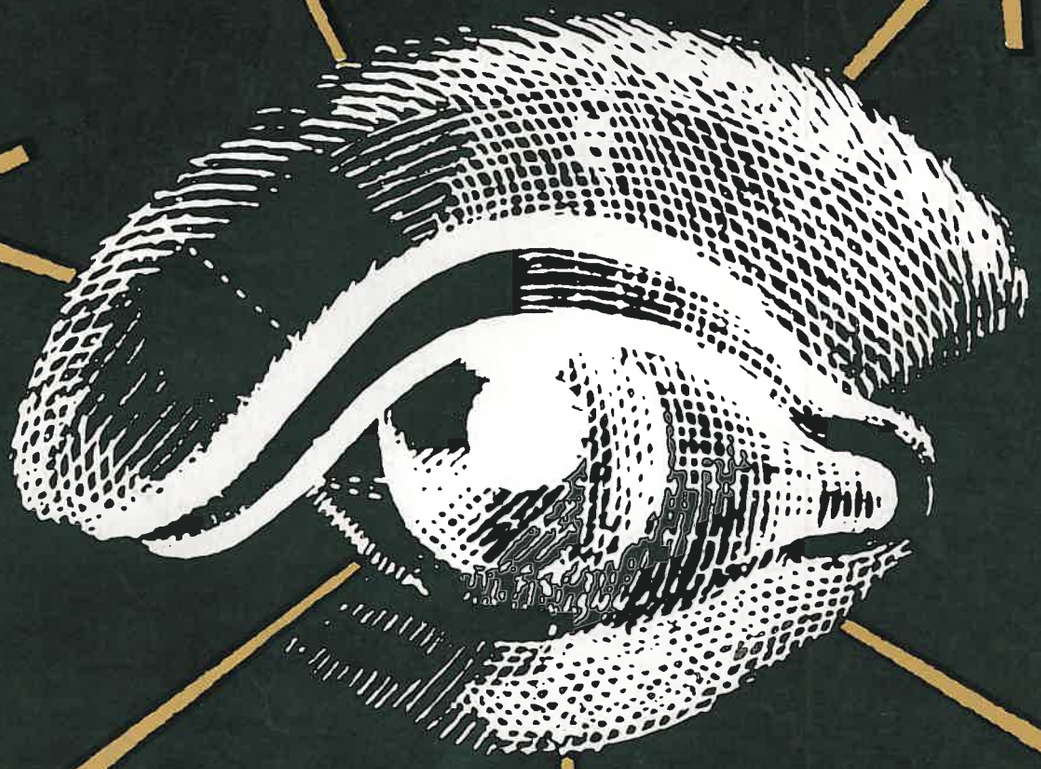
light



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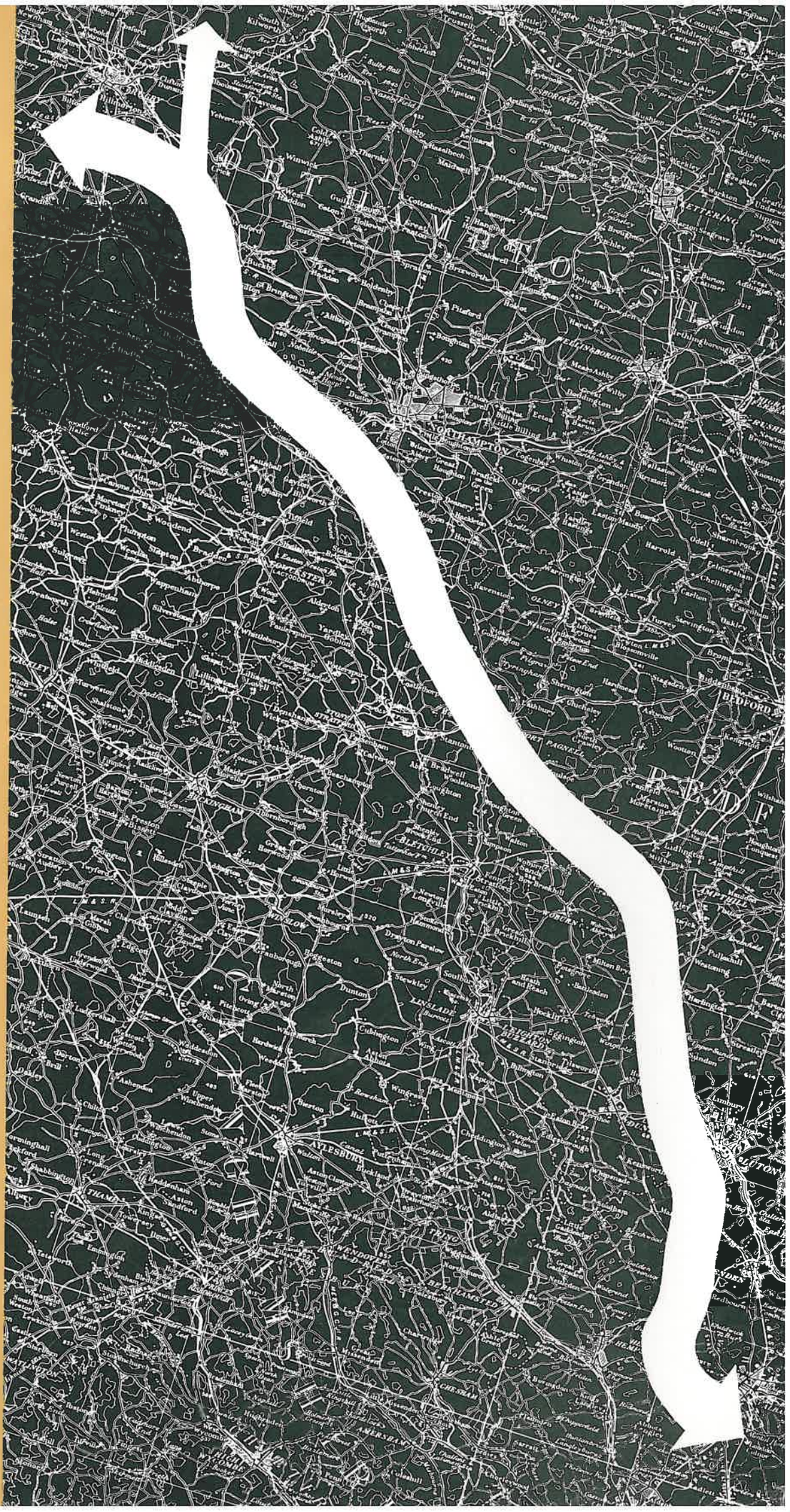
THE MAZDA LIGHTING JOURNAL VOLUME 3 NUMBER 4

RUGBY

THE FIRST FIFTY-THREE MILES OF THE PROPOSED LONDON TO YORKSHIRE MOTORWAY



ST. ALBANS

light

THE MAZDA LIGHTING JOURNAL VOLUME 3 NUMBER 4

ONCE AGAIN time is *not* on our side says Sir Patrick Hennessy, F Chairman of the Ford Motor Company, in a letter to the London *Evening Standard*.

Already the inadequate state of our roads is, according to Sir Patrick and other independent experts, sapping Britain's resources to the extent of hundreds of million pounds a year. Transport difficulties have become a threat to the nation's economy which can be ignored no longer. At home this is being reflected in the rising cost of living; abroad we are being priced out of valuable export markets. Moreover, last year accidents on the roads killed or seriously injured more than 60,000 people.

Confronted with this horrifying picture of loss of life and wealth, the Government must act. Of course, the problem of bringing all roads into line with the requirements of modern traffic conditions is so immense that it will be many years before substantial improvements can be made to the minor roads. But a start is being made on the all important question of providing adequate trunk roads.

The Minister of Transport has announced that a scheme is under consideration for a new London/Yorkshire motor road with severely restricted access and flyover crossings and junctions. A direct north/south route from Preston to Birmingham is also planned.

Here is a challenge for the experts. Will these highways satisfactorily meet the requirements of present-day road transport? It surely depends upon the skill with which *all* aspects of the project are treated—and not the least important of these is *lighting*. So often neglected in the past, a lighting system can make or mar the effectiveness of a road. Properly planned it can add to the safety and appearance of the highway. Put in as an afterthought it can make death-traps of the most carefully planned crossings. In recent years great progress has been made in the science of streetlighting. The development of electric discharge and fluorescent lamps, and of lanterns with highly efficient optical systems, has opened up immense new possibilities for transforming the illumination of our roads. The opportunity to apply these developments to the new highways offers a challenge to the authorities concerned and to the lighting and planning engineers who *must* work in collaboration with them. Now, at the planning stage, is the time for the experts to have their say.

In this issue of *Light* technical and design authorities put forward their proposals for an approach to outdoor lighting which is in tune with the needs of the 20th century. They lay down no hard and fast rules. Their purpose is simply to suggest the means, practical and aesthetic, by which lighting can contribute to the efficient flow of goods, the safety of travel and the appearance of outdoor areas.

It is to be hoped that the expansive mood of the Government, the outcry of the press and the urgent need of industry will give rise to early co-operation among the experts and official bodies, who alone can ensure that money spent on roads or rail-sidings, docks or shipyards, is *well spent*.

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'In our view a good road system might be likened to a conveyor belt for industry. We are certain that much of the increase in American productivity is attributable to the building up of an excellent road transport system based upon good roads'.

From a report by the European Productivity Agency of the Organization for European Economic Co-operation.

Britain's first motorway, soon to be built, will cut a clear path between London and Yorkshire; a modern traffic system to speed the millions of vehicles which hitherto have wound their way through the tortuous lanes of the old A.5 and A.6.

Will this motorway compare with the best in Europe and America? Or will the result at night still look something like this?

Modern, well planned lighting can provide the answer but it must be an integral part of this and other road-building schemes—*Not* a mere afterthought.


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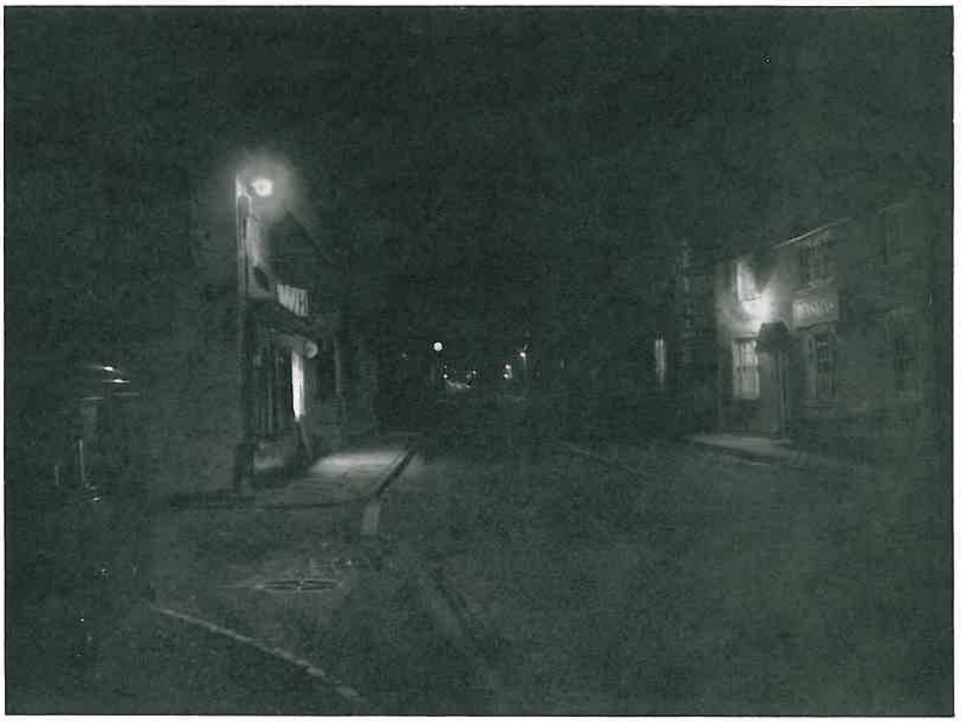

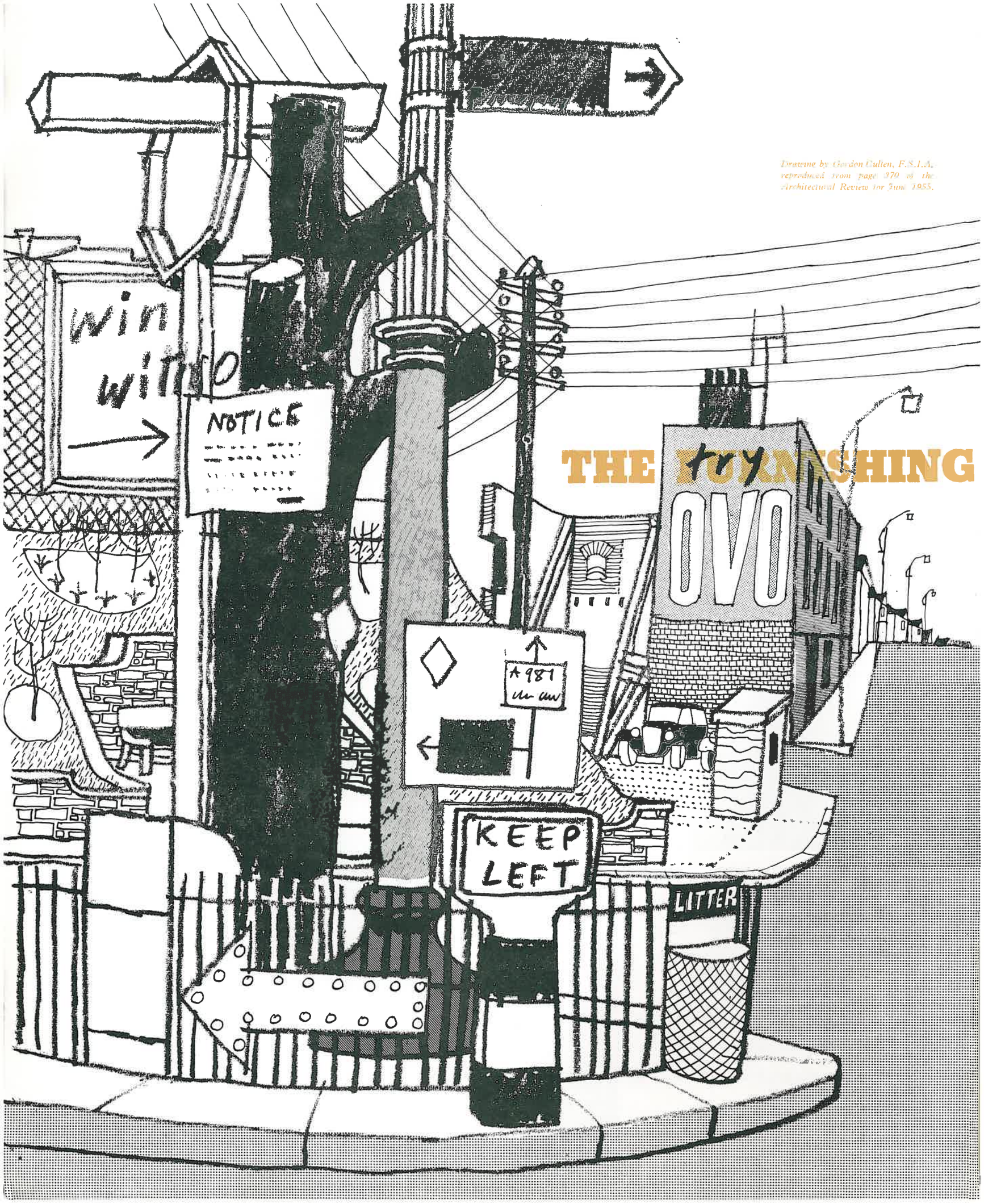

Drawing by Gordon Cullen, F.S.I.A., reproduced from page 370 of the Architectural Review for June 1955.

