



# TABS

Published by The Strand Electric and Engineering Co., Ltd.  
in the interests of the Amateur Theatre

## CONTENTS

	PAGE		PAGE
Editorial ... ..	2	Model Stage Lighting Equipment	14
A switch in time saves ... ? ...	5	Colour in the Theatre—No. 8 ...	16
Review, "You and the Theatre"	6	Stage Switchboard Design	
Audiences must give Audience ...	7	(concluded) ... ..	19
A prompt on how to convey		Safety Regulations ... ..	26
a Cue ... ..	10	Location of Hire Stores ... ..	28

## EDITORIAL

With effect from April 19 (i.e., immediately after Easter), all our hire stocks of stage lighting equipment will be removed from Covent Garden to 271 Kennington Lane, S.E.11.

As from that date all such equipment being returned from hire should be despatched to us at that address and NOT to Floral Street. Similarly, hire goods being collected will be available at Kennington only. By prior arrangement only (not less than 48 hours previous notice) hire orders may be collected from Floral Street as in the past.

On the back page of this issue will be found a map showing the location of the new hire stores, and cricket lovers will note the immediate proximity of the Oval cricket ground. For those to whom cricket is only something that lives on or in a hearth, we would say—cross Vauxhall Bridge from North to South and carry straight on, bearing slightly left at the fork beyond the railway bridge. You'll find the stores on the right—about 7 minutes by car from Head Office. Decorative fittings will continue to be displayed and stored at King Street, and may be collected therefrom. In all cases the reversible addressed labels affixed to or enclosed in crates, cartons, etc., should be used for return of hire goods.

About a year ago we mentioned in these columns that members of our staff had travelled 25,000 miles by air in the previous 12 months. At the moment of writing they have flown about 8,800 miles in the last two weeks alone. If, therefore, on occasion our telephone operator has to tell you that the individual you wish to contact is absent from the office for a few days, or if you have to wait just a little longer for that batten or switchboard, please remember the export drive.

\* \* \*

We continue to receive requests from our friends in the amateur theatrical world that we should take advertising space in their programmes. We regret that we are debarred from so doing by the rules and regulations of the Theatrical Traders Association, of which we are members. In order to save unnecessary correspondence therefore, it will be appreciated if such requests cease. Unfortunately, much as we might wish to, we are not in a position to discriminate. In point of fact, how many amateur productions are there, we wonder, in the course of a year? Such bodies as B.D.L. and N.O.D.A. could no doubt produce the information as far as their own members are concerned but just how many "independents" are there? It would be most interesting to know. A spot of research for you, Mr. Editor Taylor of the Amateur Stage?

\* \* \*

In our last issue we announced our new Decorative Fittings Hire Catalogue. We also drew attention to the fact that members of the British Drama League and N.O.D.A. were entitled to certain hire discounts. Unfortunately we did not apparently make it clear that these discounts only applied to stage lighting apparatus and *not* to decorative fittings and similar props shown in the last-named catalogue. The hire charges for the latter are strictly net.

Although this catalogue has met with applause and congratulations on all sides, it would appear that not everyone has discovered the tables at the back indicating the available quantities of each type of fitting and the hire charge therefor. Consequently we have received a number of enquiries for specific types of fitting in quantities in excess of those which we hold, and likewise we have received enquiries as to the cost of fitting number so and so, although the information is clearly enough stated at the back of the brochure. It is, however, necessary to remind all concerned to state the voltage of lamps required.

\* \* \*

Disappointment is occasionally caused because insufficient notice is allowed for despatch of such items as maroons, flash



powder, flash paper, transformation fire powder, smoke powder, ultra violet liquid and lamp lacquer.

Owing to restrictions on the carrying of inflammable goods, we are not able to despatch per passenger train or per post ; the only method open to us is by goods train or by a carrier with licence to carry inflammable and explosive goods. It is, therefore, most necessary that we receive at least 10 days clear notice in order that we can arrange for the goods to be despatched to arrive in time.

\* \* \*

The position regarding colour media continues to improve. All the colours shown in our colour chart are available in gelatine, and we are glad to be able to report that experiments are well in hand regarding the use of new dyestuffs of a more stable nature than those hitherto available. In the case of some of the blue tints, it would appear that we can expect a life (before noticeable fading) of about five times that which we have been experiencing since the war. In the case of "Cinemoid" it is hoped that Colour Nos. 1, 8, 15 and 21 will be available during the summer months. With the exception of those colours and Nos. 55, 56 and 60, which it is not intended to manufacture in "Cinemoid", the "Cinemoid" range is now also complete.

\* \* \*

We have just completed one of the most up-to-date and complete stage lighting installations in Europe at the State Opera House, Ankara, Turkey. Our illustration shows the Light



Console control which is housed in a room at the rear of the auditorium where the operator gets a clear view of the stage through the glazed panel seen at top right. The somewhat misty group of figures seen through the panel are not in fact dancers, but part of the decorations on the fire curtain. From this Console one operator has remote control of no less than 136 stage lighting dimmer ways and 112 colour filters in front of circle-front and acting area lanterns. Switch pre-setting is also available for up to eight distinct scenes.



The next Strand publication is due out about the beginning of June. Entitled "Stage Planning and Equipment", this book of about 120 pages, is an informative guide to all who may be interested in the design, planning, equipment and use of the stage in general, but particularly in multi-purpose halls in schools, colleges, community and civic centres, village institutes, Little Theatres, Service and works canteens and the like. Only a part of the book deals with lighting, much space having been devoted to planning, sight lines, working

space, fire precautions, stage machinery and so on. The author

of this book is Mr. P. Corry, manager of our Manchester Branch and director of Messrs.

Watts & Corry. Readers of "TABS" are by now quite familiar with the blended wit and wisdom which appear over the initials "P.C." but on this occasion he has removed the tongue from his cheek and has, we think, collected a mass of information, pictorial and otherwise, and presented it in an interesting and instructive manner. Orders, which may now be placed for this book, should be accompanied by a remittance of 5s. (postage 4d. extra). The book which is bound in stiff boards with a dust jacket, is illustrated here.

#### A SWITCH IN TIME SAVES . . . ?

*A story with a moral.*

Fantastic as it may seem the following is true. In the last twelve days of rehearsal of a spectacular show, a certain individual was helping on the stage of a West End theatre in the capacity of supernumerary stage manager and general factotum. Suffering, as he did, from weak eyes, he was somewhat troubled by having to work continually in the great intensity of light which this particular production was using.



For his own personal comfort, therefore, he made a point of instructing the electrician to kill all stage lighting and to put on pilots and working lights whenever there was a hold-up or discussion at rehearsal. (You know the sort of thing. Having failed for the tenth time to get just what he wants the producer shouts "Hold it, I'll come up on the stage and show you myself" and the resultant break lasts anything from 30 seconds to half-an-hour.)

Apparently these interruptions and switchings off were fairly frequent—anyhow they eventually became a joke with the stage staff who came to take up the cry "Kill the stage, Charlie" at each opportunity whether our bespectacled friend was present or not.

