RANK STRAND

Oimmer Memory Lighting Control Systems

THE ROYAL SHAKESPEARE STRATFORD-UPON-AVON
FORDS THEATER WASHINGTON
SMETANOVO DIVADLO
PRAHA
GLOBE THEATRE LONDON
THEATER DER
STADT SCHWEINFURT
STORA TEATERN GOTEBORG
ST.LAWRENCE CENTRE TORONTO
ROCKFORT COLL-
EGE ILLINOIS
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BERLIN
PHOENIX CIVIC PLAZA ARIZONA
USTI
STATNI DIVADLO
PHILIPINES CULTURAL CENTER
MANILA
OTTAWA NATIONAL ARTS CENTRE THEATRE
& OPERA
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COLISEUM LONDON
UTAH MORMON TABERNACLE SALT LAKE CITY
DET
NYE TEATER OSLO
WINTER GARDEN THEATRE
LONDON
UNIV.OF
TEXAS EL PASO
HAYMARKET LONDON
MT.HOOD COMMUNITY
COLLEGE GRESHAM
OREGON
THEATER
DES WESTENS BERLIN
LOS ANGELES LIGHT
OPERA
FESTHALLE
VIERSEN
ADELAIDE
FESTIVAL THEATRE
STADS TEATERN NORRKOPING
DALHOUSIE UNIVERSITY STUDIOS ONE & TWO &
REBECCA COHN AUDITORIUM
PAUL THOENE HALLE
GUETERSLOH
LE GRAND THEATRE DE QUEBEC
SALLE LOUIS-FRECHETTE ET SALLE CREMAZIE

What Memory Systems are all about

A remarkable development of the last decade or so has been the recording of lighting pictures for subsequent reproduction. Originally very much of a novelty it now becomes necessary for quite modest installations to consider whether to substitute recorded reproduction of lighting cues for the time-honoured method of reading a plot and setting up dimmer levers to correspond. During the long development of stage lighting the ultimate at one time seemed to be the provision of two or more sets of dimmer levers (known as Presets) so that the next changes of lighting could be preset exactly while existing lighting was held in use. Lighting cues were in the main a series of pictures, each picture being balanced out (painted with light) using the dimmers. Thus dimmers were not merely there to fade from one lighting picture to another, the most obvious effect being a sunset or dawn, but were vital components of a static picture which might in fact not change through an entire act.

As lighting has become more sophisticated the number of lighting changes has tended to increase—many of these changes making their point subconsciously rather than being perceived by the audience. Where such changes follow rapidly one upon another an operator would be increasingly hard put with a Preset system to keep up. Rank Strand have always been reluctant to increase the number of presets beyond three (or four as an absolute maximum). This was because of the loss of compactness of the control desk. Although with modern remote controls the dimmer levers themselves had become small, it was impossible to go below $\frac{3}{4}$ in. centres without making finger operation very difficult. As the number of dimmers increases so the number of presets required to set ahead also goes up and with it the physical space needed. It is possible in America to find examples of installations where all the walls of a control room are lined with row upon row of small dimmer levers.

To avoid this it has been Rank Strand's practice to employ grouping aids so that only part of a preset need be used for localised lighting changes. Large numbers of installations by this firm, with what is known as memory grouping, have been supplied during the past twenty-five years or so. These group memory systems still relied on dimmer levers for the levels of lighting but were helpful in determining which of these would be brought in and out of service. A touch of one button could activate just those dimmer levers needed out of the large installation for a particular restricted effect. Famous installations of this type are those in the Royal Opera House, Covent Garden, and in the London Palladium.

Nevertheless the true solution to lighting control is to record the lighting levels of the dimmers so that the operator has in effect an infinite number of presets to call upon in any order for recording or playing back.

Rank Strand are the pioneers in this field, having introduced their first system in 1959. There are by now, as our cover design shows, numbers of Rank Strand Dimmer Memory Systems in most countries of the theatre world.

Before dimmer intensities or levels can be recorded or "memorised" a means of setting up the lighting in the first place is required. It has been the Rank Strand aim in the theatre installations to make this process resemble normal theatre practice. There is a control to each dimmer and there are no special techniques to learn. The recording and reproducing medium varies. The simplest is punched card, but this involves a certain amount of manual and mechanical handling. The more sophisticated systems use magnetic stores. These latter are properly referred to as "memories" since the information is *instantly* stored or withdrawn therefrom without any mechanical action.