Hackney High Street 1850

AND LIGHTING OF STREETS

by Jack Howe, F.R.I.B.A., F.S.I.A.

MUCH HAS BEEN SAID in recent years about the need for simpler and more elegant street furniture. Much more needs to be said about the gradual disintegration of town and country under this increasing accumulation of ill-assorted paraphanalia. The tendency has been to consider, when it is considered at all, each piece of street furniture as a separate self-contained unit. Little has been done to relate one to another, or to the landscape of the countryside and the architecture of the towns.

One reason for this is that furniture of the street, unlike the furniture of the room, is chosen and sited by many different authorities, each working quite independently of the others. When we furnish a house, the result, whether it be in good taste or bad, fake period or Tottenham Court Road contemporary, will have some sort of unity because we and our wives have worked together on the whole scheme of things. But imagine the family, plus friends and relations and a few outsiders all making their independent contributions. Then you will have a result very much akin to that of a modern street which presents an accidental assortment of poles, wires, bins, signs and signals. (Fig. 1.)

To generalize in this way would be unfair without quoting exceptions and the one which immediately comes to mind is the London Transport Executive. This authority, continuing the fine tradition established by Frank Pick, has set, and continues to maintain, an exceedingly high standard, not only in the design of the individual pieces but in appropriate positioning and proper relationship.

Hackney High Street 1954

Furthermore, many instances exist where designs have been produced combining several functions such as shelters, seats, signs and illumination in a single well-designed unit.

A most important step towards the improvement and unification of street furniture design was made in 1952 when the Council of Industrial Design set up its Street Furniture Committee to examine designs submitted by manufacturers. This Committee has done first rate work as an approving body, beginning with lighting and extending its influence over many other items.

The need for co-operation between Government Departments, Local Authorities and Transport Undertakings cannot be over-emphasized and the establishment of a co-ordinating body, such as the Council of Industrial Design with broad terms of reference, is to be strongly recommended. But this article must concern itself primarily with the contribution of the lighting engineer and manufacturer.

Modern streetlighting as a public service is of comparatively recent date and has developed parallel with the increased speed of travel. At the end of the seventeenth century, public lighting was introduced into London entirely for the guidance of pedestrians who previously had carried their own lanterns when venturing out after dark. These oil lamps, either supported on brackets attached to buildings, or suspended over streets, were superseded by the newly-invented gas lighting of the early nineteenth century. Gas lighting was greeted with outcry from a public who feared injury to health and danger from explosion. When neither of these catastrophies occurred, tempers cooled and gas lighting in streets became common practice in towns where the service was available.

1 Subtopia

The Architectural Review recently published a special number entitled OUTRAGE. In it they uttered a prophecy of doom—the doom of an England reduced to universal SUBTOPIA, a mean and middle state, neither town nor country, an even spread of abandoned aerodromes and fake rusticity, wire fences, traffic roundabouts, gratuitous notice boards, car-parks and THINGS in Fields. It is a morbid condition which spreads both ways from suburbs out into the country, and back into the devitalized hearts of towns, so that the most sublime backgrounds, urban or rural, English or foreign, are now to be seen only over a foreground of casual and unconsidered equipment. Subtopia is the world of universal mess.

The bat's wing burner of the first gas lights, the incandescent mantle and the electric filament lamp were all stages in the rapid development of streetlighting, which has now reached a high level of technical efficiency with its several forms of discharge and fluorescent light.

It is interesting to note that like so many new inventions or methods, each development in lighting tended to copy its predecessor. The first gas lamps resembled closely the earlier oil lanterns; and although the introduction of the incandescent mantle enabled the fitting to be inverted, so that the light shone downwards, many street lamps were still in the form of the older oil lamps. Similarly the early electric lanterns were copies of gas and many are still. It was not until the introduction of horizontally burning sodium and mercury discharge lamps and fluorescent tubes, that modern streetlighting fittings began to escape from tradition and express their natural characteristics.

In the case of columns, the story is in some ways similar. Before the nineteenth century, the early wood posts were superseded by cast iron, and many examples still exist which are distinguished and elegant, with simple decoration appropriate to their form and method of manufacture. (Fig. 2.) As the Industrial Revolution gathered momentum, a growing confidence in foundry technique combined with an undisciplined desire to cover products with machine-made ornament, produced the familiar Victorian lamp posts. They were over elaborate and coarse, yet in a way, contained a certain charm in their sheer unshamed vulgarity. (Fig. 3.)

Today, cast iron is no longer an economic material, and with rising costs of labour, the question of maintenance has to be carefully considered. Tubular steel is cheap but more subject to corrosion than cast iron; consequently reinforced concrete is the most favoured material because of its low initial cost and upkeep. (Figs. 4 and 5.)

The early designers of concrete columns were in a slight quandary. They felt that the best way to popularize a completely new use of a material must be to copy the earlier cast iron designs which the majority of people had accepted, or, by long familiarity, no longer saw. But concrete was not the same kind of material as cast iron and could not be formed into intricate shapes and ornament in quite the same way.

This short history of streetlighting has been mentioned in order to illustrate how present day design has tended to lose its way. Firstly it has gone astray through lack of a clear statement and understanding of the problem, and secondly because those responsible have not completely grasped the nature of the materials and processes with which they proposed to work; this quite apart from the vitally important relationship between the unit and its surroundings which is so seldom considered at all. It is largely assumed that reinforced concrete lighting columns, because they are comparatively cheap and require little maintenance, are universally applicable to all streetlighting problems. This, apart from the appalling designs that have been perpetuated, has done a great deal to bring concrete columns into disrepute. The material, by nature is somewhat heavy and can seldom achieve the refinement and slender proportions of say, steel or aluminium.

Yet fine streets of architectural distinction have been ruined by the installation of unsuitable columns, to say nothing of the lighting itself. This picture, although gloomy, is not entirely black. There is now evidence of keen competition amongst manufacturers to produce really good designs. When this keenness reaches those who choose and buy the products, then a considerable advance will have been made.

The following is a brief description of some new designs now being manufactured and developed. With the exception of Fig. 7 these columns are of reinforced concrete and have been designed for spinning. Spun concrete is a process particularly suitable for lighting columns, since by revolving the mould at a pre-determined speed, the concrete is thrown against the outer face. Thus, a densely compacted mix is assured where it is most needed for strength and clean surface finish. At the same time a hollow centre is produced for cabling, without the use of a core. The 25-ft. column (Fig. 5) was designed to avoid sharp external arrises (always vulnerable both before and after erection) and the joint lines in the mould were made to coincide with the internal angles of the clover leaf form of the cross section. The control gear chamber is located at an accessible height, and the double taper gives a minimum girth at ground level. The tubular galvanized steel bracket arm retains

2 *Georgian cast iron street lamp.*

3 *Victorian cast iron lamp standard.*

4 *Concrete streetlighting columns installed at Gateshead in the 'thirties. (Spunconcrete Ltd.)*

5 *25 ft. BTH streetlighting column and lantern. (British Thomson-Houston Co. Ltd.)*

2

3

4

5

the simplicity of the column form, and has the advantage of providing any required outreach by simply cutting to length. The alternative concrete bracket requires a separate mould for every difficult outreach, and however many standards are produced there will always be those who want one just a little different.

The design illustrated in Fig. 6 is a column for 'B' category roads and is similar in form but with a pole-top lantern. Such a light source satisfactorily solves a very difficult problem in regard to this type of column which, the standard demands, must be 15 ft. from the pavement to the centre of the lamp. This height is just too short to clear the highest vehicles; consequently a projecting bracket is out of the question. A side or top entry lantern can only be used with a swan-neck bracket which prevents the lamp being fouled by passing traffic. This type of bracket is exceedingly difficult to resolve as part of a design, the reason being that it tends to hinder the function of the lantern which itself is designed to throw unobstructed light downwards. To place a lantern designed in this way immediately above the pole at once provides the obstruction that should be avoided; thus the position regarding 'B' road lighting is unsatisfactory. If it is intended that the roads should be properly illuminated for the guidance of traffic, then the column should be sufficiently high for a bracket to project over the road clear of all vehicles. If, on the other hand, a general form of amenity lighting is considered satisfactory, then the column should, if anything, be somewhat shorter than the present standard. This with a pole-top lantern would be more in scale with its surroundings, which are frequently of a domestic character.

The columns shown in Figs. 6 and 8 are similar to that in Fig. 5, but they differ in certain respects, because of changed design requirements. In the previous case it was required that no finishing work would be done to the column after its removal from the mould. This is sensible design and sound economics. But in order to meet a fashion for grinding the surface of concrete columns, it was necessary to provide flat surfaces to the faces of the triangular cross section without any re-entrant angles. Another condition which exerted its influence was the possible substitution of prestressed reinforcement; therefore, there is a single taper from base to top, interrupted only by the control box.

Basically similar in both appearance and construction, the 15-ft. column and the 25-ft. column have base chambers of the same girth. Therefore there must be a greater projection from the more slender shaft. But to satisfy those, who for some reason or other, dislike this projection, manufacturers of control gear might well give some consideration to reducing the bulk of this equipment, so that it could be housed in a smaller space.

A very real problem for those responsible for installing streetlighting lies in dealing with ancient towns and cities where streets are narrow and congested. To erect a forest of poles is no solution. Not only does it destroy the quality of the architecture, but it adds to general confusion. Bracket lights attached to buildings have been used for centuries past and, if well designed, can solve the problem in a satisfactory way. Local Authorities of course, prefer to put up columns, because they are relieved of the task of negotiating with individual owners. But a little more patience in this respect might well have prevented some of the mistakes which have already been made.

If a scheme of wall lighting is to be carried out, there should be a corresponding column type for use when there are no buildings, or for some reason, a bracket cannot be attached. The column illustrated (Fig. 7) is of tubular steel—concrete would be unsuitable—with a cast cover for the control gear, and was produced for use with vertical fluorescent wall brackets.

In this short article a few of the problems associated with street furniture in general, and lighting in particular, have been mentioned. It is hoped that the tendency towards better individual design will be followed by a concerted effort to co-ordinate and unify the whole process of street furnishing so that it can be regarded as a positive contribution, and not an unwelcome intrusion.

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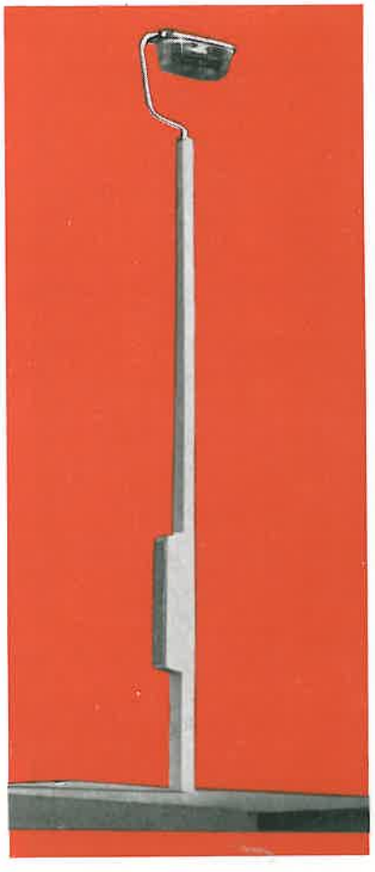

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6 *Model of 15 ft. column and lantern. (Spun Concrete Ltd.)*

7 *Model of 5 ft. vertical fluorescent pole-top lantern on a tubular steel column. (British Thomson-Houston Co. Ltd.)*

8 *Model of 25 ft. streetlighting column. (Spun Concrete Ltd.)*

Acknowledgements

Fig. 1. Architectural Review.

Hackney High Street 1850
Hackney High Street 1954
Figs. 2, 3 and 4 } *Council of Industrial Design*

Rural contrast.

GOOD LIGHTING SELLS PETROL

By Derek Phillips, A.R.I.B.A.

NOTHING can take the place of a good name built upon pleasant, efficient service. In the case of petrol stations such a reputation will be considerably enhanced if the garage is designed to play its part in selling—by day or night. Above all, this means good artificial lighting to attract the driver at a time when his attention is properly concentrated elsewhere.

Where is the driver who has not gone in search of fuel, the needle of his gauge hovering ominously around zero, only to find himself driving straight past a garage because he has not seen it *in time?*

The right kind of illumination is obviously best achieved by co-operation between the architect and the lighting engineer when the station is built. But a good deal could be done to improve the standards of lighting in existing establishments.

The Approach

The first essential is, of course, to catch the attention of the driver. In general, this is best achieved by contrast. Where the rural station is concerned, for instance, the attraction of light against a dark background helps considerably to persuade the driver to stop when travelling at high speed in an area with which he is not familiar.