In due course the show opened, and his job being finished the question of his remuneration arose. It happened that no fee had been agreed and he was asked to name one, which he did. It was, however, not acceptable to those controlling the money bags—once the show was launched they forgot the all-day and all-night sessions which had been involved.

As an alternative, the ex-S.M. then suggested that he be paid the difference between the theatre's electric light bill for the 12 days he had been working with the show, and the previous 12 days. This was readily agreed by the management who no doubt rubbed their hands with glee at the thought of the money they were going to save—but not when they heard what they were in fact committed to.

Our gentleman of the weak eyes had saved the theatre—and earned for himself—a sum well in excess of £50!

The moral?—well, "Kill the stage, Charlie"! And remember that in addition to saving current you are saving valuable lamp-life hours and some projector lamps are only rated for 50 hours to-day  
H.C.

## REVIEW

"YOU AND THE THEATRE" by CHARLES LANDSTONE,  
*Macdonald & Evans, London. 6s. (Fully illustrated).*

We cannot do better than quote from the "curtain raiser" by Dame Sybil Thorndike. "Here now is a guide for those who want to tread the thorny, winding, wormy ways of theatre management: here is a guide for the actor who leaves his dramatic school full of ideals, and hopes of fine work, and is so often thrown into despair by the importance attached to things that seem to him to have nothing to do with the arts of the theatre; a guide to designer and craftsmen, and also to those who, loving and desiring to work on the stage, yet possess no particular creative gift and have to find an outlet in the general organisation—staff, front of the house, etc.—all these are made to feel that their work is honourable because contributing to the good of the whole . . . . So to all aspiring geniuses, to all true lovers of drama, even to the audience, who are as much a part of the theatre as the players, in fact to all who want to know something concrete about this absorbing and adventurous business, I say, 'ask Charles Landstone'."

## AUDIENCES MUST GIVE AUDIENCE

It is not only on the stage that a performance in the theatre is a co-operative affair. The audience is a necessity. It is a curious phenomenon—this assembly of individuals that is welded into a composite unit with collective emotional responsiveness. To be a member of the perfect audience at the perfect performance is an experience that is rarely equalled and never surpassed. It is complete theatrical consummation. Every audience has a collective aura of which the sensitive actor is conscious immediately he steps into the acting area. No two audiences are identical; even two "perfect" audiences will be different in their perfection. Consequently, the actor can never give two identical performances; he senses those subtle differences and varies his performance, be it ever so slightly, to attune his transmission to a varied reception.



. . . the perfect audience at the perfect performance.

Membership of an audience is no passive affair. One must bring to it a certain sensitivity. The physical fact of being in a darkened auditorium, with the attention concentrated on a comparatively small patch of light, intensifies emotional susceptibility and diminishes rational judgement. Somebody has described the audience as being in a state of "suspended disbelief". It is a voluntary acceptance of suggestion by illusion and an establishment of unity between actors

and audience—each gaining something from the other. The great difference between a "live" show and a mechanically reproduced one is that in the first the audience is a part of the show and in the second, the audience merely watches or listens. Those actors who use a microphone, because they haven't bothered to learn the most important part of their trade, are weakening an important link between stage and auditorium and depriving the customer of his rights.

But the customer's rights also imply obligations. Possibly the impersonality of the cinema has caused a deterioration of theatre-goers' manners. Possibly most people have such rare opportunities of visiting the live theatre that they have not been able to acquire audience-technique. Possibly some people cannot avoid being bad mannered whether in the theatre or elsewhere. Whatever the cause, there is room for improvement. It is true that our general standards of social behaviour compare badly with those of more placid times. We have shed some of the insincerities (and



usually substituted others!) but we have also shed with them the grace of numerous trivial courtesies that helped to make communal life pleasant, or at any rate bearable.

The ill-mannered boor is always a menace; in the theatre he (or she) is a positive blight. The presence of one such individual can mar the experience of a thousand. Even the most abysmal ignoramus usually has sufficient glimmer of intelligence to understand the printed symbols used to indicate the time a performance begins. Yet at every theatre in every town at every performance, the first five minutes of every play are ruined for everybody by the mannerless creatures of both sexes who consider they have the privilege of ignoring the obligation to find their seats before the curtain rises. There is no acceptable excuse. If they were catching a train they would be in time—or miss it. Because we are so mistakenly tolerant of social crimes we prefer to let such offenders spoil the opening for other people rather than make them miss what is left of the first scene. Late-comers invariably have seats in the middle of the most inaccessible rows and sufficient impedimenta



... their progress—a trail of devastation.

in the shape of handbags, coats, furs, umbrellas and packages of edibles to make their progress in the light an epic of adventure, but in the dark it becomes a trail of devastation.

Another scourge of the theatre is the person who delights in protracted manipulation of rustling wrappers of confectionery, which is afterwards masticated with a damnable audibility calculated to destroy a theatrical mood of any delicacy.

The smoker has a freedom in the British theatre that makes him into the menace who blithely burns holes in his neighbour's clothes or the management's carpets, obscures the vision and irritates the bronchial tubes with his pungent puffings and, at the most inappropriate of moments, distracts attention with his flaming matches. Many of us who are heavy smokers would welcome a ban on smoking in all theatres and cinemas; it would combine communal virtue with national and personal economy.

Most of these offenders are doubtless more negligent than vicious, but the type of individual who cannot be restrained from giving a running commentary on any performance anywhere is an ego-maniac for whom the only remedy is violent immolation.

To join an audience implies a willingness to co-operate. That willingness requires sufficient concentration to rule out all possibility

of avoidable distractions. Those who cannot or do not wish to conform should keep away from the theatre. Bernard Shaw knew something when he suggested that we get something from his plays only in proportion to what we bring to them—which usually results in getting nothing for our money. But even if one cannot bring to the theatre intelligence of Shavian standards, one can at least observe accepted standards of decent behaviour.



... we get only in proportion to what we bring.

he may be. The actor is entitled to expect from his audience a similar sense of responsibility. He cannot give his best unless he has co-operation. A radio performer is, of course, blissfully able to ignore the fact that he is competing unsuccessfully with a spirited discussion of the comparative virtues of kippers and cod, or a scandalised dissection of the doubtful virtue of the woman next door. But in the theatre, actor and audience are parts of a complete whole. The audience may, quite permissibly, be actively antagonistic or enthusiastically approving; but it must not be apathetic or inattentive.

Contrary to the belief of some of its more intense devotees, the theatre is not a penitentiary to which one should go for spiritual correction; it is not as others seem to imagine, an exclusive academy for educational uplift. It is a place of entertainment... where entertainment can be spiritually stimulating and educationally uplifting; but even when it is what it is most often, amusing or what is currently known as "escapist", the need for co-operation between actors and audience is just as real and should exclude incongruities on both sides of the footlights (if any).



... must not be apathetic or inattentive.

It has already been said in these articles that we get the plays we deserve. Perhaps the theatre gets the audience it deserves. And that could be quite a chastening thought.



