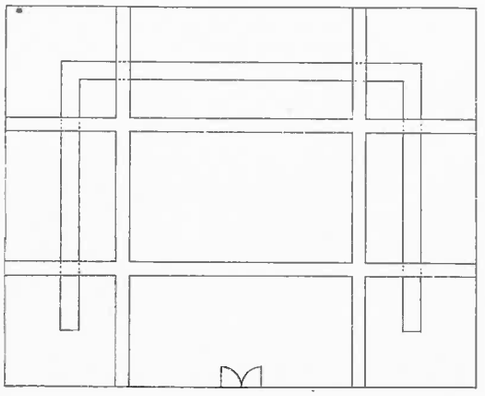
To summarize, Control Room lighting requires a high degree of mechanical precision and a good deal of attention to the more decorative aspects of lighting. This combination makes the subject an unusually interesting one, involving the utmost co-operation of the various interested parties.

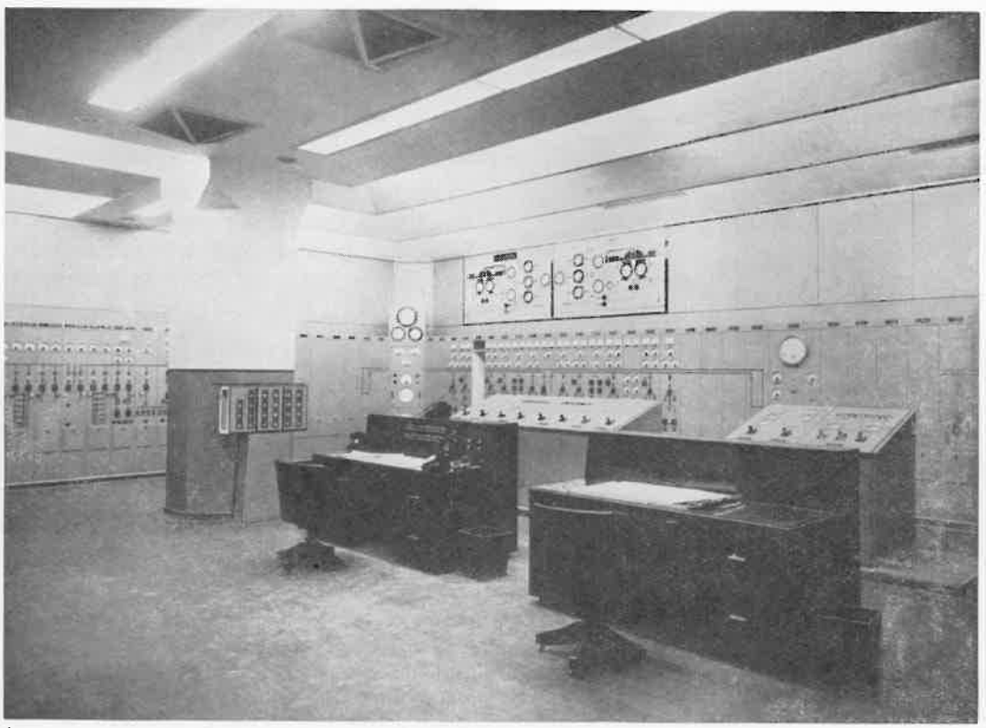


ELLIPTICAL LAYOUT OF CONTROL PANELS IN RELATION TO RECTANGULAR BEAMS: DIFFICULT TO ILLUMINATE

3

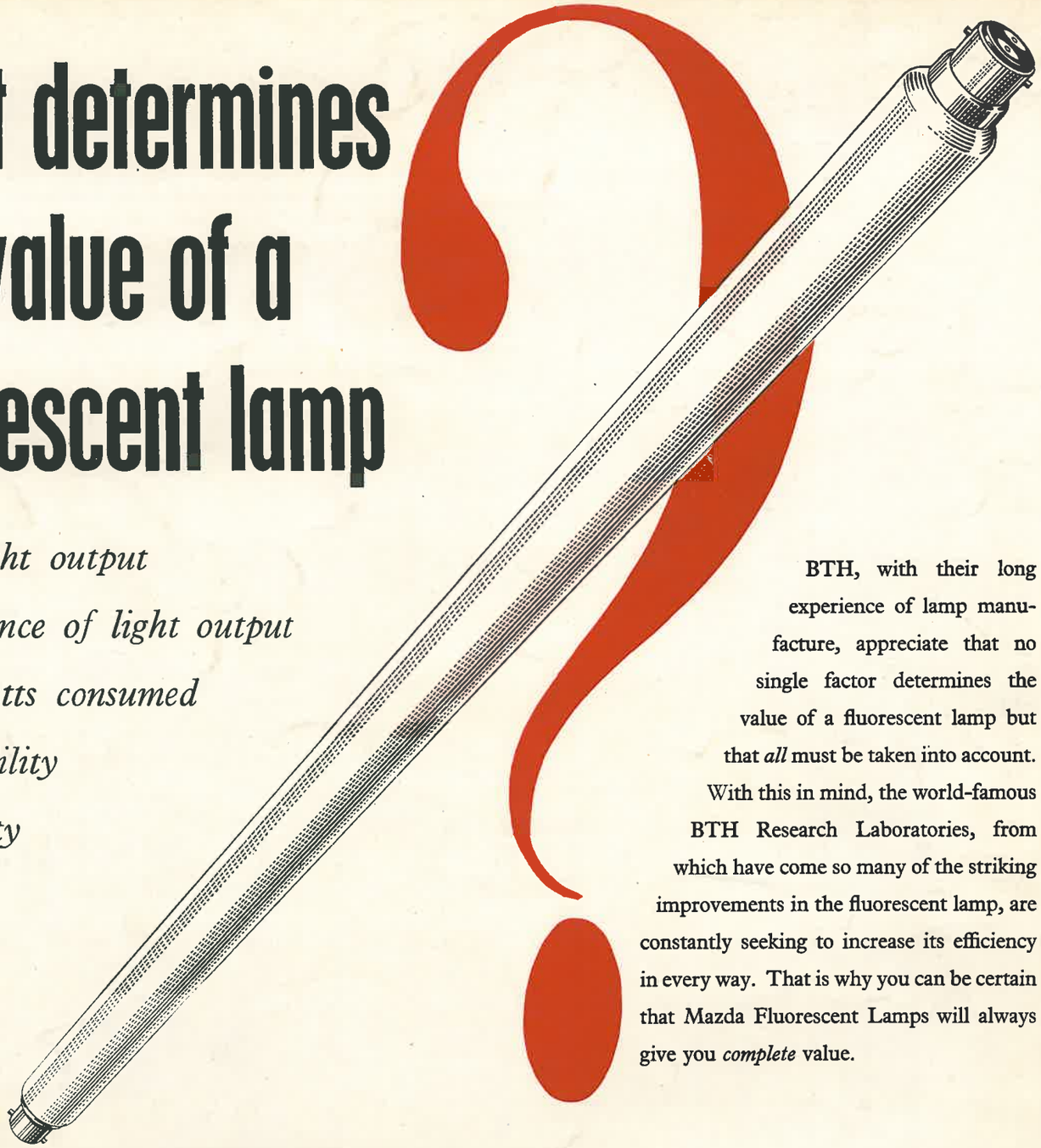
RECTANGULAR LAYOUT OF CONTROL PANELS AND BEAMS: LIGHTING FACILITATED





4

What determines the value of a fluorescent lamp



Initial light output

Maintenance of light output

Total watts consumed

Dependability

Uniformity

Colour

Price

Life

BTH, with their long experience of lamp manufacture, appreciate that no single factor determines the value of a fluorescent lamp but that *all* must be taken into account. With this in mind, the world-famous BTH Research Laboratories, from which have come so many of the striking improvements in the fluorescent lamp, are constantly seeking to increase its efficiency in every way. That is why you can be certain that Mazda Fluorescent Lamps will always give you *complete* value.