Although magnetic memories can store a large number of presets and will retain that information indefinitely a second or "Dump" store as it is known is sometimes required. The most obvious case being that of an opera house. The repertoire method of playing there requires the shelf storage of lighting plots for productions some of which may not return to that stage for months or even years. There is a parallel with the handling of the scenery—obviously the entire repertoire cannot be hanging at the ready in the flys over the stage, it has to be stored. Fortunately, unlike the scenery, the transfer of lighting plots in and out from the Dump store to the Main or Production store is a simple automatic process requiring but a few minutes.

The Types of Memory System

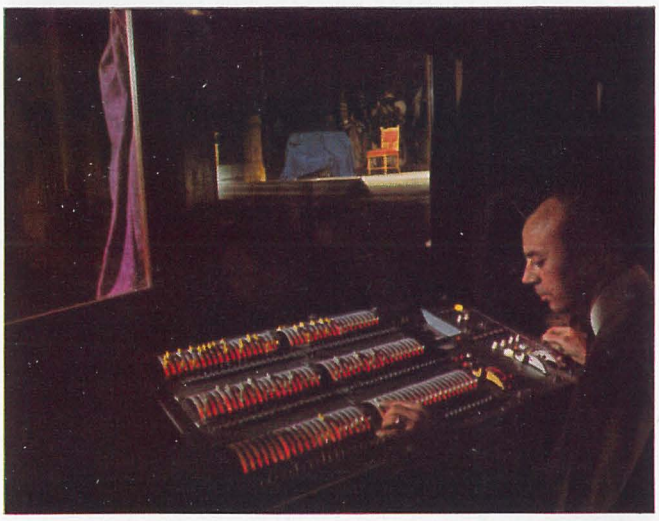
Rank Strand manufacture and market three types of memory system each of which is the best representative of its kind and indeed the third and most recent system, DDM, stands alone. The other two systems are System MemoCard and System MSR (the early models of which were known as System IDM).

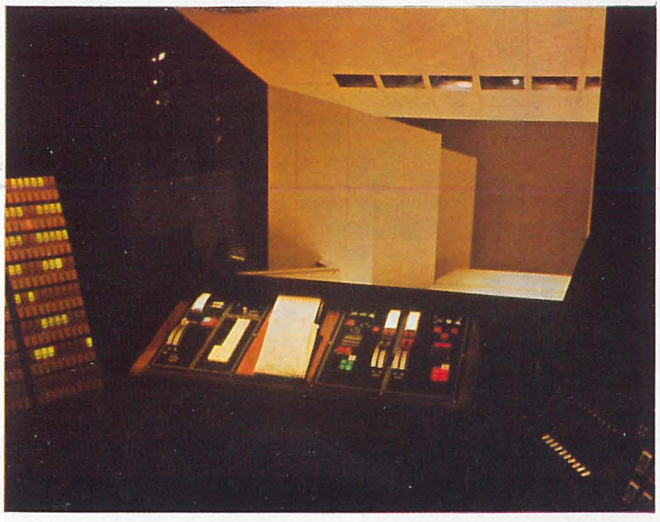
All three systems still have substantial merits which should be examined when considering control for a modern lighting installation. In economic terms it cannot be said that one system has replaced the others. All Rank Strand systems operate the same types of thyristor dimmers, therefore other factors should be taken into account when coming to a decision. Considered in both economic and ergonomic terms each of the three systems is valid in the theatre scene today.

The great merit of System MemoCard is that it is far and away the least expensive of all dimmer recording systems. The punched card obviates any need for additional equipment to provide dump storage. One simply takes the pack of cards representing the show and puts them away on a shelf. The cards can be brought out at any time and put into play immediately.

There is only one optional accessory, namely an automatic punch for plotting cues instead of a manual one. Where change of production is occasional only and the equipment is mainly used for repeat performances, the time-saving represented by the automatic punch is unlikely to justify the extra expenditure.

The operator writes his plot by manually punching holes in the card. This done, all subsequent processes are automatic; it is simply a matter of inserting the cue card in the appropriate reader and crossfading or piling as the plot requires. Where an automatic punch is provided, the machine takes its signals directly from the dimmers and punches out the appropriate combination of holes. The equipment used to do this is standard and only its application to stage lighting is at all novel. The playback master desk is beautifully engineered and involves two or three readers for the cards and there are two complete presets of Rank Strand finger-tip dimmer levers to set up lighting in the normal way.