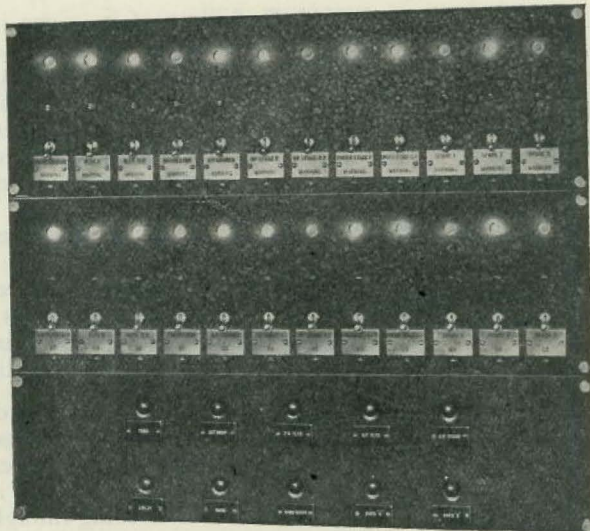
## A PROMPT ON HOW TO CONVEY A CUE

Being a continuation of the article on the same subject in our last issue.

The previous article in our last issue dealt with the method of preparing cue sheets and only very slight reference was made to the equipment required, since it was felt that this subject was of sufficient importance to justify an article on its own.

As was stated cues can of course be aural or visual. As far as the first is concerned, the audible voice (put the — green spot on for —'s sake) must be ruled out as also must be the use of buzzers or bells. The reasons are, or should be, sufficiently obvious to require no further comment on our part. We know all about dressing room bells, bar bells and such like, but the cues, or signals as they are sometimes called, with which we are concerned at present, are those given from one part of the stage to another, i.e. where it is most important that the person for whom the signal is intended shall receive it but not the rest of the world.

The method employed therefore in the modern theatre, is the visual signal, and by that we mean a subdued light and not the magnetically operated swinging disc that waggles about in the kitchen when the lady of the house rings for the maid or butler (or more probably nowadays which summons the mistress herself to answer the back door!).



*A typical theatre cue board. The top two panels are for giving visual signals to various parts of the stage, and below, the various bell pushes for bars, etc.*

Cueing is so important that the person giving the cue (normally the stage manager) must be sure that his cue or signal has reached its destination. Electrically this is arranged by having a light at both the stage manager's control board and at the cue position, called the out-station. These two lamps are connected in series and operated by one switch, which means that both lamps must light unless either or both have been subject to removal or breakage. Thus if the stage manager's lamp does not light on closing the appropriate switch, he knows his signal has not "been received and understood" as they say in the Services.

The stage manager's cue board, an example of which is shown on page 10, is therefore equipped with a number of small lamps and switches which control similar lamps at the various out-stations. In the case of the former each lamp should be in a separate light tight compartment and needless to say the switches must be noiseless in operation, such switches being obtainable. It is surprising how the least sound of cue apparatus can be heard all over the theatre, even the tiny noise of a very small switch can be heard in a quiet scene right at the back of the gallery, unless it is a really silent type.

### Importance of position and size

Of great importance is the size of the control panel which has to be accommodated in the prompt corner with such other apparatus as telephones, clock, fire curtain control and frequently sound amplification and various other gadgets. Of necessity the stage manager's control board must be as neat and small as possible but even after reducing things to a minimum it may well still be that this has to be sited in such a position that the stage manager cannot always see the whole of the stage and cannot always, therefore, pick up the cues himself without leaving his board. In such cases a suitably placed motor car driving mirror may be of the greatest assistance.

### Warning and Go

Having arranged by means of series lamps that the stage manager will always know whether or not his signal has reached its destination, we must consider some form of warning or stand-by cue. A cue given without any warning deserves the result it usually gets. "no warning, no result"; or at best, "no warning, delayed results" and the latter is often just as damaging to a production as the former. Such unwarned Cues are known—and rightly so—as "sudden death". Even if a Cue *can* be operated without warning the waiting period does more to turn the hair grey than most things.



In order to provide the necessary "warning" as distinct from "go" signals, not one but two sets of lamps are installed for each out-station these normally being coloured red and green. The arrangement in the professional theatre varies but the usual is red for warning and green for go. Obviously, however, as long as the colour meaning of each lamp is understood by both stage manager and the recipients of his signals at the various out-stations, the colouring is of secondary importance. Out-stations usually consist of a sheet steel box fitted with two lamps situated behind coloured bull's-eye shaped lenses, these giving a wide angle of visibility to the observer.

#### Electrical conditions

As the signal lamps themselves are wired in pairs in series (one on the stage manager's panel and the other on the out-stations for "warning", and a duplicate arrangement for "go"), it will be understood that these will be operating at half the line or mains voltage. Thus if the electric supply was 200 volts, 100 v. lamps could be utilised. These would then burn at their full intensity. It may, however, be found that with this arrangement the lamps would give an unnecessary or perhaps even embarrassing amount of light. In that event lamps of higher voltage could well be utilised, e.g. 110, 120 or even 200/240 volts, but it should be understood that the increase in resistance due to using lamps of higher voltages will automatically result in a considerably reduced amount of light (and heat). The all important point to remember in this connection is that the voltage of the two lamps burnt in series must be the same or the result will be the premature death of the one having the junior voltage.

#### Outstations

We have already mentioned the location of the stage manager's board but have not yet dealt with the location and number of the various out-stations. In a large professional theatre the number of the latter may vary from 12 on the average, to 20 or more in such houses as the Haymarket, Covent Garden or Drury Lane. Out-stations in such theatres are usually situated as follows :

Switchboard.	Up stage-left.	Orchestra.
O.P. corner.	Up stage-right.	Property room.
Flys P.	Under stage.	Curtain, etc.
Flys O.P.	Front of house arcs.	

The reasons for some of these positions may not be immediately obvious. As far as some of the points at stage level are concerned, it must be appreciated that quite frequently actors are required to make an entrance on to a quiet stage, i.e. when they cannot take a word cue and then from a position where they cannot see how the

action is proceeding. "Props" will require to know just when to produce the glass crash or other effect. Demons, "letters-off" of bombs and suchlike will want to know when to dive through the trap or fill the place with smoke from below stage. Then too, and not forgetting the little chap working the radiogram in the corner, there may be six or more isolated front-of-house spotlight positions, the operator at each of which awaits the stage manager's command.

Sometimes the warning circuits of out-stations are fitted with switches so that the stage manager can be notified that the attendant is at his point ready for the "go". These positions are usually orchestra, flys and curtain, which positions are apparently particularly conducive to a thirst or a craving for a smoke.

The lamps used are usually 15 w. Pygmy Sign type which are small and compact and having B.C. caps not S.B.C. This point has its value as it is sometimes necessary to extend the signal from one of the out-stations. This is easily accomplished by a length of flexible cable and a B.C. adaptor, which can be inserted in the B.C. holder in place of the existing signal lamp.