Mazda *lamps stay brighter longer*

B T-H

The British Thomson-Houston Company Ltd.

Crown House, Aldwych, London, W.C.2. *Telephone : Temple Bar 8040*

London Showroom and Trade Counters — Crown House, Aldwych W.C.2. *Telephone : Temple Bar 1343*

LIGHTING ADVISORY SERVICE

Mazda House, Fitzroy Road, London N.W.1. · *Telephone : Primrose 7750-62*

LONDON	Primrose 7750-62	CHESTER	20813	HUDDERSFIELD	3291	NORWICH	22541
BELFAST	24523	COLCHESTER	2843	HULL	Central 36241	NOTTINGHAM	43588
BIRMINGHAM	Midland 6335	CROYDON	5633	ILFORD	2561	OXFORD	4170
BLACKBURN	7093	DUBLIN	77379	LEEDS	31541	PLYMOUTH	61915
BLACKPOOL	South Shore 41422	DUNDEE	5600	LEICESTER	Granby 291/2	PORTSMOUTH	4383
BOURNEMOUTH	Boscombe 34194	EDINBURGH	Central 6922	LIVERPOOL	Central 5721	READING	2700
BRISTOL	20111	EXETER	55749	MANCHESTER	Blackfriars 2691	SHEFFIELD	23086
CAMBRIDGE	54370	GLASGOW	Central 4331	MIDDLESBROUGH	2476	SOUTHAMPTON	3369
CARDIFF	7171/3	GUILDFORD	2788	NEWCASTLE-ON-TYNE	25040	STOKE-ON-TRENT	48768
CHELTENHAM	2776	HASTINGS	2734	NORTHAMPTON	2981	SWANSEA	2151

L883/7

Printed in England by Albert Frost & Sons, Ltd., Rugby, for The British Thomson-Houston Co., Ltd