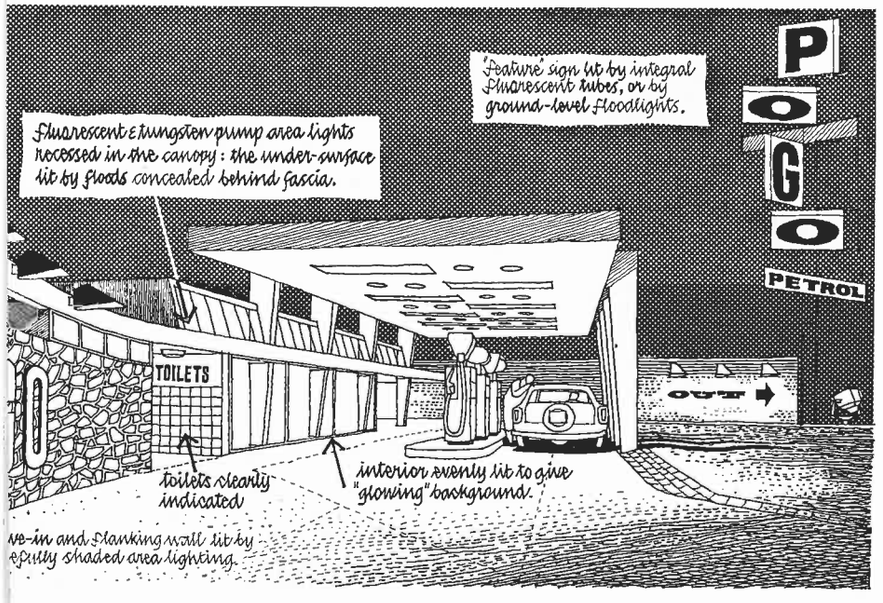
To set out to attract the driver as one would a moth is hardly sufficient, however. Most of us have our favourite brands of petrol, and filling stations in this country, like those in the United States, are rapidly becoming tied to one or other of the major oil companies, forming part of a nation-wide organization. This makes it important that the lighting should clearly identify the petrols and oil which the station sells. Attention must be caught and recognition of the brand of oil or petrol take place far enough away for the driver to stop in time.

Next it must be clear to the driver where the entrance is. Just as its surface must be a good one and access and circulation simple—these features should then be clearly defined at night time by functional lighting. The driver should be able to see at a glance where to stop for the different grades of petrol.

Planning Lighting

There should be sufficient correctly distributed light to enable the service-man to work upon the car. The way to the toilets should be clearly indicated. Other services, such as air pumps and adjoining cafes, must be emphasized. Showrooms should be well lit. On leaving, the lighting should help the driver to see immediately the way out, and

Urban confusion.



Some ways of doing it.

must be so arranged as not to interfere with the view of the approaching traffic. As the level of lighting in rural and some suburban areas will be low in contrast to the station, the level of illumination in the station must be reduced towards the exit to enable the driver to adapt his eyes to the lower intensity of the road.

A small illuminated sign is sometimes placed in such a position that it can be seen upon leaving only, saying 'Thank you—please call again'. Such little extra courtesies may well ensure that the traveller does.

Town and Country

In the city, where road lighting is often of high intensity, it is difficult to compete by means of higher brightness. However, the problem of attracting attention on town sites may not be so acute as in the rural or suburban stations, where they often rely more on casual traffic for their trade. Perhaps the greatest problem exists where a series of stations of different oil companies compete for the motorists' attention in the approaches to a town. In such a case it is not always the station that shouts the loudest which has the greatest appeal, but rather the one which answers the problems of lighting with the most imaginative and unified scheme.

A method which has been exploited is to use the reflective characteristics of certain surfacing materials to give a brightness greater than that of the street, without resorting to very high intensities. Crisp, brightly coloured panels are a possible means to this end.

Co-ordination

In the ideal situation of the new station built on a selected site, it is important that the architect should co-operate with the lighting engineer from the beginning to ensure that the day and night effects may be co-ordinated. A good example of this co-operation is provided by a recent series of stations based on a 40 in. planning grid, using patent glazing and giving the appearance at night of lighted glass boxes.

The reflective panel method is perhaps more flexible in a nation-wide scheme, however. Inevitably, a large number of older buildings will have to be converted by applying light coloured paint or some form of sheet material to the facings and a high brightness can be obtained by this method. The 'glass box' can be effectively lit only to the extent of the reflective nature of the equipment within it which, in the motor industry, consists largely of dark metal parts.

The most important aspect of these stations will be some form of illuminated symbol or sign to catch the attention, and this together with the form of the buildings, and the general appearance at night will in most cases assist also in recognition. Oil company signs are generally standardized for stations all over the country, so that anything too elaborate would be impractical. Essentially these should have simplicity of form, cleanness of appearance, colour and light. Where the oil company has already a well established trade mark, then this or some formalised version of it is appropriate. At night the sign should glow with light and this may be achieved by making it of translucent materials with internal lighting, or of some less easily broken material with light thrown upon it from remote spot lights, or less effectively by the headlights of the approaching car.

However, the lighting should be designed in relation to the sign for the best results, and there are many new materials such as fibreglass from which relatively indestructible translucent signs can be made.

The canopy over the pump area can be an important element in design and it should be planned with a view to integrating the lighting. Whatever form the canopy takes, it offers a unique opportunity to exploit the uses of illumination—the interplay of light on the undersurface can add sparkle to an otherwise prosaic scheme.

The pump area illumination should be to a level of approximately 4 to 5 ft. candles, and this illumination can form a most important aspect of the appearance of the canopy. Methods which might be adopted are lines of fluorescent or cold cathode lighting set into the underside of the canopy and patterns of spotlights with some upward lighting for the canopy itself. A most effective method would be to have a wide area light source using fluorescent strip lighting above plastic diffusers. This system reduces specular reflection and provides improved working conditions.

Entry to and departure from stations can be made easier by area floodlighting to intensities which are dependent upon the nature of the surroundings.

Floodlights should be arranged to give ample light without glare from the equipment. The lighting should emphasize the texture of the road surface and the intensity should be graded inwards from the entrance to the pump islands to assist in adaptation.

Low running costs and easy maintenance are of importance to the proprietor of the station, and may best be achieved by the use of fluorescent units with a limited amount of 'spot' and 'flood' lighting for emphasis and interest. But, as in all matters of design, simplicity is the key to effectiveness—visual and commercial.

Summary

The increasing number of cars in this country and an expanding market for the sale of motor fuel, are bound to result in greater competition amongst the different oil companies, and a far higher standard of service will have to be maintained.

Nothing can take the place of a good name built up upon pleasant efficient service, but this will be greatly facilitated if the station itself, both by day and by night is designed to play a positive part in selling. This can only be achieved by co-operation between the architect and the lighting engineer, to ensure that the station is well lit in a practical manner, but more than this, that it catches the attention, associates itself with good service, and appeals to the imagination.

Contrast by even illumination.

GREAT WHITE WAY LIGHTING COMES TO BRITAIN

GREAT WHITE WAY LIGHTING has come to London—the Great White Way Lighting which has been so much discussed but which has not previously been seriously attempted in this country.

'Great White Way Lighting' appears to have originated in the United States, where streetlighting of an unusually high value has been installed in some of the major thoroughfares in a number of the main cities. This type of lighting has been used for quite a number of years now and started some little while before World War II.

Some of the outstanding American installations—which are in some respects very similar to existing ones in London such as Piccadilly Circus and perhaps the Strand—consist of pairs of lanterns spaced at as little as 70 to 80 ft. apart, each housing two or sometimes three 1500-watt tungsten lamps per lighting point. This type of lighting technique becomes necessary when there is dense traffic, particularly when pedestrian traffic is also heavy. In such conditions, the method of lighting tends to become direct rather than to make any serious use of the silhouette principle in which an object appears as a dark shape against the illuminated road surface in the distance.

The idea of achieving 'Great White Way' lighting in a more efficient manner by using electric discharge lamps in modern lanterns to give up to fourteen or sixteen thousand lumens per hundred feet is comparatively new. The goal would seem to be most easily achieved with multi lamp fluorescent lanterns, housing high efficiency 5 ft. fluorescent lamps.

The development work by L. J. Davies and W. D. Sinclair of the BTH Research Laboratory, Rugby—carried out before the pioneer fluorescent streetlighting schemes were installed at Rugby and in Bond Street in 1946—showed that in many cases fluorescent streetlighting gives a higher standard of visibility with the same illumination level as the older light sources.

This result is due to the lower brightness of the fluorescent lamp. For whilst it has not yet been shown exactly *how* visibility varies with glare, it is now acknowledged that visibility is increased as glare is decreased.

Besides the low brightness of the light source fluorescent lighting has many other advantages. Among them, the longer light source enables the road coverage to be far more effective since the brightness areas by which the road surface is covered are immensely increased in size.

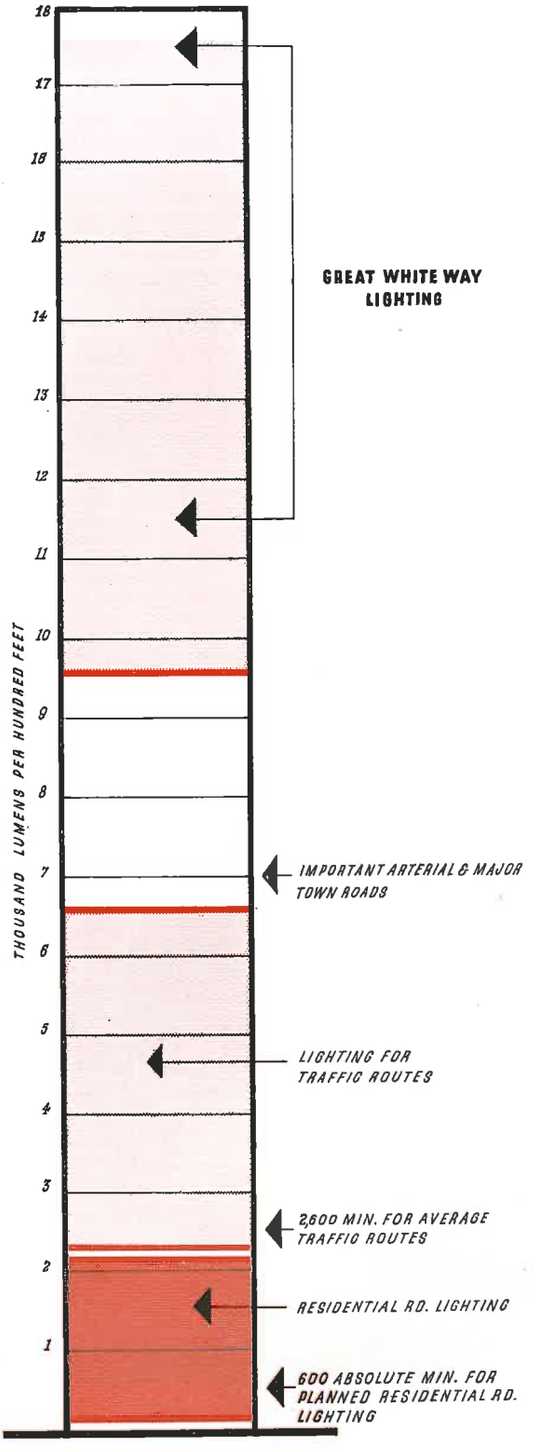
Good fluorescent lighting is also an economy measure; for whilst the capital cost of fluorescent streetlighting may appear higher, the true criterion must be the *total* outgoings which fall on the rate-payer. Owing to the long life and very high efficiency of the lamps, the *overall* economics of fluorescent streetlighting usually give the community the best value.

One particular borough for instance—which has an overall plan to convert all mains roads from existing gas or tungsten filament lamps—has estimated an overall saving when their programme is completed of approximately £20,000 per year.

These then are the fundamental advantages of fluorescent lighting—which are greatly accentuated as the required visibility approaches the 'Great White Way' level.

The first stretch of truly 'Great White Way' fluorescent streetlighting in Great Britain has recently been switched on in the City of Westminster. Already, surrounding Boroughs are becoming interested; and without a doubt the general public (and particularly the motoring public) will be expressing an active interest also.

The acceptance of the 'Great White Way' principle marks an important stage in the development of streetlighting in this country.



Above. 'Great White Way' Lighting in Kensington Road, Westminster. This is the second fluorescent streetlighting scheme installed by the Westminster Council—the first, a pioneer BTH fluorescent scheme was installed in Bond Street in 1946. Mazda four-lamp 5 ft. fluorescent lanterns have been used mounted on steel columns at a height of 25 ft.

An illumination of 11,000 lumens per 100 feet of roadway has been achieved. This intensity may be compared with the 7000 lumens per 100 feet recommended as the normal maximum for ordinary main road lighting by the British Standard Code of Practice.

Right. Specially designed Westminster City Council steel columns with ornamental cast-iron sleeves were erected with lanterns *in situ*. The North Midlands Engineering Co. Ltd., carried out the work in the evening, during periods when traffic was slack.

The Mazda Queen of Light Competition finds

All the contestants are interviewed before the judges' final decision is made.

Britain's Queen of

The Queen of Light Competition shows signs of becoming as much a national institution as it was in the past. It is a competition for blondes, judged on beauty of face and figure, attractiveness and beauty of hair, and deportment.

Many glamorous blondes, elected in the provinces, come to London in December from all parts of the country. Many are fashion or photographic models, but students, factory workers, housewives and many other occupations are represented.

Since the dawn of history humanity has chosen its favourite gods for their association with light. Light gods and beautiful women have always been subjects of keen interest to man and it is not perhaps surprising to find the two pre-occupations merged in pagan religions. One of the most ancient ceremonies which remained popular until comparatively recent times was the crowning of Queens of Light.

In December 1954 the custom was revived in this country by the BTH Company, who as manufacturers of Mazda lamps have a double association with light, and it was repeated with great success in 1955.

Mazda and Mithras

Almost every civilisation has possessed its sun or light god. Amaterasu, linked mythically with legendry catastrophes of the past, was the Japanese sun goddess, and Yang, symbol of creation, was the ancient Chinese light god.

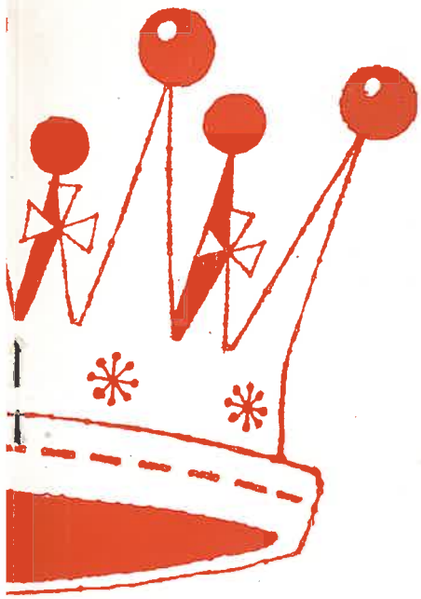
Persian Zoroastrianism held Ahura Mazda to be the supreme being who, in the beginning, filled the world with light. In the battle with dark and evil his champion was Mithras. The cult of Mithras was known in the West by Caesar's time and soon spread—thanks to the mobility of the Roman legions—to Gaul, Germany and Britain, where one of his temples was discovered a year ago in London. The ritual of initiation, carried out in an artificial cave, involved the killing of a bull and baptism in its blood.