The switches may be of various types. Sometimes a separate on-and-off switch is fitted for each "warning" and "go" lamp. On this system it is possible to leave the warning lamp alight after the "go" signal has been given. The only practical use this has is that it destroys any argument that no warning signal was given before the "go". Another type of switch is of course the two-way-and-off switch by means of which either the warning or go lamp may be lit but never the two together.

#### A consistent warning period

In conclusion one word about the use of signal boards as described above. To give a warning signal too far ahead of the "go" can be almost as embarrassing to the recipient as too little notice. It is bad enough for the electrician who, perish the thought, may be poised on one leg, the other being wound round a dimmer handle while he grasps other switch and dimmer handles in his hands, teeth and eyebrows. But think of poor old "props" and "effects" who may be standing with a tea chest full of broken glass or the greater part of an iron bedstead raised at arm's length over his head, awaiting the cue to drop the lot. For normal conditions one page of script—usually about one minute—should be found quite adequate for a warning but of course this must be adapted to circumstances. The important thing is that warnings shall always be the same length of time. To give a two minutes stand-by one night and only five seconds for the same cue the following show, is obviously asking for trouble. But with a modicum of common sense and equipment on the lines outlined above, one starts well towards having a "clean show".



## MODEL STAGE LIGHTING EQUIPMENT

*Mr. Speaight will already be known to many of our readers as the author of "Juvenile Drama"—a veritable text book on the old "penny plain—twopence coloured" toy theatres. He is also a well-known "puppeteer"*

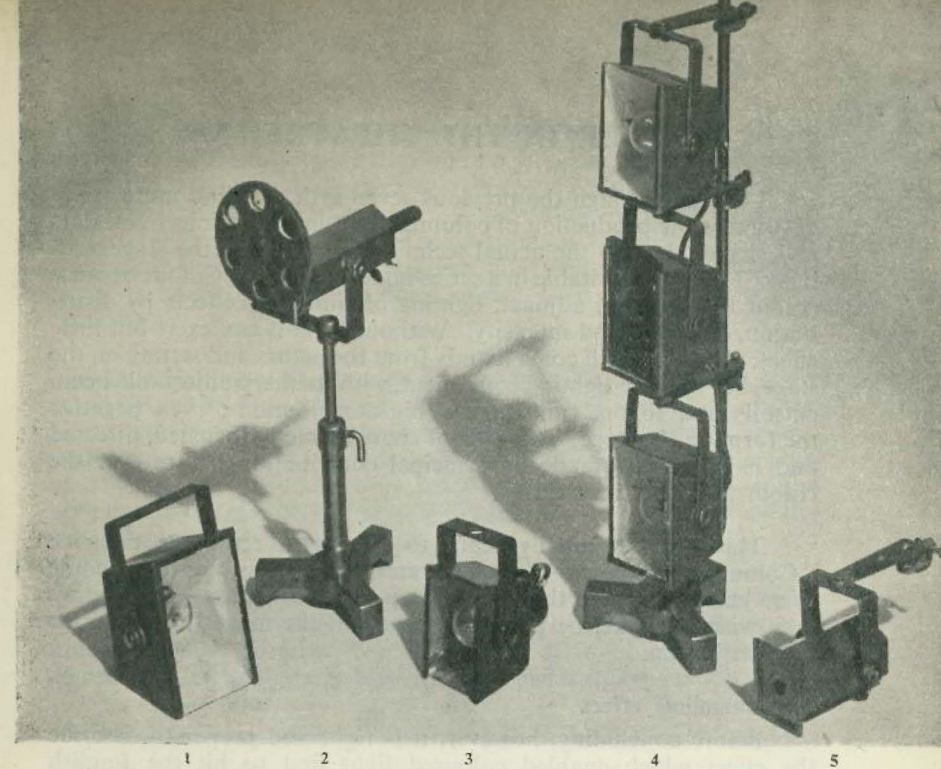
Almost every producer and scene designer recognises the value of making scenic models when planning a production ; the problem of lighting them is more complicated, but, while it may not always be possible to reproduce exactly the lighting of the full-size stage, a great deal can be learnt from experimenting with different lighting plots on a miniature scale.

The simplest method is, of course, to utilise existing mains lighting. Striplights will serve admirably as battens and floats, but they suffer from the disadvantage that they cannot be dimmed without special apparatus and that they cannot show colour changes. It is, however, possible to construct a special tin shield around the striplight, along which coloured gelatines can be slid. But though a lighting system of this kind will provide very attractive effects on a model stage, the source of light is so entirely different to the standard stage equipment that the results obtained need very careful interpretation before transferring them to a larger stage.

The ideal miniature lighting system would seem to be one in which each and every unit of stage equipment is reproduced to the same scale as the model itself. The lamp bulbs used must inevitably be the type manufactured for torches, and these can be obtained in various voltages from 2.5 to 6 volts. If the model stage is made to a scale of an inch to a foot, a suitable single compartment floodlight can be made to measure 1 in. by  $1\frac{1}{2}$  in. (Fig. 1) ; a slightly smaller example measuring  $\frac{3}{4}$  in. by  $1\frac{1}{4}$  in. is shown in Fig. 3. These floodlights provide a basic unit which can be mounted in a floodlight tower (Fig. 4), in a batten, or as floats. Colour filters may be inserted in each compartment, as required.

These floodlights will prove satisfactory for all batten and cyclorama lighting, but for spotlight effects it is necessary to construct something special. Fig. 5 shows a non-focussing spotlight, fitted with American "spot" bulbs, suitable as an Acting Area Lantern ; and Fig. 2 illustrates a focussing spotlight, fitted with a lens and six-colour wheel, standing 4 in. from the ground when fully extended.

The power for these lamps may be provided either by batteries or a transformer. The latter is far more satisfactory but few of the transformers at present on the market possess sufficient amperage for more than three or four lamps at a time. A suitable transformer can be specially wound with an output of 3.8 volts at 10 amps., which will light thirty 0.3 amp. or sixty 0.15 amp. bulbs without any loss of power.



As far as the switchboard is concerned, this can range from a simple arrangement of switches and dimmers to an elaborate installation on the lines of any modern London theatre.

This miniature lighting equipment, with which the Strand Electric Company made some valuable experiments before the war, is now being made by Messrs. Robin Hood and John Edwards, for Benjamin Pollock Ltd., the toy theatre makers, of 1 John Adam Street, Adelphi, W.C.2, who will be glad to send a full catalogue and price list on request.

George Speaight.



## COLOUR IN THE THEATRE—No. 8

Looking through the previous seven articles. I find more space devoted to the production of coloured light in the various hues, tints and shades than to the actual technique of painting the stage with light. This was inevitable in a series under the title of Colour because colour is merely an adjunct, lighting obtaining its effects by distribution, direction and intensity. Without form it can exert but little effect. The form will come mainly from the actors and setting on the stage, but modern lighting equipment, with its sharp adjustable beam cut-offs and so on, can make a big contribution; even negative the form on the stage. A batten of spots correctly focussed, directed and balanced has made its principal contribution before ever the colour filters are inserted.