System MemoCard (top left) can be summed up as a normal dimmer switchboard with punched-card presetting—the number of presets being infinite. All that is necessary is to purchase extra packs of cards.

Much the same can be said of System MSR (middle left) which once again resembles a normal switchboard with a complete set of dimmer levers. This system, which in its early versions was known as IDM (in America it is marketed as Memo Q), allows lighting to be set up in the normal way on the levers and instantly recorded magnetically.

The whole process is electronic and no mechanical action is involved. The lighting once set, the operator simply gives it a reference or cue number and files it instantly away in the magnetic memory. Equally such lighting can be brought back instantly into play. It is as if there are several hundred sets of levers hidden away each representing a separate preset which can be brought back on either side of the crossfader in any order and degree of lap over required. So like a normal switchboard in operation is this system that the operator feels at home with it right away.

The third, System DDM (bottom left), is a computer system, and is an entirely new approach to the processing of lighting cues. Like System MSR it has an instant magnetic memory to record each stage lighting picture but thanks to the fact that both the recording and the playback actions are processed by a computer, improvisation, modification and operator override to an amount hitherto undreamt of can be superimposed on this exact recording. In the hands of a virtuoso operator there seems to be nothing that could be asked of a lighting control that the computer would not allow him to do. Further it takes his latest desires and reconciles them to what has gone before, thereby relieving him of any detail working out. A crossfade, for example, can be interrupted at any time and turned into a different type of action or actions. Cues can be amalgamated, subtracted and otherwise combined without completing any particular process but merely reacting instantly to the needs of the stage at the moment. System DDM is an exact, precise recording and reproducing machine and at the same time the most versatile instrument for improvisation of lighting yet produced.

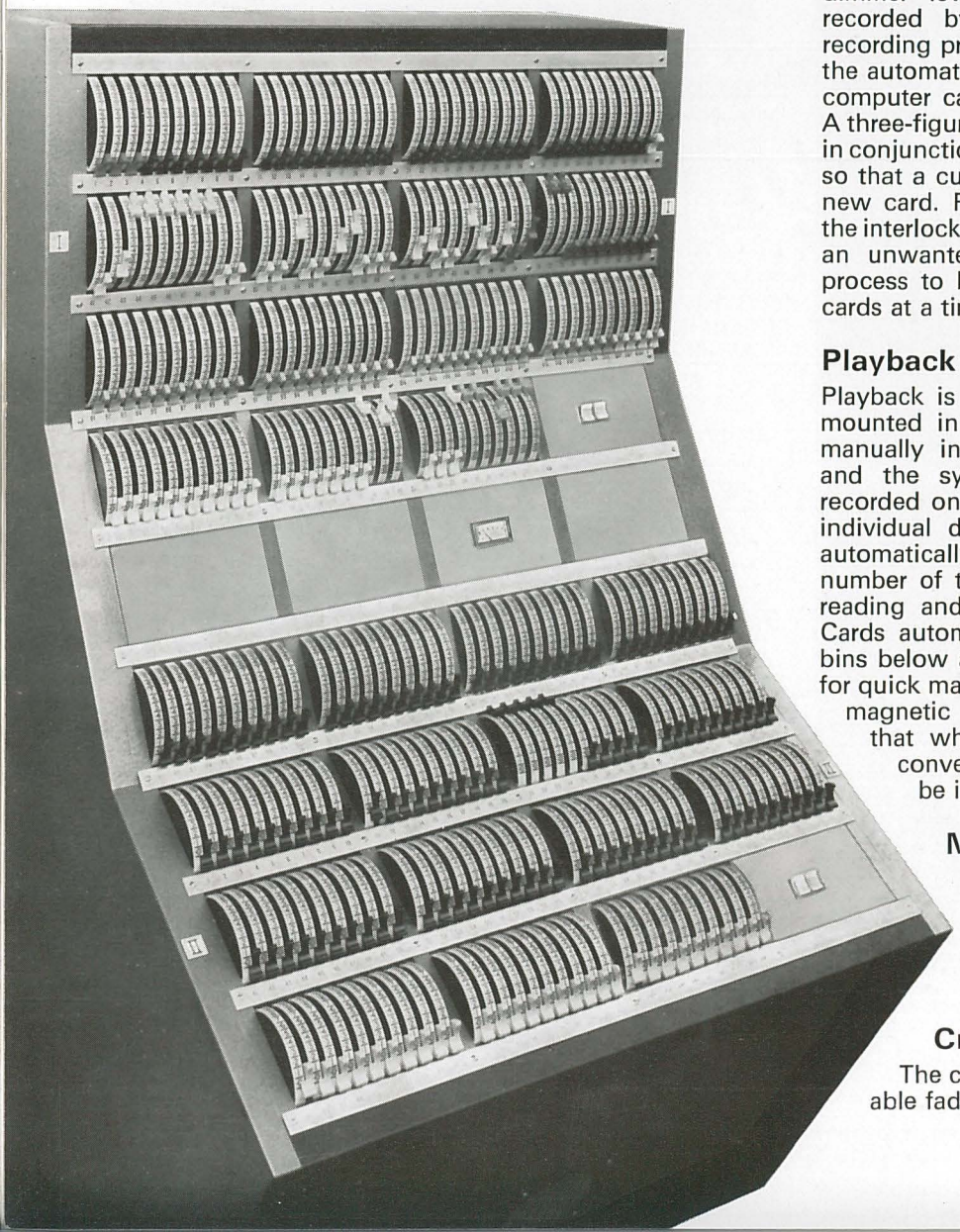
Both Systems MSR and DDM may require dump stores for shelf storage of productions depending on the needs of the theatre production schedule. These auxiliaries are described in the following pages along with typical installations of the three systems. It should be remembered in the case of System MemoCard and System MSR there are a number of standard variants available. In the case of System DDM the possibilities for the future are so great that the particular installation described can only be taken as an indication of the type of thing that has been done so far.