Saint Lucia

After the collapse of Roman and Mediterranean paganism, the cults of northern Europe continued but eventually the ceremony of crowning Queens of Light, was adopted in a modified form by the Christian Church who grafted it to the legend of St. Lucia, who was executed by her husband when she confessed that she had given her dowry to found a monastery.

The revels have always been held at the winter solstice to celebrate the passing of the shortest day and longest night and the coming of spring. The custom continued well into medieval, and even Merry

Miss Stephanie Howell, Queen of Light for 1954/55, performs this year's crowning ceremony.



Light

Joan Duncan

Marjorie Scorer

England, and on St. Lucia's Day a jingle was sung:

Lucy Light, Lucy Light,
Shortest Day and Longest Night.

Light Queens were almost as much a national institution as May Queens and were elected in villages, market towns and even by the tenants of big estates. Certainly before the custom fell into disuse there was a London Queen of Light and many local Queens.

There is a special condition of entry to the competition—the hair, whether natural or bleached, shall remain blonde for the year of office.

Maureen Killen

Brenda Mee

Jenifer Chimes, a young housewife from Leamington Spa and mother of two children, is Britain's Queen of Light for 1956. She was chosen from seventeen finalists all of whom had qualified by winning area competitions held all over the United Kingdom.

The panel of judges included such celebrities as Terry Thomas, Sabrina, and American film star Steve Cochran.

THE

APPLICATION OF LIGHTING TO RAILWAY STATIONS

By Francis Moran

PERHAPS THE most important advance towards more comfortable rail travel has been the interest taken by architects and lighting engineers in bettering station design. Some years ago travellers complained—with good cause—of the discomfort of our stations and were swift to point out that an unhealthy part of their time was spent sitting around on draughty ill-lit platforms and in cheerless waiting rooms.

They have less cause to complain nowadays; platforms and waiting rooms are undergoing a 'face-lift' and the experts are seeing to it that adequate lighting is installed.

Whether designing the lighting fittings for Emmett's *Far Tottering Junction* or for a spacious main-line terminal, two important factors must always be considered—the safety of passengers and railway staff and the adequate illumination of notice boards and signs.

For economic reasons, of course, expenditure on lighting must be allocated according to the importance of the traffic, but this does not mean that Mr. Emmett's delightful stations should be neglected. With the electricity supply now widely available throughout the country, there is nothing to prevent the installation of simple, electric fittings to take the place of the outdated square lantern oil burners which—quaintly decorous though they may be—are anything but effective.

There is no standard fitting suitable for *all* stations, but there are certain desirable features in a fitting for the average platform. These are:—Good diffusion, with a light distribution which offers a strong illumination in the vertical plane; simple, unobtrusive design; robust construction; and ease of maintenance.

Diffusion: It is obviously important to avoid glare, and illumination in the vertical plane is very important—direction signs, time-tables, clocks and carriage-door handles must be seen clearly. Doors not properly closed are potential sources of serious accident, and second only to defining clearly the edge of the platform, it is a paramount duty of lighting to show up the door handles and enable the staff to make certain that they are in order.

Design: The atmospheric conditions on a railway are among the toughest to cope with from the maintenance point of view. The mixture of dust and dirt with a damp atmosphere, reinforced by corrosive products of combustion from locomotives, make it imperative that lighting fittings should stand up to such conditions.

Unobtrusiveness: This may not appear a very important factor, but it is surprising what a large number of signs and notices hang from the roofing of a modern station platform; to install obtrusive lighting fittings, mixed up with all the other hanging objects, would merely add to the confusion. The old-fashioned lantern and the later type of reflector fittings will probably give way in time to some sort of tubular strip lighting, below which notices and signs could be hung, or on which signs could be included, and so ensure that they will be legible.

Platform Lighting

In platform lighting, particularly, it is important that there should be a reasonable degree of uniformity. There are liable to be so many hidden traps and obstructions on a platform that it is a primary function of the lighting to avoid shadows and to reveal standing obstacles as clearly as possible. Glare should be avoided, though this is not always an easy matter at the extreme end of a platform where the width may not permit of the erection of lamp standards. One way of lighting a platform extension is to install a floodlight on a 25 ft. post fixed on the platform ramp. The floodlight is provided with a spreader glass, in which horizontal prisms give a wider beam in the vertical plane, and internal louvers limit the beam in azimuth.

There is no doubt that the fluorescent tube is the answer to good platform lighting, as it has proved to be in so many other fields. That there is a general trend towards the adoption of fluorescent tubes is evident from a recent Report on Railway and Dock Lighting presented at Zurich. It was clear from this Report that both on the Continent (especially in Holland) and in the U.S.A. fluorescent lighting is being developed on an extensive scale, beginning naturally with the important stations where buildings and platforms are being constructed in a modern architectural style, and the development is certainly spreading to Britain. The vitreous enamel tungsten lamp reflector fitting of the dispersive and distributing patterns, is likely to hold the field for many years at the smaller stations, but the move towards fluorescent lighting has definitely begun.

In this country extensive use has been made on tube railways of a simple type of fluorescent fitting. The white tiled surface against which the bare lamps are viewed reduces contrasting brightness and makes it

unnecessary to use any special glare-avoidance device. The atmospheric conditions on tube railways are, of course, exceptionally favourable to lighting by bare fluorescent tubes. Best results are gained when modern station roofing construction is allied to a continuous tubular lighting system. A good example of this is found in the Southern Region of British Railways where cold cathode tubes have been employed, attached directly to the concrete roofing. In such a case it was easy to house the transformers on the outside of the roof and bring connections through to each tube section. The colours of the tubes were selected to give an accurate colour rendering for posters and other features.

A type of fluorescent fitting which is particularly applicable to platform lighting is illustrated on this page. A 5-ft. tube is housed in a totally-enclosed opalescent plastic trough fitting with the station name appearing on both faces. This fitting is designed to be mounted under the canopy of a platform. Similar fittings may be set on concrete or metal poles beyond the roofed portion of a platform. The lanterns can be set parallel with the track on single platforms, or at right angles to it on an island platform.

The author saw a similar type of fitting with a rather different application recently when in Switzerland. In this case two fittings were suspended over the forecourt of a station at a mounting height of 15 ft. and a spacing of approximately 60 ft. The effect of good illumination on the forecourt walls, with plenty of downward flux to reveal approaching vehicles, provided an excellent example, and one which it is to be hoped will be followed in this country.

From Switzerland to Holland where, at Rotterdam Station, a striking example of a modern design for station roofing combines with an unusual arrangement of fluorescent lighting. A continuous trough, housing 40-watt fluorescent tubes is fixed to the roof immediately above the platform edge, producing indirect lighting from ceiling to platform and direct lighting to the platform edge through slots in the base of the trough fitting. This makes the distinction between the platform-floor and the train perfectly clear.

Buildings and Offices

Station offices, with the exception of booking offices, seldom require special lighting treatment. As might be expected, with the general trend towards tubular light fittings, fluorescent lighting has been adopted in the more important and up-to-date buildings.

The waiting room, however, deserves far closer attention from the lighting point of view than it generally receives. Here, on a dismal winter's day, the wrath of the cold, wet and frustrated traveller may well be focused.

The newer stations usually make provision for comfort in waiting rooms and lighting—whether from standard tungsten or fluorescent fittings—is designed to give at least the level of illumination which is desirable in the domestic sitting room. But such stations are relatively few. In the main, the waiting room is a less inviting relic of Victorian or Edwardian utilitarianism and if nothing can be done about the cream and brown tiles or the large if ineffectual iron fireplace, at least the lighting can be readily converted so as to dispel some of the gloom. There is a strong argument for a warm coloured indirect fluorescent lighting system which could be installed virtually as a standard feature using a simple type of pelmet. If the tungsten lamp is to be retained, at least it should be used in a wall-bracket fitting over seats with, if necessary, a supplementary centre-of-the-ceiling fitting.

'Sign' Lighting

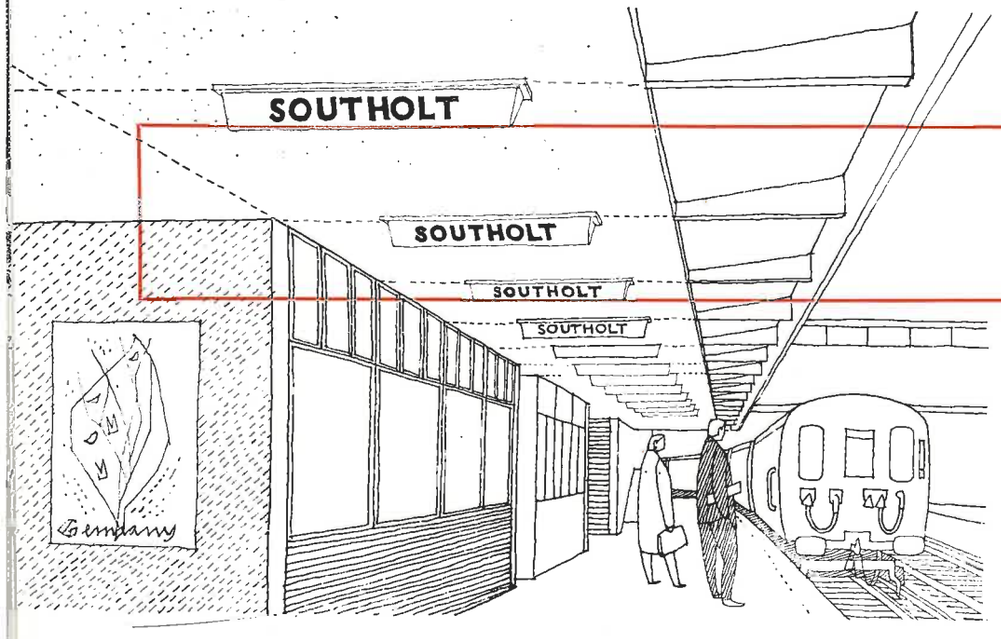
The chief consideration in lighting time-tables, indicators and advertisements is brightness without blinding glare and on many stations certain types of tungsten fittings have been used with reasonable success. It is probable, however, that fluorescent lighting is most suitable for these purposes and will be used more extensively in future. There is a trend towards incorporating advertisements and train information in one effective display using special lighting treatment.

Train information relies on good sign-lighting, and if the train indicators, notice boards and signs are clearly lit and legible by both day and night, the traveller will escape a good deal of frustration; with the improvement of public address systems, he may come to regard rail travel more as pleasure than exercise in guesswork.

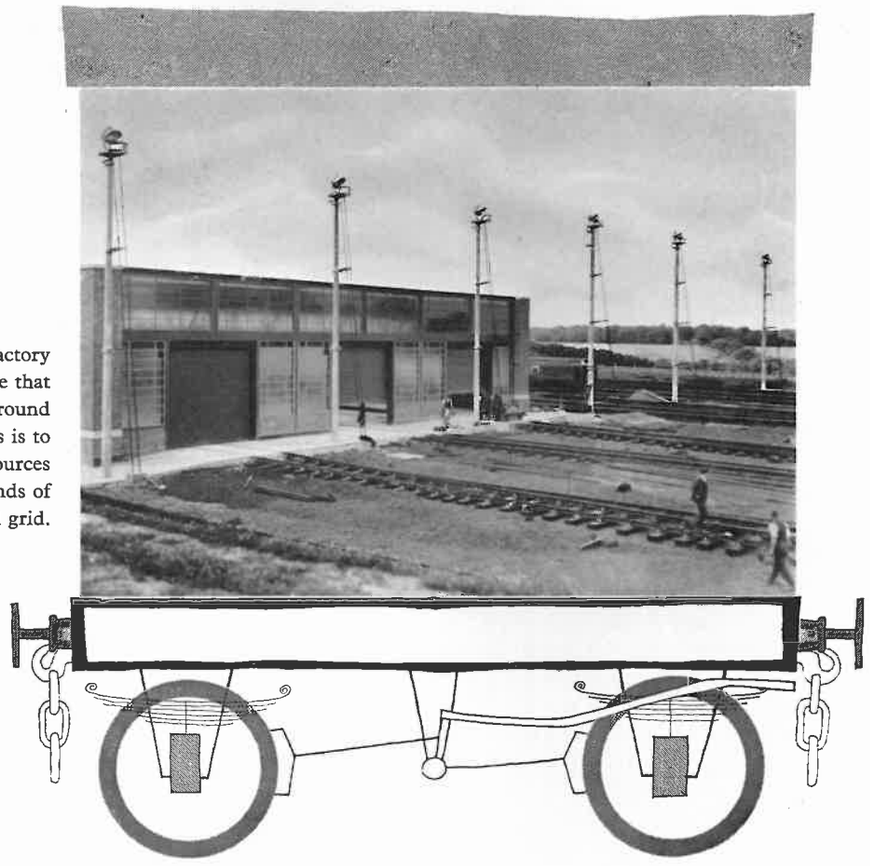
The Board of Trade regulations requiring the name of the station to appear on each lighting unit has lapsed to a great extent, but many railways have maintained the principle by the use of enamelled-iron nameplates fixed near the platform lamps to receive adequate illumination.

More recently there has been a reversion to the name sign inscribed on the lantern, thus securing internal illumination with improved legibility.

Once these lighting factors are incorporated in the majority of Britain's stations we shall have taken a big step towards the safety and comfort which the traveller has a right to expect.



Best results are gained when modern station roofing construction is allied to a tubular lighting system (above) a typical fitting.



The most satisfactory way to ensure that light strikes the ground between tracks is to direct it from sources placed at the ends of the rail grid.

....AND SIDINGS

By K. GRAHAM

IMAGINE A PEDESTRIAN trying to cross a road on which traffic is moving in a dozen continuous lines—each vehicle at least 10 ft. high and bonnet-to-tail. These are roughly the conditions which have to be taken into account in lighting railway sidings.

A lighting system for rail sidings has to fulfil stringent requirements: It must provide sufficient illumination for traffic movement; to allow shunters to walk safely between rows of trucks, some of which may be moving; and to enable address labels on trucks to be read without auxiliary lighting. It must accomplish this degree of illumination without the need to erect poles or towers where they may cause obstruction. In effect, this means that no poles can be erected between rail tracks and those round the periphery of the sidings should be not less than 5 ft. from the nearest track.