This series, originally begun to expose the erroneous doctrine "Colour is all important" then featured in the press, must now come to an end and any further exploration in the art of stage lighting we may wish to make, be based on light and the means available for its distribution.

### The Samoiloff effect

Before concluding, however, it is right and proper to describe the effect which enabled coloured light first to hit the English newspaper headlines. This effect is now known as the Samoiloff effect (after its inventor) and was first used on a large scale in the production of "Round in Fifty", at the London Hippodrome in March, 1922. Adrian Samoiloff did not of course discover the principle of complementary colours on which the effect is based, but he appears to have been the first to see the possibilities when applied to the theatre.

If we paint a bright red cross on a white ground several transformations can be performed. Under white light we see a red cross, under blue-green light (No. 16) a black cross and under red light (No. 14) no cross at all. The reason is fairly obvious; blue-green light from a No. 16 filter contains no red so the cross will not reflect; an all red light on the other hand does not provide sufficient contrast to the background to enable the cross to be perceived.

Paint a blue-green circle round the red cross and then under blue-green light there is a black cross only; under red light a black circle only, and under Mauve No. 26 (transmits red and blue) the red cross will be in a blue circle.

These effects can be tested using coloured chalk and looking through small pieces of gelatine or even by laying a strip of gelatine upon a white blotting pad and looking through another. Such

rough tests are quite striking but may tend to make the effect appear too easy. It is quite possible to paint two scenes on top of each other, one in red and one in blue-green and at a touch of a switch to change the scene from a warm interior to a cold exterior but to do this needs perfect filters and pigments. The moment a red pigment reflects some blue or green, or a blue-green filter transmits some red the effect is spoiled. Therefore considerable care and experiment is necessary.

True black can be of value in a design. For example an actor can be made up red and wear a blue-green jacket with black stripes. Under red light he will appear as a white man in a black jacket; under blue-green as a negro in a striped blazer. Of course, in both cases the stage is flooded with lurid colour light which limits the application of this effect to stunts, though it is remarkable how the eye accepts each colour.

Sometimes to avoid too heavy lighting for the main part of a variety act, the different complements such as yellow and blue, are used for the negro effect but blue to my mind provides too little contrast to the apparently black face to give a striking result.

Of course the principle can be used to provide less complete changes and subtle and beautiful effects may be obtained as for example in Mr. Cochran's cabarets in the Trocadero Grill before the war. The pattern and design of a costume can be quite transformed by a slight almost imperceptible change of lighting colour which allows a different set of hues to dominate and thereby reveal other colours hitherto not apparent due to the lack of contrast.

Time spent on Samoiloff experiments is not wasted because such stunts bring home to one in an exaggerated and therefore obvious way the factors at work every time we light even the straightest of straight plays with its cast of cigarette smoking females in frocks of various hue.

### The Fluorescent effect

Many people tend to confuse the Samoiloff effect with fluorescent effects. In actual fact the two phenomena are quite different; the coloured pigments in the Samoiloff are not changed—they are merely made to reflect, and are illuminated by light of a limited part of the visible spectrum. A pigment designed to reflect on long wavelengths of light such as orange cannot reflect light of a short wavelength, such as blue. A fluorescent pigment, however, can be so composed as to reflect as a light of long wavelengths (orange) when in fact the illumination is by short wavelengths (blue). Indeed the activating light can be so short as to be invisible



(known as ultra violet), while the orange pigment glows as brightly as if it were lit by white light. The result is all the more striking to the eye because the illumination being invisible, the orange pigment glows in contrast to the surrounding velvety darkness.

The common use of fluorescent chemicals for the tubular lamps may lead the reader astray. In these lamps the fluorescent pigments are coated on the inside of the tubes and the light output (mainly invisible) of the electric discharge inside the tube is converted thereby into visible light before it leaves the lamp. If this coating were omitted and applied to a few objects in the room, they would glow brightly in the comparative darkness of the room.

To get the best results special discharge lamps are made with "black glass" bulbs which pass the ultra violet light and only the minimum of visible light (a trace of violet blue). These lamps are popularly known as black lamps and the invisible ultra violet light they radiate, as black light. The 125-watt black lamp mounted in a baby flood with reflector, opens up many interesting effects.

The most obvious are ghost illusions and it is easily possible to have a danse macabre in which a skeleton throws his bones away one by one until he disappears. Only the bones (attached by clips to black tights) and mask are treated with the fluorescent chemicals. A low intensity of ultra-violet light from one or two floods in the footlights is needed and the stage must be draped and carpeted in black. This is very important as not only is there slight visible radiation from the black lamp but also many paints and materials used for scenery (also the human body, especially teeth and hair) fluoresce slightly.

Apart from illusions, very beautiful decorative effects are obtained by specially treated costumes, artificial flowers and make-up. In this case, high intensity of ultra violet is needed, the brilliant glowing colours being more important than an absolutely black background. Sometimes the ultra violet is used along with ordinary lighting, to bring out colours that would not normally appear in the costumes, for example red, orange, yellow and green under a blue flooded stage.

Whereas all fluorescent colours are vastly attractive under ultra violet, under white light some are less attractive, some are garish and others completely invisible. Nor do the various liquids "take" equally well on all materials and a demonstration and advice is essential before plans are too deeply laid.

F.P.B.

## STAGE SWITCHBOARD DESIGN—II.

(concluded)

It is a curious thing that remote control to which we now turn for a solution to our problems, was usual in stageboards constructed in the early days of electricity. The liquid resistance pots used in those days were too inconvenient to house on the stage, adjacent to the regulating levers. Thus the stageboard at Drury Lane, installed in 1902, and still in use, consists of four tiers of shafts with self-release handles at five-inch centres, connected by tracker wire to the dimmer pots in the room below.

However, it was in Germany that the use of remote control to provide a compact regulator was developed. The liquid pots were first replaced by metal resistances and then more recently by multi-way auto-transformers to give the same dim irrespective of load. Whatever the dimmer, the tracker wire connection to the regulator was retained. The centres between the regulator handles were reduced both horizontally and vertically and various mechanical refinements fitted. This then is the characteristic German dimmer regulator which, situated at a considerable distance from the dimmers, gave its operator good control over the very large lighting installations common in that country from 1910 onwards. The circuit switches formed a separate unit not necessarily adjacent to the regulator. As is still usual the show was worked mainly on the dimmers.

Meantime, in England and America, the smaller stage lighting installations encouraged the development of the direct operated boards described in Part I of this article. By the time really large installations needing remote control arose here and over there, several electrical devices were available to be used instead of mechanical tracker wire. Whereas the new German installation at the Paris Opera in 1937 used tracker wire operated auto-transformers, the re-equipment of Covent Garden Opera House and the Metropolitan Opera, New York, both employed in 1934 all-electric remote control; the one electro-magnetic, the other electronic.