Rank Strand System Memocard

at The Kings Theatre Edinburgh

This control is a dimmer level memory system using conventional computer punched cards to store information. Any number of channels up to 240 can be operated from this system. Considerable variation to customer choice is available and the 150 channel installation described in detail below is given as a typical example but should not be regarded as a specification.

The master controls are mounted on a tubular steel desk, of the standard "office type" construction with a wooden top having sloping panels at the rear to give the operator a clear view of the control levers, clock, etc., mounted thereon. The card readers are mounted in the horizontal surface of this desk. Individual channel levers are mounted forty to a row as two presets one above the other in the ergonomically shaped wing 30 ins. (762 mm) wide shown below.



Channel Controls

An individual quadrant fader lever is provided per channel, per preset. There are two presets. The levers are of the Rank Strand illuminated plug-in type. The lamp in the illuminated fader shows whether the channel dimmer is in use or not.
The dimmer lever scale acts as a push-button switch to give instant meter read-out of the level of any channel at any time. Each preset has a master control in the master desk.

Recording

The system is supplied with an auto-punch so that the dimmer level of every channel may be instantly recorded by pressing a single push button. The recording process takes about 7 seconds and involves the automatic punching on a standard 8-column computer card the information for each dimmer level. A three-figure thumb wheel numerical selector operates in conjunction with the "Punch" push and is interlocked so that a cue number must be set before punching a new card. Provision is made deliberately to Override the interlock if the same number is required and to Reject an unwanted card without waiting for the punch process to be completed. The magazine houses 400 cards at a time.

Playback

Playback is by means of three standard card readers mounted in the master desk. Each punched card is manually inserted in the reader, the reader closed, and the system instantly accepts the information recorded on the card as to the channel level of each individual dimmer in the system. Each card reader automatically displays in a luminous indicator the number of the cue recorded on the card which it is reading and has a master fader associated with it. Cards automatically eject from the card readers into bins below after use, thereby clearing the card reader for quick manual insertion of the next card. An electro-magnetic interlock system is provided to ensure that while the cards are actually being used to convey information to the system they cannot be inadvertently removed from the readers.

Master Controls

The master controls for the two manual presets and the three card readers are grouped together. Each master is switchable to operate from the Cross-fader or independent of it or "off".

Crossfader

The crossfader lever is motor driven, fully adjustable fade times of one second to one minute and

The King's Theatre, Edinburgh, is a typical No. 1 touring house built in 1906. Under civic control but run on a commercial basis it achieves international status during the famous Edinburgh Festival each summer. The proscenium opening is 9·75 m wide and both musical and dramatic productions are staged. There are 1,600 seats on three tiers. The installation of Rank Strand's System MemoCard is part of the modernisation undertaken for the 1972 Festival.
The equipment in the lighting control room at the back of the stalls comprises the channel lever wing, the master desk, and the power supply cubicle. The thyristor dimmer racks for 150 channels are situated backstage.

one minute to one hour being obtainable. During cross-fades between manual presets, and between all card readers, any channel levels which are set to the same level will not dip, i.e., there is a dipless crossfade in respect of lighting common to several changes. The crossfader lever may also be used manually or the motor overridden at any time, and a Cut button permits instant snap changes between one cue and the next.