The most satisfactory way to ensure that light strikes the ground between tracks is to direct it from sources placed at the ends of the rail grid. Attempts in this direction have been made, notably London Transport's installation at Cockfosters. This uses single narrow beam projector fittings mounted on poles approximately 40 ft. high and situated beyond the ends of the rail tracks. Thus, shadow is eliminated, adequate vertical illumination is produced and there is no physical obstruction.

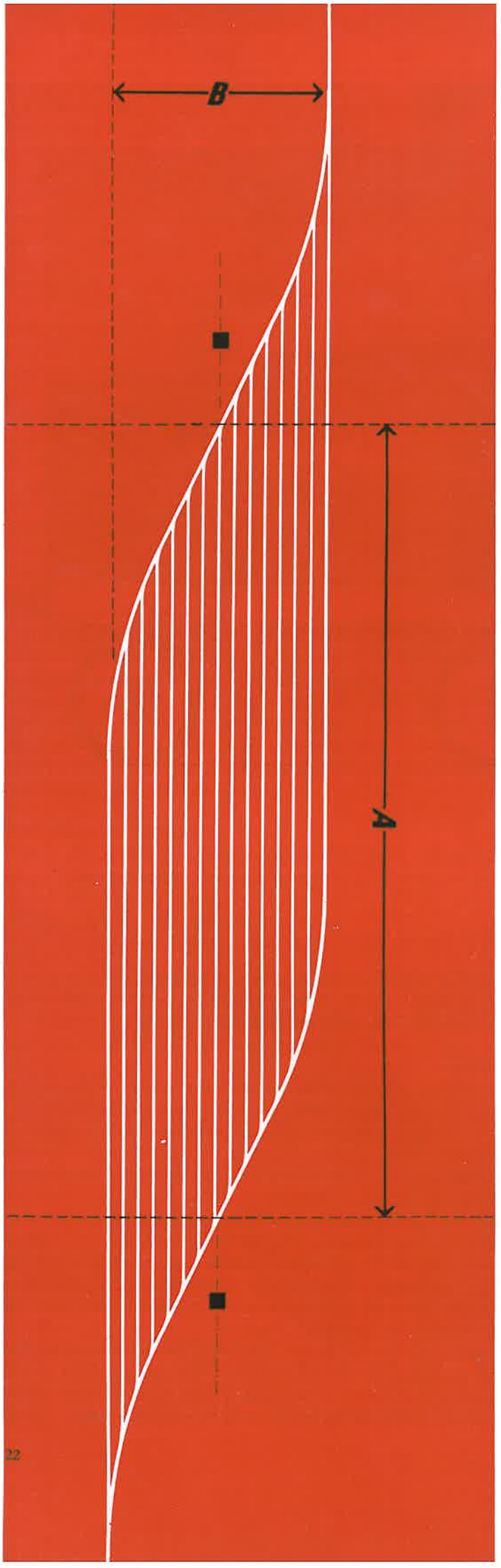
There are other difficulties, however. Glare from powerful sources at only 40 ft. or so above ground is liable to be excessive, a large number of mounting points is required and horizontal illumination is liable to fall off very rapidly owing to the low angle of incidence.

Planning

The problem is, therefore, to find a method of applying end lighting with reduced glare and better distribution. After experiments with various types of floodlight projectors, mounted at different heights, BTH has found that at 150 ft. a narrow beam projector is high enough to mitigate glare. The angle of incidence with the ground is greatly increased and more even lighting can be obtained.

Exact placing of lighting points is mainly decided by the ground space available. The base dimensions of a 150-ft. tower are about 20 ft. square. Since the siding is narrow compared with its length, the best answer is to place lighting points on the centre-line, one at each end, far enough away from the ladder-track to avoid obstruction. Suitable ground space can usually be found at this point.

This principle of siting on the centre-line can be taken as the best location in the majority of cases. Often a marshalling yard may consist of a number of grids, and in this event the placing of the tower should be arranged to make the maximum use of each lighting point.



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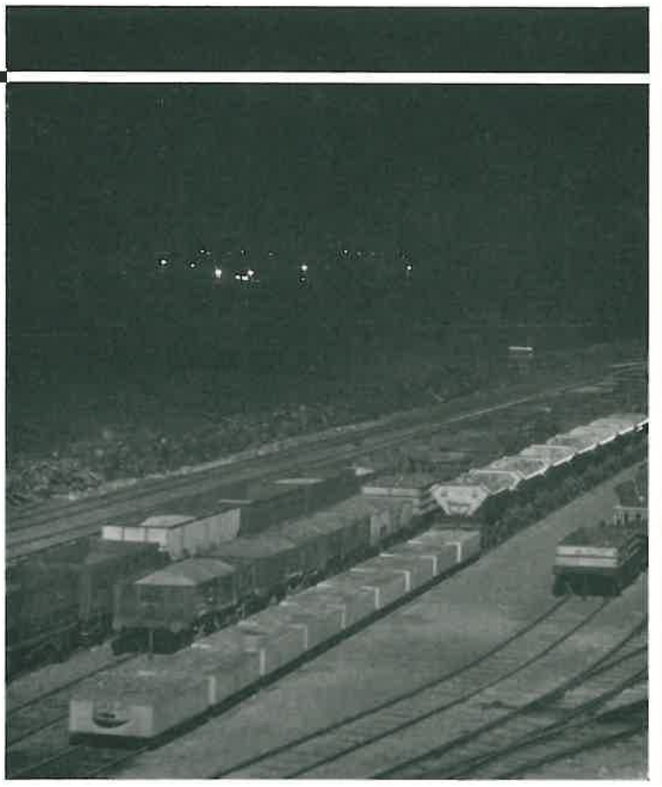


3

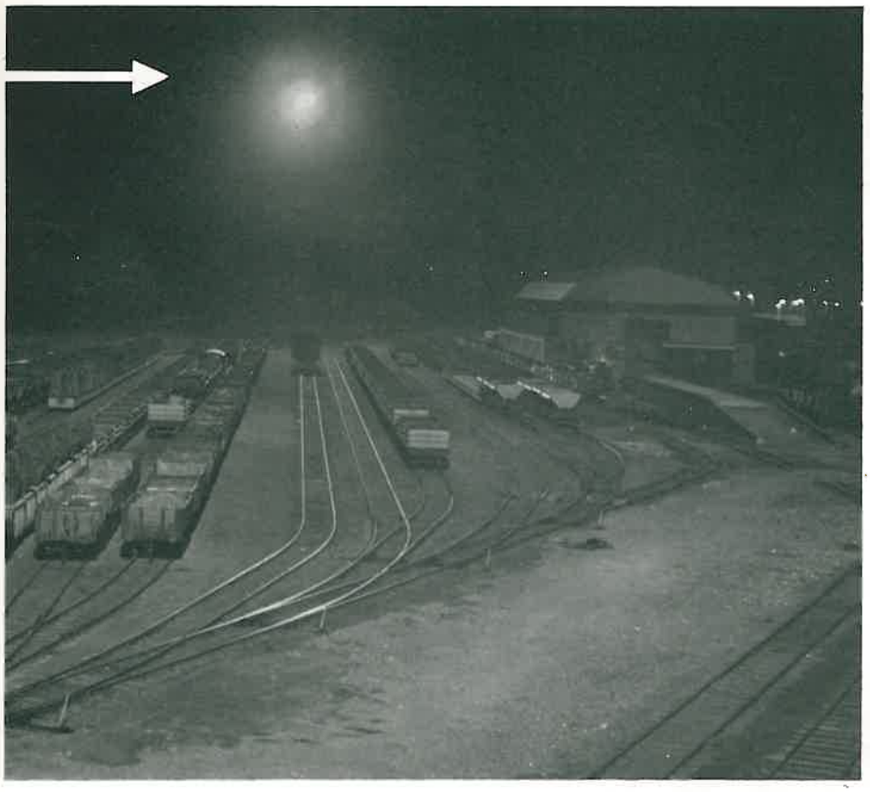
A special tower is necessary to carry the number of floodlights required at a height of 150 ft. above ground. A tower employed by BTH has proved satisfactory for a number of installations now in use—a platform accommodates up to 48 projectors which can be mounted in three tiers of four on each side.

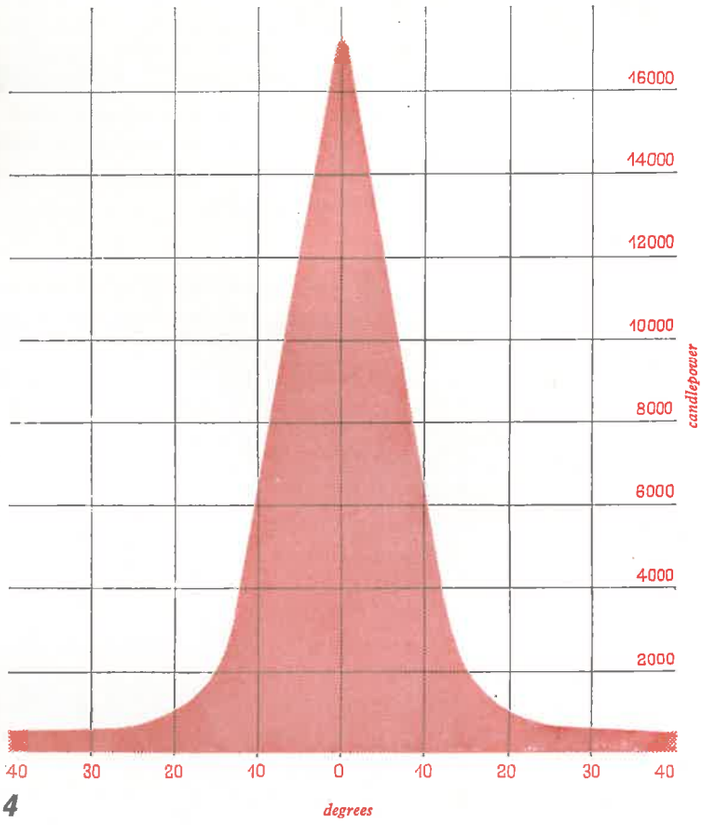
Power supply is usually controlled at the tower base by means of a time-switch in a weatherproof box. The fittings are fed from distribution boards located on the platform, with facilities for isolating individual units.

For the purpose of initial experiment, illumination values in the region of 0·5/2·0 lumens per sq. ft. horizontal illumination were considered to be suitable objectives. Tests indicated, however, that although these intensities are easy to achieve, lower values are adequate and a standard of 0·2 lumens per sq. ft., average horizontal illumination may be adopted. The type of installation employed is completely flexible, however, so that at any time additional light can be provided at selected points merely by the addition of extra fittings and/or re-alignment.

With these illumination values all requirements are met. Address labels on trucks can be read easily without using handlamps since intensities on the vertical plane are greater than on the horizontal plane.

Multiple units must be used in order to cover the whole area and the majority will be operating with throws of 300 ft. or more. It is an advantage, therefore, to use the highest lamp wattage possible to obtain maximum efficiency from the minimum number of fittings.





1 *A typical siding formation. For lighting purposes the length of the siding is taken as the dimension down the centre of the grid between the two sloping tracks carrying the points (A). The distance varies between 800 and 1500 feet. Width (B) varies between 100 and 400 feet.*

2 *The lighting tower, accommodating 48 projectors, employed by BTH.*

3 *A grid of the Dorman Long rail sidings lit to the BTH specification from two towers approximately 1,200 ft. apart, the area being about 200 ft. wide.*

4 *A typical candle power distribution curve for a Mazda '22' floodlight using a 500w. lamp with diffusing glass.*

The beam shape should produce an elliptically lit area with proportions, major to minor axis, roughly the same as the proportions of the area, i.e. long and narrow. This reduces waste light to a minimum. Such a shape is provided by a symmetrical beam of about 20 degrees angular width. The standard type of long-range projector has these characteristics when used with 1000w. or 1500w. G.L.S. lamps, lamp in focus.

Lighting Efficiency

Maintenance work on towers usually means the payment of danger money or some other compensation. This makes it economic to use G.L.S. lamps which have a long life rather than projector lamps which have a higher efficiency and give better optical control but a relatively short life.

Illumination planning follows standard procedure, but it must be remembered that particles of moisture and light-coloured solid matter suspended in the air cause scattering of light which, although it does not involve a great loss, reduces average intensities, particularly on longer throws.

Most industrial atmospheres contain a combination of moisture and both light and dark solid matter in suspension and the actual overall scatter and attenuation depends upon the particular area. On Tees side, where the atmosphere has a high solid content, average attenuation under typical atmospheric conditions has been found to amount to 50 per cent. In very bad fog the attenuation rises to 75 per cent; though in view of results obtained in practice over the past two years, it is plain that this type of installation does not as a rule suffer unduly under fog conditions, the diffused light scattered by the fog providing excellent shadow-free lighting.

It is essential that tests be carried out first in any area where atmospheric conditions are not previously known, so that a suitable factor can be determined for inclusion in calculations. There are no simple means of calculating the loss to be expected in any given area.

When the total number of fittings is known, aiming-points are plotted on a site plan for each fitting. They are arranged so that the ellipses overlap to give complete coverage and the numbers of fittings aimed at any one point are adjusted so that even lighting is produced.

Illumination is best determined for individual fittings from the polar curves using point-by-point calculation.

In the cases represented by diagrams 5 and 6, the proportions of the area were such that all ten fittings on each tower were aimed at one point only, 500 ft. from the tower base. It is more usual, however, for a number of separate aiming-points to be plotted. In addition to the fittings used on this long throw, one or two lower wattage units with wider beam spread would be added, to cover the area adjacent to the tower. In this way, all fittings are accessible for maintenance from one point.

When design is completed, the setting and aiming of each projector should be accurately carried out. The usual method is to plot on the ground the calculated aiming points for each fitting and mark them with

pegs. An operator on the tower platform co-operates with an observer located at each peg in turn. A photometer may be used for very accurate results, but a satisfactory method is for the observer to note when the reflector is fully flashed. This indicates that the main axis is aimed at the observer. Focus of the fittings is then checked and locked in position.

An interesting variation of this method involves the same principles exactly but can be done in daylight, using binoculars. It is still necessary, however, to focus the fittings at night.