The lighting control designed by Strand Electric for Covent Garden and installed in 1934, is probably still the largest all-electric remote control in Europe (130 ways), though it will have to give way to the new 152-way installation shortly to be completed at the London Palladium. The dimmers are resistances (in the case of the very large cyclorama loads several units being used in parallel) mounted in four tiers on a frame in a room below stage.



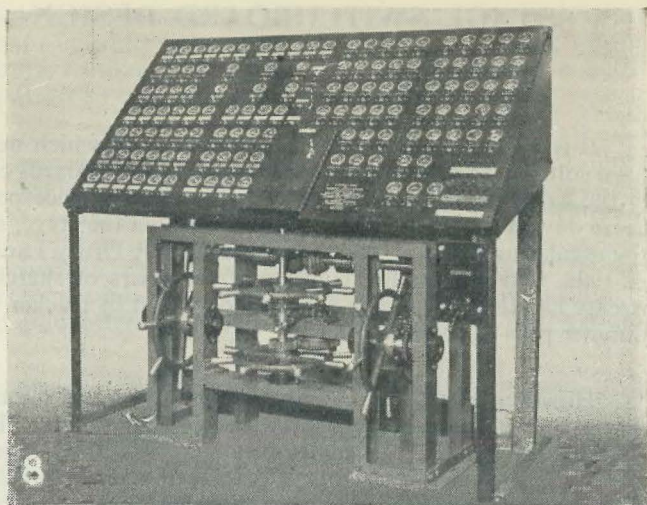


Fig. 1

Each dimmer is connected to travel up or down from the individual shaft by pairs of magnetic clutches. The clutches are energised by two-way and off switches (up, down and stop), from a panel on a perch platform above the stage (Fig. 1). The shaft is driven in two sections, colours and independents, from quick and slow motion capstan wheels under the panel. Above each switch is a dial which gives the dimmer position at all times. The circuit switches and blackouts are on a separate panel further along the perch platform.

With this control all the self-release handles of the direct operated board have in effect been brought together as a compact panel above the grand-master wheel. Furthermore, we can send dimmers up and down simultaneously although they are operated by the same shaft. In the work for which it was designed—opera—the control is very satisfactory but for certain types of production, with frequent rapid and complicated changes, it would to-day be considered inconvenient. For example, suppose the sixteen spots on No. 1 bar are locked on for a slow check and No. 7 has to move quickly on cue. At this the other fifteen switches must be put in the neutral position, the wheel spun quickly, then the fifteen locked on again. Actually this particular cue would be quicker on a direct operated board, since one can leave the master wheel for a moment, unlock Spot No. 7 only and push its lever up individually.

About this time the Strand Light Console (which combines rapid and slow working) was being developed, but the Covent Garden board had to be designed and made in a few weeks so that anything too experimental was out of the question.



Fig. 2

In the Strand Light Console, the control by Grand Master as initiated at Covent Garden, is carried to its logical conclusion. All changes, whether of one dimmer or many, take place at the Master, in this case a keyboard with a set of dials (Fig. 2). Each lighting circuit is only represented individually at the console desk by a single switch, known as a stop-key. This stop-key bears the name of its circuit on its operating tablet and has two positions—on and off. When “off” the lighting circuit remains undisturbed at the intensity to which it was last brought; when “on” it is locked to the master to be driven up or down, switched on or blacked out; or, where the necessary mechanism is fitted to a lantern, to have its colour filter changed.

It is the fact that each lighting circuit is only represented by a single stop-key that makes it possible to put all the controls for an installation, however large, within easy reach of an operator seated at a small desk. The new Light Console under construction for Drury Lane Theatre will actually contain all the switching and dimmer controls for 216 individual lighting circuits plus accessories, in a movable desk 4 ft. 7 in. wide by 3 ft. deep by 4 ft. 2 in. high overall, on the end of a flexible cable. (Fig. 2).

Rapid work is possible because the console operates both switching and dimmer movement: also pre-setting and cancel devices are fitted to the stop-keys. Not only is it easy to run one's



hand over or under the keys to lock or unlock a number of circuits, but push buttons under the keyboards can be set to cause groups to spring on or off. As a matter of fact to carry out the cue previously described for Covent Garden, all that has to be done is to press the "Spot No. 7" stop-key hard against a spring, and when so held its neighbours are disconnected from the master when No. 7 is moved, its exact position registering on one of the master dials. On release of the stop-key we carry on as before.

The Console dimmer bank is rather similar to that at Covent Garden except that the shafts are driven by motors whose speed is regulated by the large foot pedals in the centre of Fig. 2. Also each dimmer carries an electro-magnetic switch in series and another in parallel to it to allow of instantaneous switching full on or off regardless of dimmer position.

There is one feature of the Console which is not properly understood and I think is responsible for Mr. Devine's comment "I do not visualise a long-haired genius 'playing the lights' just as his feelings take him".\*

At first sight there seems no way of plotting the position of dimmers for repetition once a particular effect has been obtained at rehearsal. In fact the dials of Covent Garden are there, but as large master dials over the keyboards. These normally register the amount of movement imparted to dimmers locked on to the master keyboard at the time, but they can also be made to read the actual position of any dimmer by merely giving that particular stop-key a heavy touch.

However, I must confess I hate to see (as at Theatre Royal, Bristol) the console planted in the wings out of sight of the stage, with the operator working dimmers from one set of plotted positions to another at the stage manager's signal. To me, personally, stage lighting should not be dimmer movement but a matter of painting the stage with light. Seeing the stage before him a good operator should, in my opinion, use his keys and controls instinctively to repeat the effects of rehearsal, only the changes which cannot be detected by eye (because of an intruding blackout or curtain) having to be plotted as dimmer positions. In this way I think, the true spirit of the producer's lighting, enjoyed and experienced by the operator, comes to life at each performance; anything else is mere mechanical dexterity which an automatic machine would repeat even more accurately. We do not use a pianola in our live orchestra so why should we aim to do so for a part of our live show.

\* See *Tabs. Vol. No. 6, No. 2, Sept. 1948, page 23.*

So far one line of development has been considered in which means are provided to interlock dimmer levers mechanically to operate them from a master. In this respect the Light Console is directly descended from all the boards hitherto described. There is another approach which has led to what is known as the Pre-set board.

As we have seen, the most obvious objection to the direct operated board is its size. Consequently there has been much invention to produce a miniature lever which, when moved, causes the large dimmer on the remote bank to move the corresponding amount. There are many of these follow-up systems but they have tended to be supplanted by electronic control, which gets the same results without any moving parts. I shall confine myself to the electronic but would make it clear that in respect of the panel design, with which we are mainly concerned, no material difference is made to the layout whether it or a follow-up system is used.

An electronic dimmer employs the gas-filled triode valve known as a Thyatron. Before the war this valve was used (as a dimmer) indirectly in conjunction with a saturable reactor, but recently valves large enough to handle the lighting load direct have become available. The direct use of the valve makes a dramatic reduction in the previous costly indirect equipment, and the system is thereby opened up for general use.