Modification in Playback

During playback of information by the card readers, the manual presets may be used to modify that information. To do this one preset is selected in a *plus* mode and the other in a *minus* mode of operation. When in the *plus* mode of operation any fader lever in that preset will add its value to the value being obtained from the card playback, and when in the *minus* mode of operation it will subtract its value. This means that any channel level can be modified throughout its full range of control at will at any time. Re-recording is possible at any time by pressing the Punch button.

Auxiliary Controls

On the master desk there is an inhibitor fader for the stage lighting Front of House and a second one to control a fixed group of channels for Tab Dressing. An electric clock is provided as standard on the master desk, also illumination (with a dimmer) of the punched card stores adjacent to the readers on the desk.
Finally, the installation can be remotely switched on and off from the desk without the need to visit the dimmer room.

Principal Features

NORMAL DIMMER LEVER ARRANGEMENT in two presets on a wing from which lighting can be set up and—if desired—directly operated.

FULL DIMMER CHANNEL LEVEL MEMORY recording system is provided at a cost well below that of an electronic memory system of any type at present available.

STANDARD EQUIPMENT such as card readers, card punches etc., with proven reliability and ease of maintenance, used to a large extent throughout the system.

CARD READERS are silent and direct in action and cue number is displayed visually to show which card is in position before it is used. Cards only have to be placed into position for use, they are automatically rejected and collected as each new one is inserted.

EASE OF MODIFICATION for dimmer levels unusual for a punched card system.

MOTORISED CROSSFADER, with a wide speed range giving non-dip crossfades, and provision for lap changes.

UNLIMITED PRESETS and shelf (Dump) storage are simply a matter of packs of inexpensive standard computer cards.

Rank Strand System MSR
at The Rotterdamse Schouwburg

This control is a dimmer level memory system for up to 240 channels which employs **instant magnetic memory** for storing the lighting cues. A number of standard sizes and arrangements are available. Up to 180 channels it is usually convenient to integrate all controls, including the individual dimmer levers to each channel, within a single desk. At this size, or above, it may be convenient to put the channel controls in a separate wing. All operating controls in both types are mounted in such a way that a seated operator can reach everything and at the same time have a clear view of the stage.

The description below is of a typical System MSR installed in the Rotterdamse Schouwburg Theatre, Holland. The 180 dimmer channels are controlled from a desk of the integral type.

Channel Controls

Individual illuminated quadrant faders with internal switch operated by pressure of the scale for selection, dial reading and other purposes. RED indication under manual control and WHITE indication on playback.

A, B and A+B grouping switches to give choice of two manual group masters for each channel.

When the fader units are internally lit in red, the channel faders together with the group switches form a conventional single preset, two group manual control with two master faders. Selection into and out of the manual state can be done individually using the scale switch or as a whole by the ALL channel master push.

FLASH FULL and FLASH OFF facility with scale switch enables channels to be rapidly located.

METER facility in conjunction with scale switch enables channel level to be checked at any time.

CONTENT switch enables the contribution of each playback even when piled to be separately identified on the white indicator lamps in the dimmer scales. Individual channels may be deleted, or transferred to manual control, by the use of the scale switch.