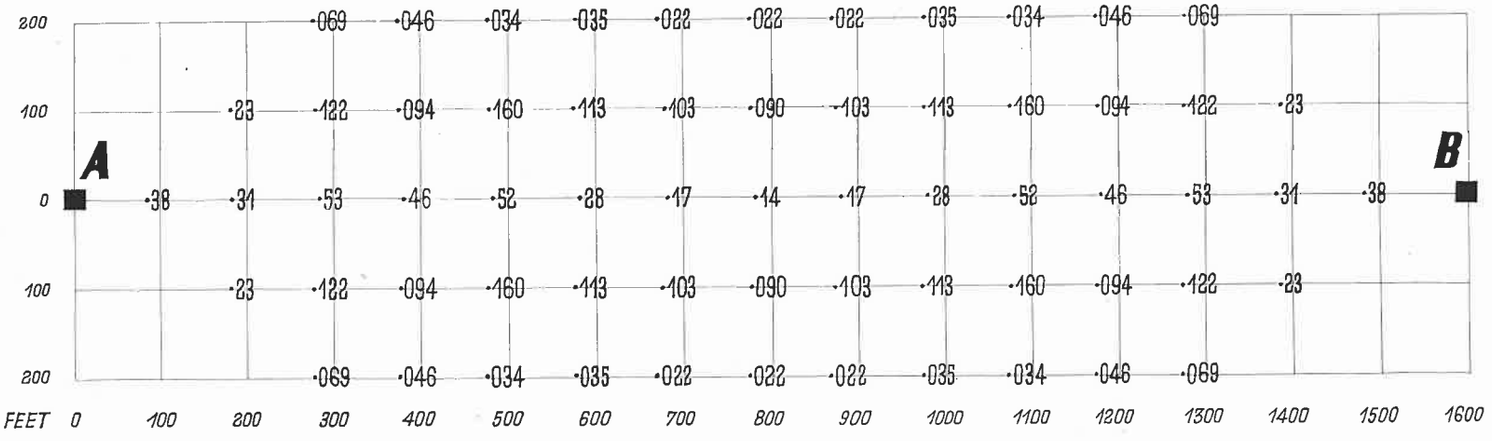
An Ideal Fitting

Whilst standard fittings with suitable optical characteristics are easily obtained, several design features make them unsuitable for mounting on tower platforms.

A suitable unit must accommodate lamps from 750w. to 1500w., for instance. The maximum attention must be paid to corrosion resistance and weather-proofing, owing to the exposed location. The focusing device must give wide variation of beam width and it must be accurate and easily operated. The fitting must be completely accessible for cleaning and re-lamping from the back without disturbing the alignment in any way. In addition, all locking screws, and similar devices, should be adjustable by hand.

In the light of these requirements a special fitting known as the Mazda '25' has been designed by BTH for this application. It is constructed in three separate sections, the central drum carrying the swivel bracket and an adjustable setting stop in the form of a slotted quadrant. If the alignment of this portion is disturbed for any reason it is easily recovered by means of the pre-set stop.

To the rear of the drum, attached by three special wingnuts, is the lampholder and focusing device housing. This withdraws complete with the lampholder and lamp so that re-lamping may be done without disturbing the alignment. This joint is fully gasketed.



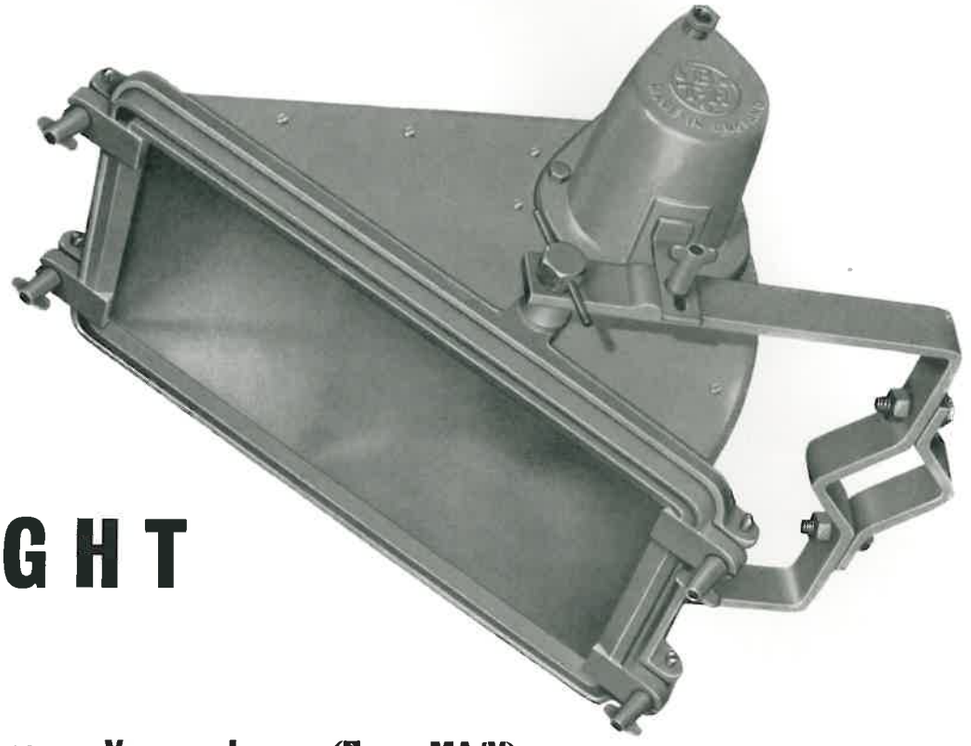
Calculated illumination in lumens per sq. ft., on a horizontal plane 1600 ft. by 400 ft., at intervals of 100 ft. M 22 floodlights are mounted at 150 ft. from ground level on towers at A and B. This lighting scheme was the first prepared for the rail sidings of Dorman & Long Company at the Redcar Steelworks. The Mazda M 25 projector was developed as a result of the experience gained on this initial installation.

When the rear section is removed, the hand and arm can be inserted inside the fitting to clean the reflector surface and inside face of the front glass.

All parts of the fitting, except the reflector and support stirrup, are cast in silicon-aluminium alloy and stainless steel accessories are used throughout. The reflector is spun in heavy gauge anodized aluminium and the glass is held in place between two cast rings with gaskets between. All locking screws can be operated by hand or, alternatively, by key in the event of their being too tight.

This fitting is almost certainly the only one designed for easy maintenance under the conditions applying on the top of a 150 ft. tower. In the light of past experience, none of its special features can safely be disregarded.

Mazda Specification Sheet No. 5



the 'TEN' FLOODLIGHT

For use with a 400 watt Mercury Vapour Lamp (Type MA/V)

Applications: For lighting outdoor working areas such as docks and marshalling yards.

Light Control

Magnetic Arc Control enables a 400-watt mercury vapour discharge lamp to operate in a horizontal position and the distribution of light is accurately controlled by means of an anodized aluminium reflector system. An adjustable stop is provided to give an accurate means of setting the floodlight after erection.

Construction

The main body of the floodlight is cast in corrosion resisting silicon-aluminium alloy, and the front cover of stippled glass provides a weatherproof seal to protect the reflector system and the lamp. Robust locking handles secure the lantern in the position determined by the adjustable stop.

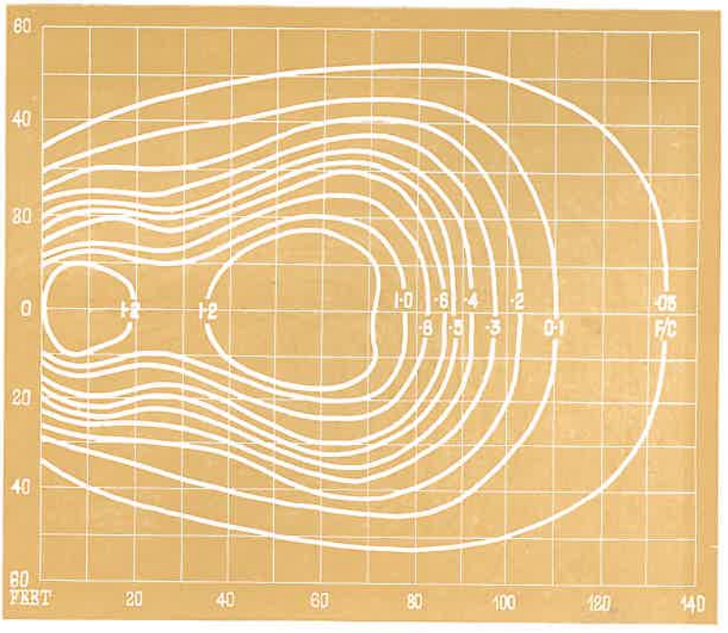
Control Gear

The control gear necessary for operating the lamp is housed separately. A cast iron box with a hinged lid secured by thumb screws is used as a container. It is fitted with flanges for fixing to a wall, or it can be supplied with metal straps for pole mounting. When ordering the diameter of the pole should be given.

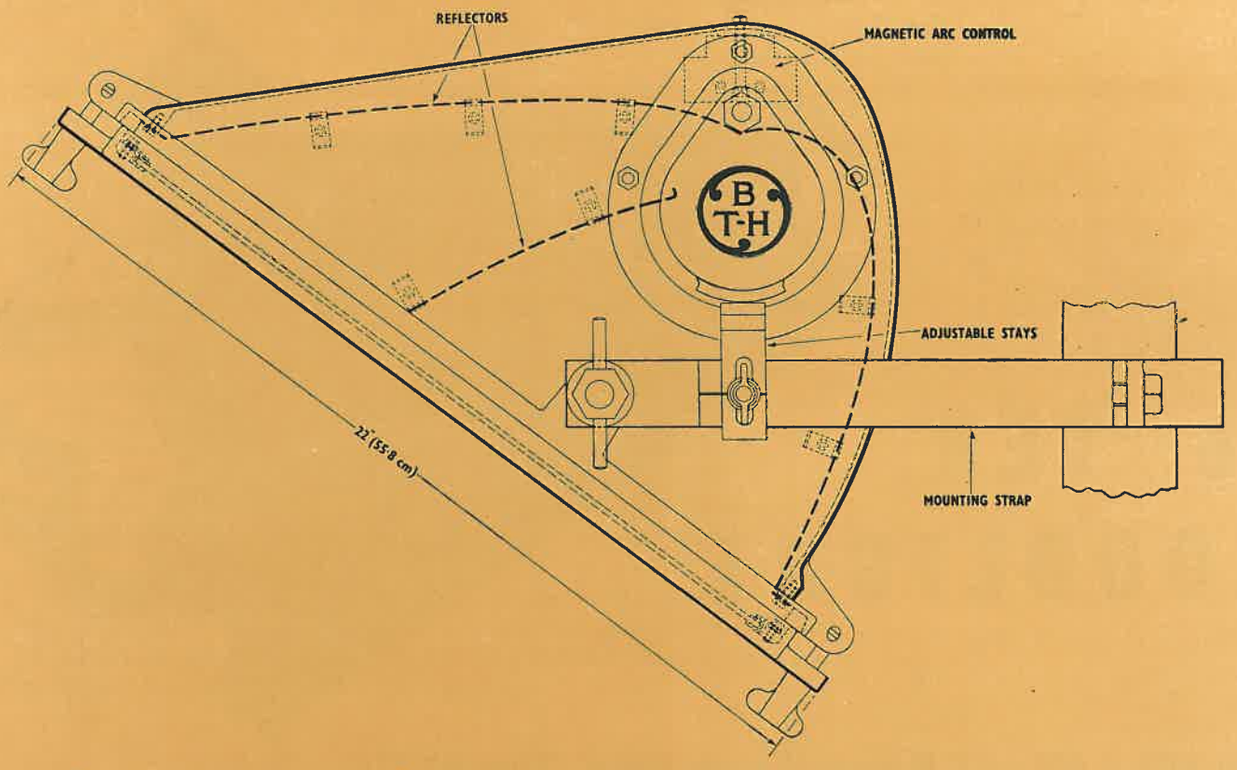
Catalogue Number EL 6098 — **Mazda Ten Floodlight**

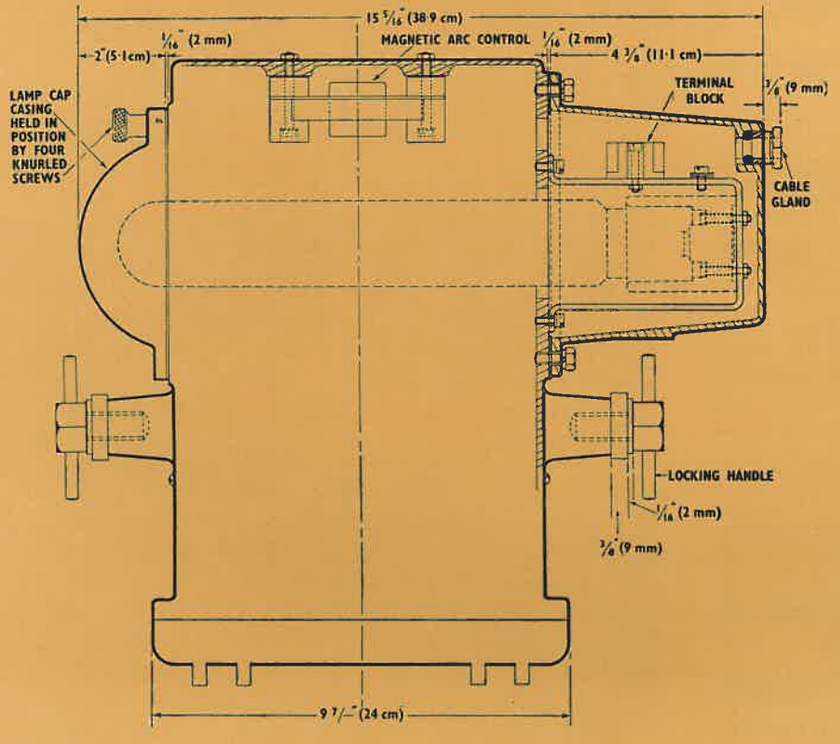
Catalogue Number SL 5071 — **Weatherproof Control Gear Box**

A similar lantern for use with a 1 kilowatt Mercury Vapour Lamp (Type MA/H) will soon be available.