Strictly the valve is not a dimmer at all but an ultra high-speed switch without any moving parts. As is generally known, the common mains supply to-day is an alternating current which passes through a cycle of change from full positive volts to zero and thence to full negative volts, fifty times a second. By altering the control on the Thyatron valve grid, the point in the voltage cycle at which the valve conducts can be varied. This control is achieved by a small potentiometer rather similar to the volume control of a radio set. By turning this knob either the valve does not conduct at all (and the lamps fed through it remain blacked out), or any variation up to full light can be obtained. The load in the lighting circuit is enormous compared to that in the control circuit and furthermore the voltage passed by the valve is quite independent of the size or number of lamps connected. The variable load dimming is just as good as that of an auto-transformer but the equipment is considerably less costly and bulky.

The direct Electronic dimmer appears to be the dimmer we have sought for years. Against it is to be set only one thing—the valve life though long is less than for resistances and auto-transformers which have to all practical purposes unlimited life with only the minor item of occasional brush replacement.



With this control we have a set of miniature levers which can form a small panel remote from the valve bank which carries the heavy lighting loads. The miniature dimmer levers can be connected by two-way and off switches to masters which unlike the previous mechanical devices will not move the individual levers but in effect proportionately reduce the supply to them—perfect proportional dimming is an accomplished fact. If a duplicate set of dimmer levers is fitted and a master control is arranged to cross-fade we can use one set of levers for the lighting as it is now and the other set to arrange the lighting as it will be after the next cue. We can have two distinct boards side by side as one unit ; the levers on the left being Pre-set 1, on the right Pre-set 11, and in the centre the cross fader. Fig. 3 shows the 48-way prototype at present under test.

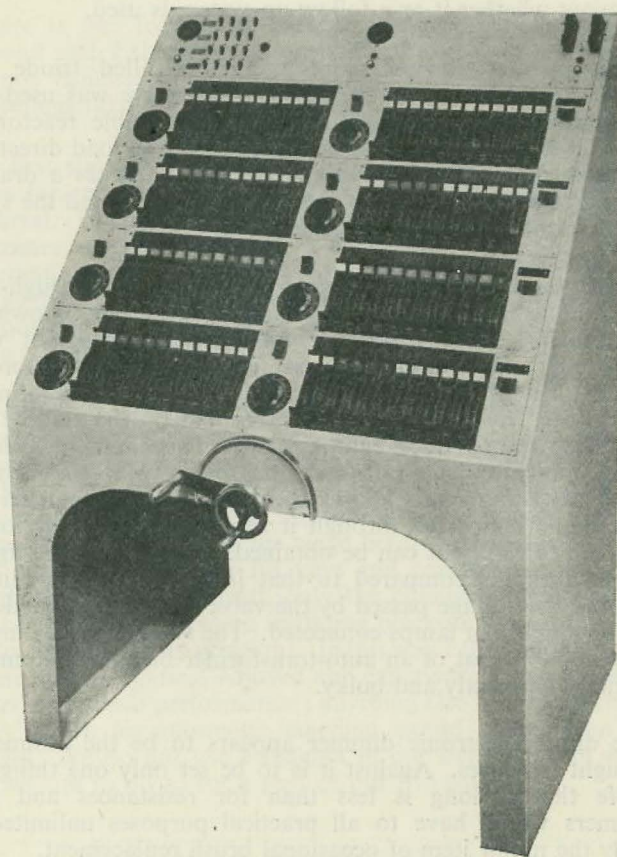


Fig. 3

Such a pre-set panel for 96 dimmer ways is roughly 6 ft. wide by 2 ft. 6 in. deep—small enough to be placed to give its operator a full view of the stage. Provided its new technique is properly mastered and adequate time allowed (between one elaborate change and another) to reset the board, lighting can be meticulously plotted and repeated. The advantage over the Grand Master direct operated board is enormous.

Mr. Devine, in the interview previously referred to, asks for four pre-sets as an ideal and this is where we can find a hint of difficulty. If producers want a series of elaborate changes following each other, before there is time to reset the dimmer levers, the number of pre-sets goes up and with it the size of the board. In America, where there is more experience of this type of control, the latest edition (1947)—the much publicised Yale University Theatre board—has eleven pre-sets to control a mere 44 dimmers. In the case of a large installation, all these pre-sets change the panel into a large switchboard difficult to house once more. Imagine the 216 dimmers required for the new Drury Lane installation, each with 11 pre-sets—2,376 dimmer levers alone to be accommodated, to say nothing of switching and the controls for colour filter change.

On the other hand, American lighting technique differs from ours : it should be remembered that although it has on occasions led to a multiplicity of operators, we in England have so far managed to limp along with no pre-sets at all. The number of pre-sets required for English technique will, in fact, have to be the subject of much care and thought. What must be decided is the proportion of cues simple enough for one operator to work, to the number of more complicated ones, which require pre-set facilities, and of course their frequency.

As it is, Drury Lane is this year to have a Strand Light Console, which will be well suited to the broad running changes for the spectacular productions on its great stage ; at the National Theatre, Iceland, a Strand Electronic Pre-set board will do justice to the meticulously precise work likely to be encountered there.

This brings me back to my original thesis that ideal boards do not and cannot exist. If for no other reason than finance, we must not fight the machine but allow the technique peculiar to each form of control to set the framework within which we are free to build our lighting. For this reason I regard it as essential that *whoever* may be arranging the lighting for a production should have spent some time working, preferably, but at least watching, a board of the type installed in the theatre in question. There is no better way to get the true feel of lighting changes than to handle the dimmers oneself.



## SAFETY REGULATIONS

From time to time we mention the importance of earthing and other safety precautions.

Here are the instructions to which our own employees work. But their efforts will be in vain if the user doesn't follow suit.

The following precautions must be taken to safeguard all users of Strand Electric apparatus from the danger of electric shock.

1. All *new apparatus* produced by the Works, and all *hire apparatus* sent to the Works for repair must be provided with approved means of "earthing" all metalwork (other than that carrying current) and must be made to comply with these regulations in all other respects.

2. All *hire apparatus* (including that of the Manchester and Dublin Branches, the Glasgow Agency and the Sign Department) must be provided with approved means of "earthing" all metalwork (other than that carrying current) and must be made to comply with these Regulations in all other respects.

3. All flexible and feed *cables* for connecting and inter connecting must contain an "earth" wire and the covering of each wire must be distinctively coloured (live—red; neutral—black; earth—green), numbered or labelled.

4. All *terminals*, including those of all plugs and sockets, must be marked, as follows:

Live ...	...	L
Neutral ...	...	N
Earth ...	...	E

and all *connections* must be correctly made in accordance with such marking.

It is most important that any paint, etc., which might result in a poor connection, "earth" or otherwise, is removed.

### PORTABLE SWITCHBOARDS, DIMMER BOARDS AND PLUG BOARDS

5. Every portable switchboard, dimmer board and plug board must be fitted with 3-pin sockets and must be provided with two separate but connected "earth" terminals, the first being the "incoming" one and the second an "outgoing" one to which should be connected the single "earth" wire to a barrel batten, and/or the metalwork (other than that carrying current) of a separate dimmer added to a plug board, etc.