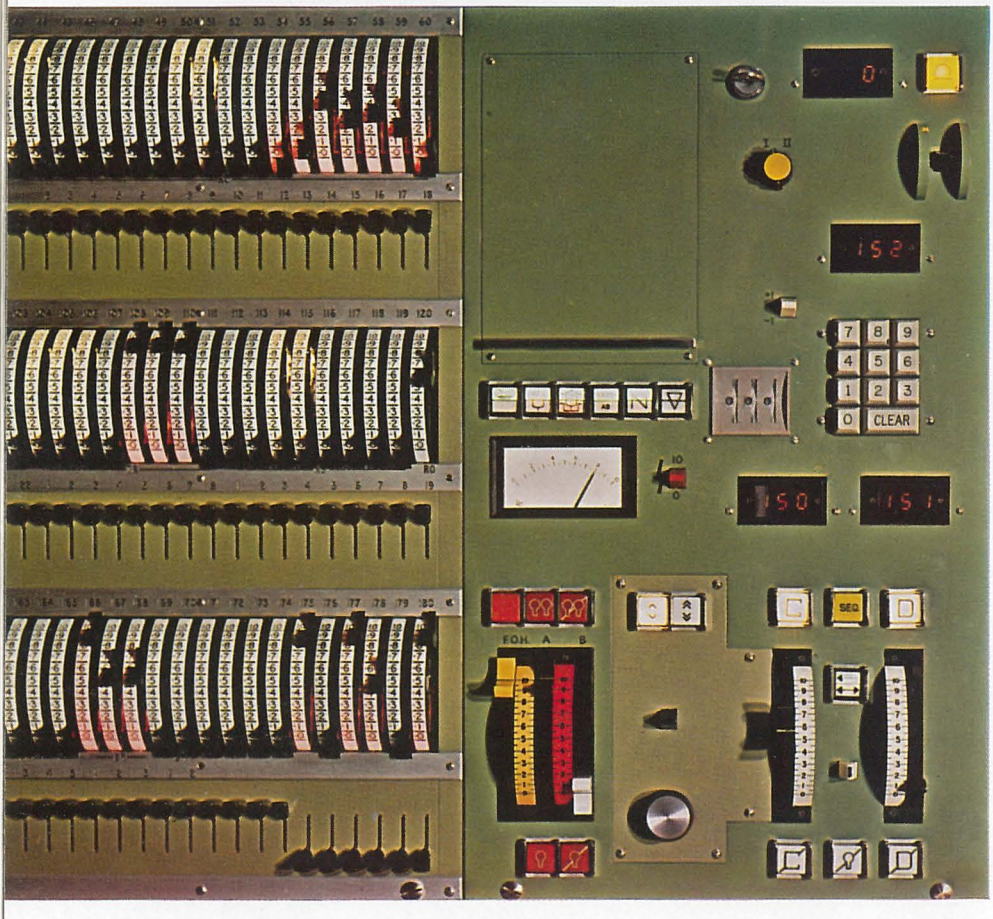
Record

Selection of the memory number is by a keyboard with an associated cue number display. A two-way indexing master switch causes the number in the keyboard cue display to increase or decrease by one each time it is pressed.

RECORD push records the cue on the number shown in the CUE window. What is usually recorded is the actual levels of the dimmers that are producing the current lighting effect on stage.

RECORD KEY locks out record facility to prevent unauthorised use.

A BLIND facility enables cues to be set up and recorded without bringing up stage lighting. The playback facilities may be used during this operation and do not contribute to the recording.



Playbacks

Reading from the memory is controlled by a master push which transfers level information from the memory to a playback. On reading, the cue number is copied from the keyboard display to a read display, to indicate that the playback now contains information from the memory of that number.

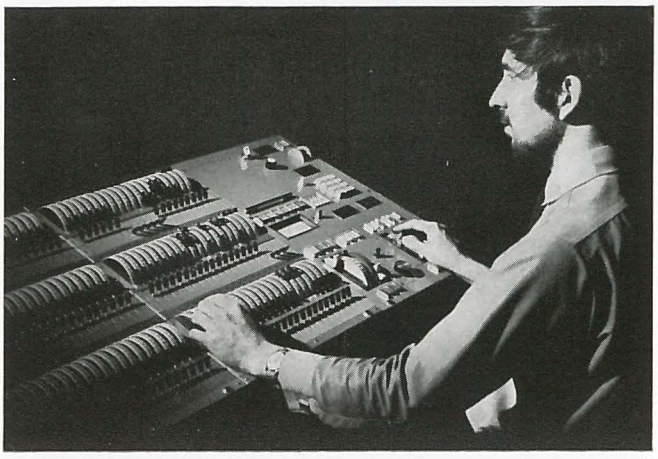
Two separate master faders, C and D, are provided to control the outputs of the two playbacks.

The outputs of the two playbacks may be combined in two ways depending on a master push:

(i) Conventional dipless crossfade controlled by a single master.

(ii) Pile mastering, controlled by two faders. The two masters can be used in this mode to:—

The Rotterdamse Schouwburg was opened in 1946. There is a permanent company, playing to a house of 986 arranged on two tiers, but there is also very considerable interchange with other companies in Holland to form a repertoire. Remarkably intensive use of the lighting equipment for drama, opera and ballet results. The proscenium opening is variable up to 12 m wide.
The MSR control desk is installed in a room at the rear of the circle. Adjacent to the desk are the three MSR racks, one of which is concerned with the Punch Tape equipment for Dump storage and Repertoire programming. The thyristor dimmer racks for 180 channels are in a room under the stage.