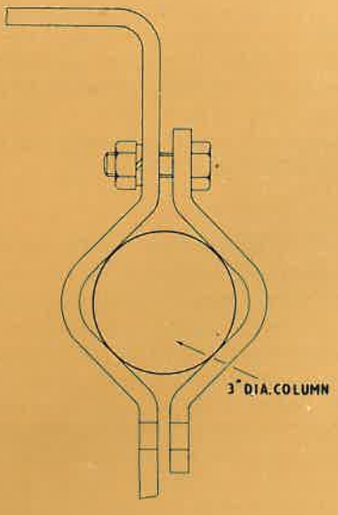


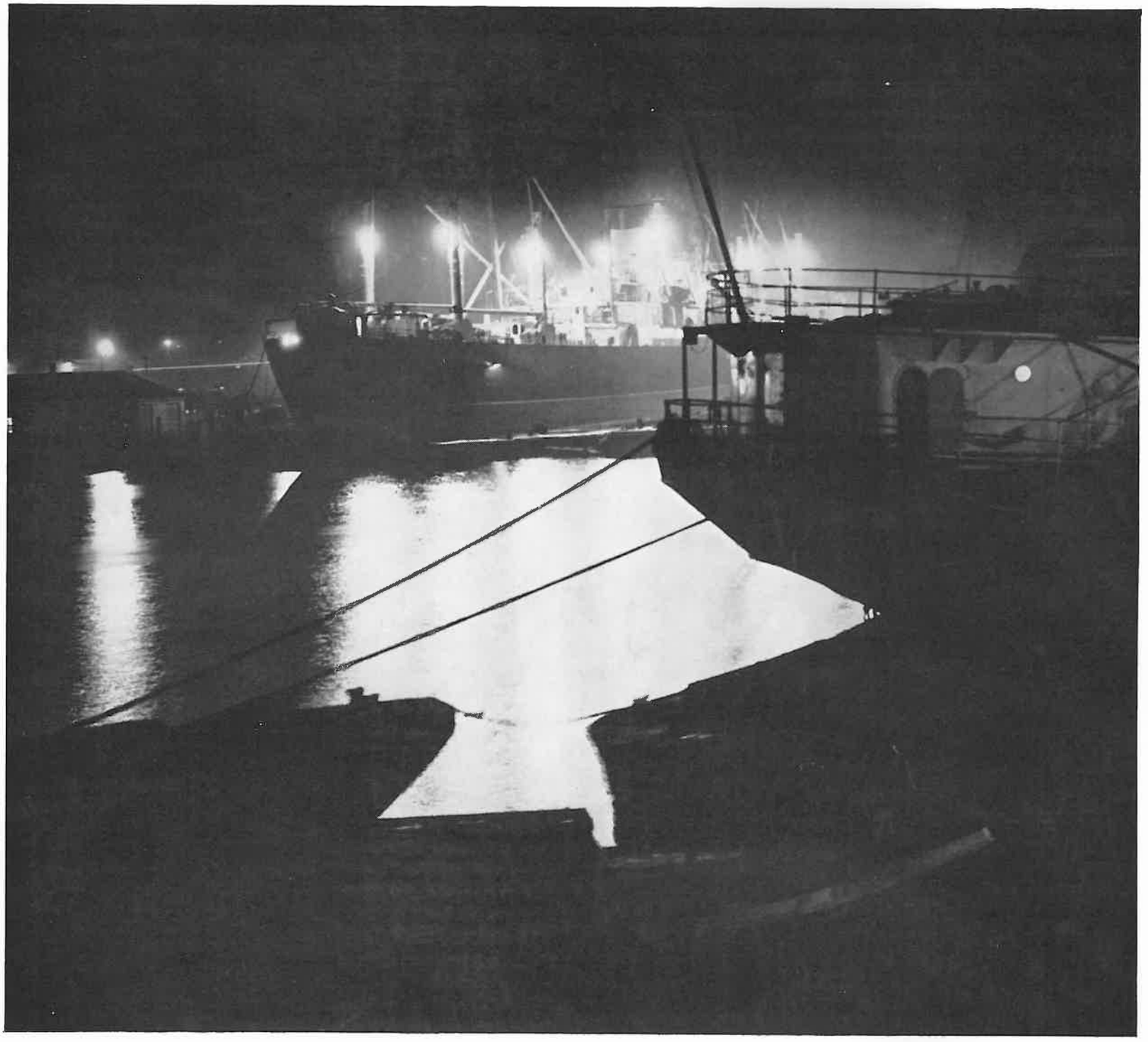
'TEN' Floodlight





PLAN VIEW OF MOUNTING STRAP





DOCKLAND BY NIGHT

By E. G. Wotton, B.Sc. (Eng.), A.M.I.E.E.

DOCKLAND SEEMS quiet at night time. But it is a deceptive quiet. Ships cannot miss a tide simply to wait for daylight. Cargo must be loaded and discharged, often with the greatest care, by day and night if the vital traffic of the rivers and seaports is to be kept on the move. And as in so many other spheres, the skilful application of lighting is essential to the safe and efficient carrying out of the job.

Nowadays, with the high power lamps and reflectors available, the night scene in the docks can be as bright as day. The use of powerful light sources is not in itself sufficient, however. Only a planned lighting scheme can ensure adequate working conditions.

What are the particular lighting problems of the dockyard? Briefly, to give enough light without causing a hazard to navigation; to define the locks clearly; to illuminate evenly and without glare the loading and unloading points on the wharves and jetties.

The Light Source

Early experiments in the use of sodium and mercury lamps in docks were not satisfactory. These lamps could be confused with coloured navigation lights particularly when viewed through mist coming up from the water.

It was the introduction of the fluorescent mercury lamp which made possible the wide application of discharge lighting. The light from this lamp is much 'whiter' than that from the ordinary mercury lamp and causes no confusion.

More recently considerable interest has been shown in the use of the tubular fluorescent lamp. It has a good colour appearance and when properly applied can provide economical illumination of the right intensity with a remarkable evenness of distribution.

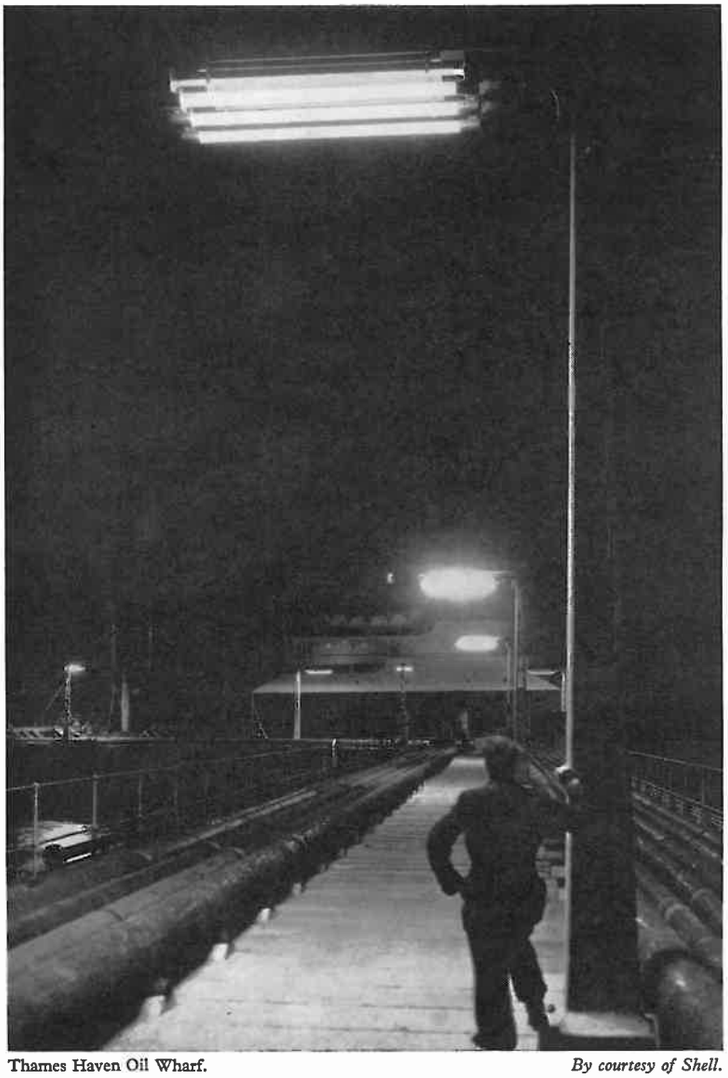
The Locks

The lighting engineer is very much in the hands of the lockmaster in planning a scheme. For example, some lockmasters require that only the coping edges shall be lighted and that the pit of the lock shall be in darkness. Others require that in addition to the coping edges the walls of the dock shall be visible. The height of the visible part of the walls varies, of course, with the depth of the water. These requirements are so much a matter of personal opinion that within some groups of docks variation even occurs from one section to the next.

A lighting scheme must ensure that the fittings cause no glare to the officers on the bridge of the ship as it enters and is lifted up and down the lock. This calls for fittings that have an approximate horizontal cut-off in the direction of the main axis of the lock.

With these considerations in mind an accepted method of lighting a lock uses the 400w. fluorescent mercury lamp mounted at about 25 ft. above the ground in an adjustable 'scoop' type fitting. The fittings are positioned up to about 90 ft. apart, about 30 ft. from the dock edge. The advantage of using a lighting unit of this type is that it can be so adjusted that the light can be cut-off at the near coping edge or cut-off at the far coping edge to illuminate the lock walls.

Jetty lighting presents many problems. Here, the application of fluorescent lamps in Mazda flameproof fittings solves them with obvious effectiveness.



Thames Haven Oil Wharf. *By courtesy of Shell.*

Wharves and Quays

There are also the wharves and quays to be considered. In these areas large consignments of goods are stacked prior to shipment and they have to be identified by the markings on the sides of the cases. This is the main working area of the dock and an illumination of some 2 lumens per sq. ft. is necessary to ensure that work can be carried out with ease and safety.

Here the problems are greater than in any other part of the dock. The working area must be kept free from obstruction which means that poles cannot usually be planted to carry the lighting fittings. Yet, if fittings are mounted on the sheds the wharf will be lighted from one side only. It seems impossible to prevent a man from being in his own light when working with his back to the fittings. This effect can be relieved if fittings can be mounted on the wharf cranes but such an arrangement is not usually possible owing to the movement of the cranes. Finally the fittings must be so positioned that they cannot be knocked by loads suspended from the cranes.

The most satisfactory practical solution employs angle fittings of the 'scoop' type mounted at a convenient height and spacing from the shed walls. As in other parts of the dock the 400w. fluorescent mercury lamp is frequently used.

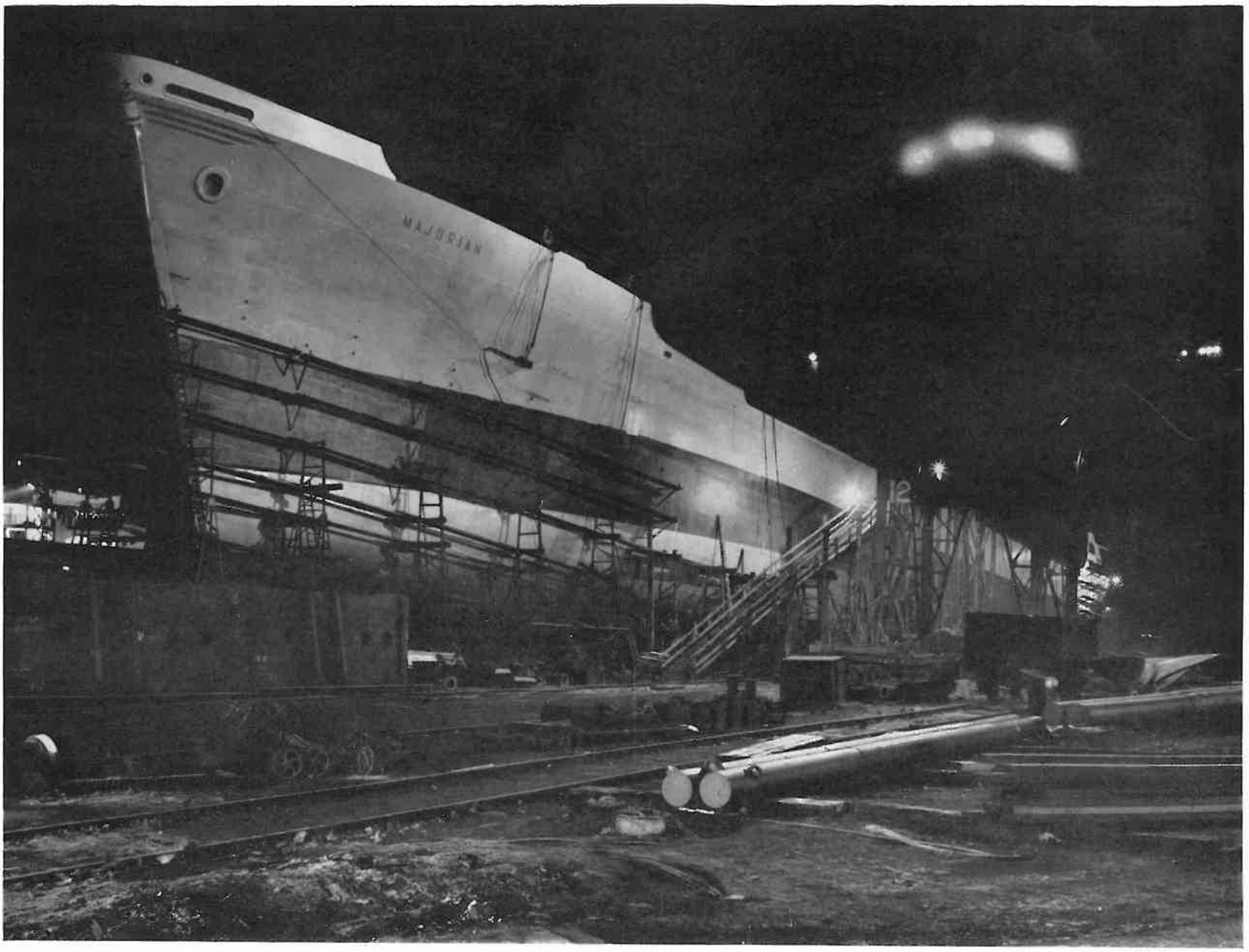
A promising alternative, however, on which experiments are now being carried out uses fittings each with a 5-ft. 80w. fluorescent tube and mounted from the sheds. These fittings are after the style of the horizontal wall mounted streetlighting lanterns. By this method shadows tend to be reduced while the fluorescent tube itself reduces glare to a minimum.

In other areas such as access roads and rail tracks where lighting is required for movement and for policing an illumination of about 0·5 lumens per sq. ft. at ground level is required.

Lighting this area needs a technique based on streetlighting. Lanterns for this purpose spread the light over a wide area, reduce the number of poles, and thus the likelihood of obstruction.