6. All control apparatus must be so arranged that all dimming (except in the case of certain auto-transformer dimmers in respect of which see Regulation No. 9) and all switching take place on the "live" side only.

7. All terminals must be marked as directed in Regulation No. 4, to ensure correct connection.

8. All circuits on every portable switch, dimmer or plug board must be protected by double pole fuses, suitably fused for the circuits they control. This regulation does not apply to boards fitted with auto-transformer dimmers, or boards which are otherwise suitable only for use on A.C. Such boards must be fused on the live side only and be clearly marked "For use on A.C. only".

### AUTO-TRANSFORMER DIMMERS

9. All auto-transformer dimmers must be so connected that the "return" side of the lamp is fed from the "neutral" and no fuse may be

inserted between the transformer winding and the "neutral".

10. Whenever it is proposed to use auto-transformer dimmers, temporarily or otherwise, in the London Area, the London County Council must be advised.

### LANTERNS, ETC.

11. In the case of all apparatus supplied with tails, an "earth" wire, connected to a hank-bush and/or an "earthing" screw fitted to the body of the apparatus, must be included.

12. In the case of all apparatus supplied with terminal blocks, an "earth" terminal, connected to a hank-bush and/or an "earthing" screw fitted to the body of the apparatus, must be included and the terminal blocks must be marked, as directed in Regulation No. 4, to ensure correct connection.

13. In the case of all apparatus supplied with plugs, the plugs must be 3-pin and the "earth" pin must be connected to a hank-bush and/or an "earthing" screw fitted to the body of the apparatus.

14. The covering of each wire of the cables used for connecting all apparatus must be distinctively coloured numbered or labelled, as directed in Regulation No. 3, and the "live" wire must always be the one connected to the centre contact in the case of all screw and pre-focus lamp-holders.

### MAGAZINE APPARATUS

15. A hank-bush with an "earthing" screw (to which the "earth" wires in the connecting or inter-connecting tails must be connected), must be provided at each end of every section of magazine apparatus.

16. The "live" wire must always be the one connected to the centre contact in the case of all screw holders.

### SPOT AND FLOOD BARRELS

17. Provision should be made for connecting the "earth" wire from each lantern on to the barrel. Alternatively, separate "earth" wires must be run back to the "earth" terminal in the connector box.

18. Where the "earth" wires are connected by screws to the barrel, the screws must not be long enough to damage cables run in the barrel.

19. Provision must be made for connecting the "earth" wire in the connecting tails on to the barrel and/or on to the "earth" terminal in the connector box.

### DECORATIVE AND SIMILAR FITTINGS

20. All metal decorative and similar fittings must be wired to a 3-pin plug and all metalwork (other than that carrying current) must be connected to the "earth" pin.

### INSTALLATION

21. When installing portable apparatus, the resistance between any such apparatus and the Supply Company's earth must not exceed one ohm.

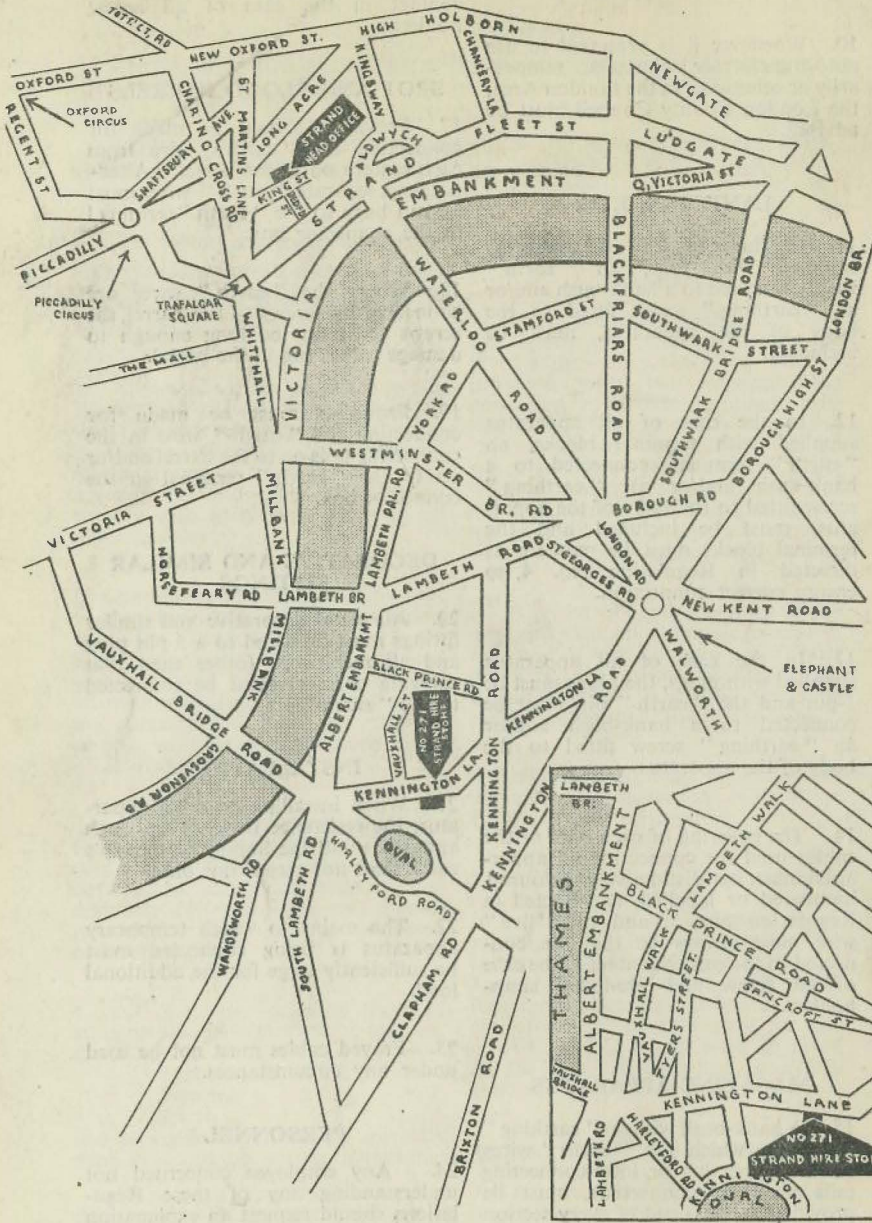
22. The mains to which temporary apparatus is being connected must be sufficiently large for the additional load.

23. Frayed cables must not be used under any circumstances.

### PERSONNEL

24. Any employee concerned not understanding any of these Regulations should request an explanation of them from his immediate superior.





Published by the Strand Electric & Engineering Co., Ltd., 24, Floral Street, Covent Garden, W.C.2. Temple Bar 7464, and printed in England by Wightman & Co., Ltd., London. (Copyright reserved). Clifton 7244.