(*a*) Combine the outputs of the two playbacks on the "highest takes precedence" basis.
(*b*) Fade either or both playbacks to zero.
(*c*) Crossfade with separate control of the incoming lighting against the outgoing lighting.
This enables incoming lighting to be established before the outgoing lighting is faded, thus providing any degree of lap change while ensuring that channels at common levels will not change.

Playbacks can be "cut" (instantly changed) to a new set of active lighting levels without moving the playback masters. The content of each playback is indicated by the white illumination within each channel fader.

A SEQUENCE facility is provided to automatically update a playback to next cue at the end of a fade.

Automatic Fader

A motorised drive is provided on the C master fader to be used for crossfading between C and D and vice versa.

SPEED RANGES 1 sec. to 60 secs.
1 min. to 60 mins.

This control is particularly useful when used with CROSSFADE and SEQUENCE. Provided cues are in sequence, operation is simply a case of setting speed and pressing a "go" push for each cue.

The motorised drive is via a slipping clutch and may be manually overridden (including reversal) at any time.

Manual Operation

In addition to the single preset of fader levers with its two group masters, the C and D stores can be used to hold cues without using the main system memory.

This facility would be useful in the unlikely event of memory failure as it would give the equivalent of three presets, with facilities rather better than a conventional three preset manual control board.

F.O.H. Master

An F.O.H. inhibitor master is provided to give overriding control of specified channels.

Punch Tape System

A punched paper tape system is provided in this installation for external (DUMP) storage of cues when the capacity of the instant magnetic memory is inadequate. This could sometimes occur when the theatre is working with a number of shows in repertoire.

Principal Features

INSTANT MAGNETIC MEMORY giving thirty-two discrete steps in respect of each dimmer for four hundred presets.

INSTANT AVAILABILITY FOR PLAYBACK of all the presets in any order, sequentially or skipping forwards or backwards at will.

FULL SET OF NORMAL DIMMER CONTROLS one per channel, to set lighting and, in consequence, a control console familiar to any lighting operator. Such new techniques as have to be learnt can be picked up in a matter of minutes.

PREPARATION OF MANUAL LIGHTING PLOTS for transfer, or touring a production to theatres with orthodox switchboards is facilitated by the fact that lighting effects are conceived using standard dimmer levers.

DISPLAY OF THE CHANNELS IN PLAYBACK at the individual dimmer control levers.

MODIFICATION OF ANY OR ALL CHANNELS can take place at any time and the result be instantly re-recorded or discarded.

INDICATION OF DIMMER CHECK POSITIONS no matter whether the dimmers are under control from the console levers, from either playback, or from any combination of all three whatever the intermediate positions of the master faders may be.

DIMMER CONTROLS CAN ALWAYS BE OPERATED directly to carry out lighting cues without using the Instant Magnetic Memory facilities.

CONTROL CONSOLES ARE COMPACT. For example a single desk type unit measuring 56 ins (1422 mm) wide × 25½ ins (650 mm) deep × 38 ins (970 mm) high (max) houses 180 dimmer channels and all associated controls and masters.

A STANDARD PUNCHED TAPE MACHINE and read-out unit for automatic subsequent programming of productions in repertoire can be supplied.

Rank Strand System DDM

System DDM can rightly be claimed to be the first of an entirely new generation of controls. It represents a change just as fundamental as came with the introduction in years past of remote control, of dimmer presetting, of group memory, and of instant dimmer memory. It is not at first glance easy to realise the fundamental change it represents. The Rank Strand DDM control presents a paradox; it combines at one and the same time dead accuracy with live vamping. Precision and improvisation are equally possible and can be combined at any time and in any proportion.