Refinery Jetties

Finally, mention must be made of the jetties which carry the pipelines at oil refineries. Here the conditions confronting the engineer are probably unique. There are no cranes so that poles must be erected to carry the lighting fittings which, in turn, must be flameproof. They should also be robust to stand up to the corrosive effect of salt air and fumes from the refinery. Although filament lamp fittings have been widely used, installations have been completed recently using Mazda flameproof fittings specially modified for the purpose, each housing a 5-ft. 80w. fluorescent tubular lamp. These fittings are arranged in units of four or five mounted at 25 ft. on concrete columns. This British method is the only one of its kind in the world, and is proving a successful means of providing safe illumination of the highest efficiency.



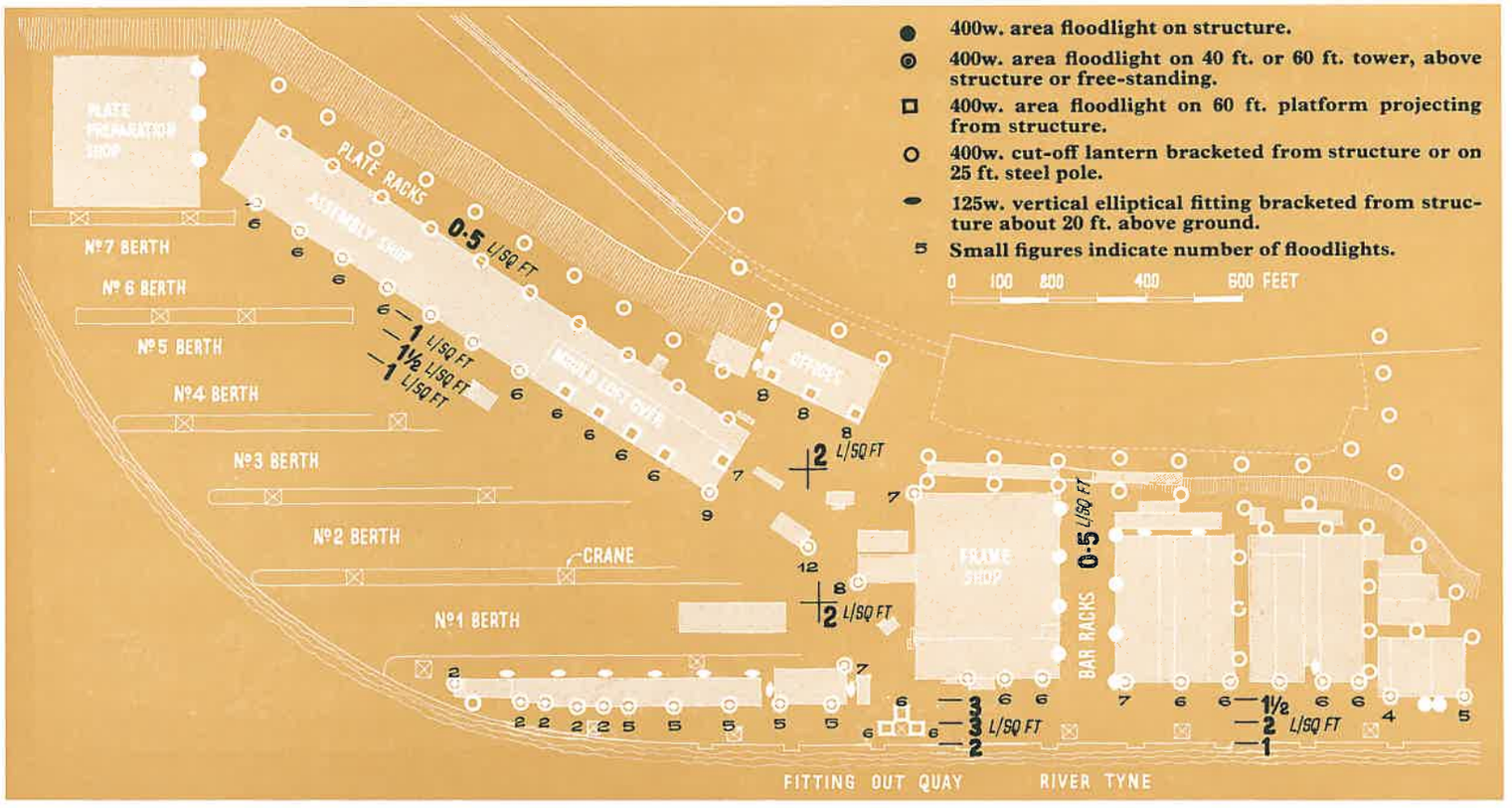
MODERN SHIPYARD LIGHTING

THE ECONOMIC hazards to shipbuilding in Britain are becoming an ever increasing threat to the prosperity of one of our most important industries. Since the war, the industry has been faced on the one hand with increasing costs of labour and materials and on the other hand with growing competition from foreign yards.

It has, therefore, become vitally necessary to consider ways of increasing the rate of production in our shipyards. One obvious means of achieving this is to lengthen the working day—by means of artificial lighting. In the preliminary draft of the new code of the Revision of Requirements for Shipbuilding and Ship Repairing under the Factory Acts, the responsibility for providing adequate illumination is carefully laid down.

The illumination provided must be of such quantity and quality that work can be continued as normally as possible well into the hours of darkness during the winter months.

Material in this article is published by the kind permission of Messrs R. W. Gregory and Partners, the Consulting Engineers who designed the lighting installation at Vickers Armstrongs' naval yard at Walker-on-Tyne.



Layout of Outside Lighting at Walker-on-Tyne

A complete scheme of outside lighting at Vickers Armstrongs' naval yard at Walker-on-Tyne provides the best—and most comprehensive—example of the way in which these standards can be achieved. The people responsible for the scheme had three main objectives.

Working illumination in various outside areas, e.g. the assembly areas at the heads of the berths, the plate racks and the bar racks, the fitting out quay and the berths.

Movement lighting over the remaining areas of the yard. The movement of both material and labour between the various shops and the ships being built on the berths or being fitted out at the quay is very large.

Supervisory lighting over the whole area.

Assembly Areas

The assembly of various parts of a ship away from the building berth contributes to the reduction in the time a ship occupies that berth. This assembly is carried out extensively at the head of the berth. The parts are often large and the working plane on them may be from the ground level to 20 ft. above the ground. Hence, in addition to providing adequate horizontal illumination, the lighting requirements call for uniformity of illumination in the vertical plane while shadows must be avoided to prevent accidents.

Two considerations are involved in siting the light sources: firstly, the number of supports must be kept to a minimum to avoid obstruction. Secondly, the angle of projection of the peak intensity must be kept low in order to prevent discomfort glare to men handling the material swinging from the cranes and to men on the staging on the ships in the berths adjacent to the assembly areas.

An average illumination of 1 lumen per square foot on ground level was decided upon as being reasonable for these areas.

Experiments in lighting the areas were first made using 1000w. narrow beam projectors mounted 50 ft. above the ground supplemented by wide angle open type floodlights mounted at 25 ft. The results were not satisfactory. The ratio of 10 : 1 between the maximum and minimum illumination was considered wasteful while glare from the projectors was experienced.

An area floodlight projector was therefore designed around the horizontally burning 400w. type MA lamp. The optical system was so designed that with a mounting height of 60 ft. a more or less even illumination was obtained from directly below the projector to a point on the ground 120 ft. away; this projection distance corresponds to the width of the fitting out quay.

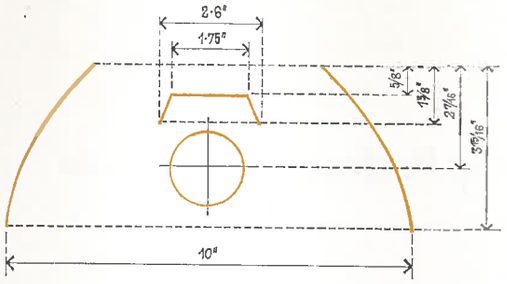
Projectors are grouped and mounted at 60 ft. above the ground from either self-supporting towers or structures erected from the roof of convenient shops.

Outside Stores

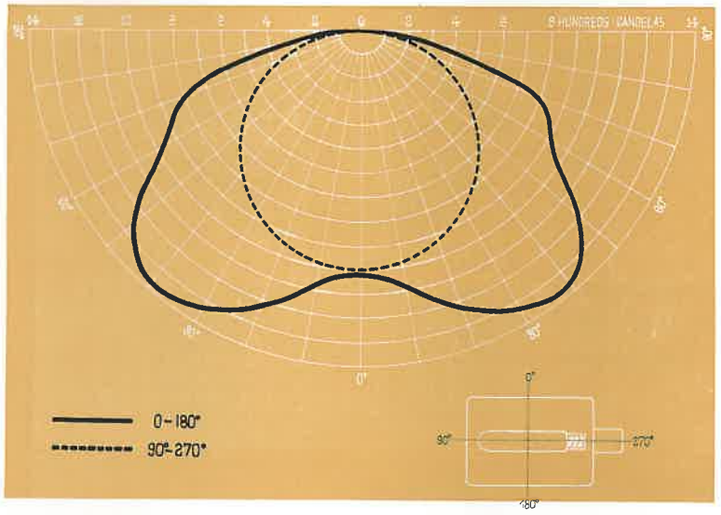
In the outside stores the steel plates and bars are stacked in racks and as these are clearly marked, an illumination of 0·5 lumens per sq. ft. was considered adequate. The plate racks are served by travelling cranes on overhead tracks while the bar racks are bounded on two sides by high buildings. In view of the vibration of fittings mounted on the crane tracks it was decided to use mercury discharge lamps as installed in the other sections of the yard.

The results of the tests using open type floodlights over the plate racks were not satisfactory as even with a close arrangement of fittings the uniformity of illumination was poor while glare was also experienced. Use was therefore made of the Mazda cut-off streetlighting lantern. The combination of a horizontally burning 400w. MA mercury discharge lamp and an anodized aluminium reflector enables the light projected

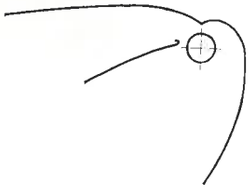
AREA FLOODLIGHT using 400w. MA/V lamp.



Profile of reflector.

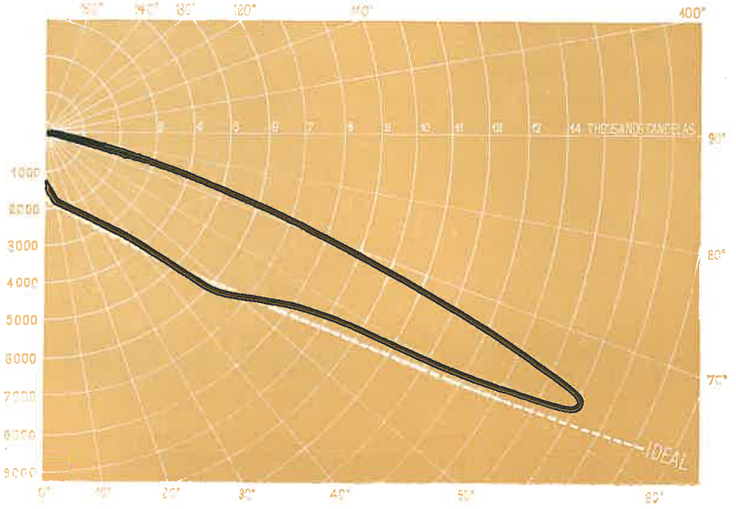


Polar curve of light distribution in vertical plane through main beam. Initial conditions: 18000 lumens.



CUT-OFF LANTERN using 400w. MA/V lamp.

Profile of reflector.



Polar curve of light distribution in two vertical planes. Initial conditions: 18000 lumens.

along the stores to be accurately controlled to prevent glare. The lanterns are mounted on the elevated crane tracks 40 ft. high at a staggered spacing of 120 ft.

Due to the greater width of the bar racks, cut-off lanterns were not suitable and area floodlights were used mounted on the adjacent buildings.

Fitting Out Quay

The fitting out quay to which a ship is moved after launching may well be, in a large yard, some 2000 ft. long and 120 ft. wide.

Material to be installed in the ships is stacked along the quay which has track and rail access along its length. The lighting can be provided only from the side of the quay remote from the water. Glare must not be caused when the men look towards the sources from the ship and the light must not interfere with the navigation of other ships in the river.

These requirements decided the use of the area floodlight projectors previously described, mounted at 60 ft. in the position shown in Fig. 1. Three groups of six floodlights mounted on the tower crane supplement the general illumination to about 3 lumens per sq. ft. in this area which is the centre of activity. A minimum illumination of 1 lumen per sq. ft. is provided along the edge of the quay 120 ft. from the building line.

Building Berths

Horizontal illumination sufficient to ensure the free movement of materials is required at the jetties.

This lighting must be provided from the minimum number of supports to prevent interference with the free movement of large steel plates slung from the cranes. Good vertical illumination, free from glare, is also needed for the men working on the staging on the sides of the ship; the working positions extend from the keel at probably 20 ft. below the level of the jetty to the deck 80 ft. above the keel.

An illumination of 0·5 lumens per sq. ft. is suitable in this area. Although it is obvious that no one scheme could entirely solve the lighting problem, a most satisfactory compromise is provided by sixteen 400w. area floodlight projectors mounted at 125 ft. around the top of each tower crane supplemented by four area projectors at 40 ft.

In making this compromise it was initially accepted that the cranes would have to remain stationary during the hours of darkness to avoid danger due to moving shadows, and that to overcome this disadvantage the material would have to be suitably stacked during daylight for night work.

Experience has shown that the lighted cranes can be moved with safety up and down the jetty and the scheme has the approval of both the work people and the supervisory safety officers.

The outside lighting installation described above provides the requisite illumination without disability glare, it gives an even distribution of illumination at the working level, except on the berths, and it uses the minimum of supports. It has involved the shipbuilder in a high capital outlay, but allowing 12 per cent for depreciation and maintenance and an electricity cost of 1d. per unit, the cost of using the whole installation will be less than £20 per hour based on 300 burning hours per annum, the estimated number of hours of darkness on single shift working. As the annual depreciation charge is about 85 per cent of the total charge, the cost of £20 per hour would be considerably reduced for two or three shift working. For example, with 1000 hours use per annum the cost of the whole scheme would be £8 per hour. This would be a negligible cost compared with the loss of production during the winter, due to the slowing down of work as darkness approached.

This Vickers Armstrongs' scheme is an impressive pointer to the future possibility of round-the-clock shipbuilding.

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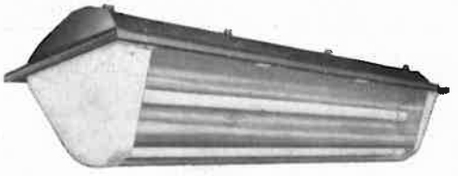

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