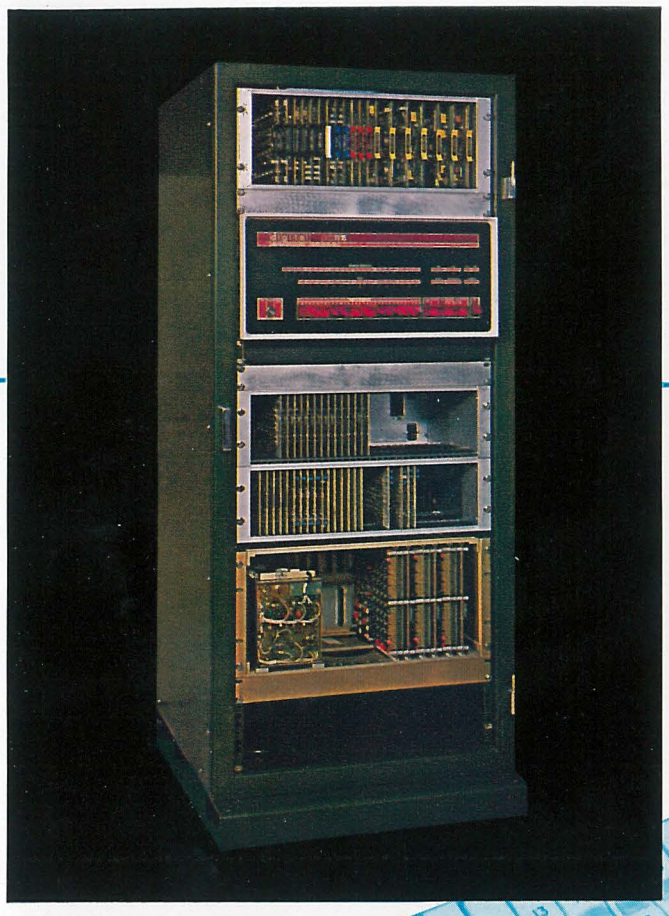
It can record exactly and instantly each lighting picture and reproduce them as crossfades one after the other, lap in changing from one to another being determined by separate speed regulators to the increasing and decreasing channels respectively. Basic controls assume progression forwards after each cue is finished with. Forward progression includes a ready means of skipping, or of adding together, memories before operation as a cue. It is only when it is required to break sequence or blend a number of types of change together for the vamping of or the composition of lighting changes that a degree of skill is required of the operator. In any display of lighting virtuosity the operator has an ally in the DDM computer which makes an instant comparison between the immediate situation now and its latest instruction or instructions. Cues do not have to be completed, there can be any changes of mind the stage situation demands and the computer itself makes *all* decisions necessary to ensure that the lighting changes occur without untoward interruption—they *flow* from one condition to another.

The Software

The use of a fully computerised system allows us to perform operational routines impossible when, as hitherto, we have been tied to the characteristics dictated by mechanics or electronics. All lighting controls have been what is now referred to as "hardwired systems", and what they did has been largely inspired by what the components they were built up of permitted. A fully computerised system literally allows one to tell the equipment what to do. The "telling" takes the form of a programme fed into the computer.

This part of the computer is known as the software and Rank Strand DDM is a software machine. Every function can be precisely determined by the needs of the lighting itself. This both permits and demands a re-think of what we expect a modern lighting control to do. We have so to speak got used to lighting controls functioning in certain ways. It could be that there is no logic in some of those things we expect a control to do; they have merely become a habit. Rank Strand System DDM as illustrated represents our initial liberated thinking with the particular requirements of the Royal Shakespeare Theatre in view. It could be that lighting development in the next few years, coupled with the use of such a flexible machine, will indicate modifications to the original programme or even some fundamental changes. Since the whole system is held together as an entity by a software programme it is possible to re-write and revise this in the light of experience. The software programme could allow a small physical change to open up some large, unexpected and exciting vista, with no more trouble than a rewrite of the programme.

This should not be taken to indicate that the programme will be rewritten or modified frequently at the control. Nevertheless there is a considerable advantage to be



DDM equipment rack containing computer, interface cards, power supplies and main ferrite memory.

obtained from the ability to experiment with—and furthermore to revise—control functions so that they line up with installations in theatres built and opened maybe years later. Again, because of the computer nucleus it is possible to extend or rearrange desk control functions to embrace such technical developments as servo-operated lanterns and so on.

Finally, the use of a fully computerised system allows theatre lighting, itself a very limited market, to take advantage of technological development and experience of the world outside. The larger part of what goes together to function as Rank Strand's System DDM is not peculiar to that instrument but is computer equipment commonly used elsewhere. It is the control desk at the one end and the dimmers at the other that make it into a lighting control; it is the software programme that joins one to the other and enables the operator at the control desk to handle those dimmers to best advantage.

The Computer

In the case of a conventional hard-wired system, a switch or push-button on a control panel is directly connected to the electronic logic and/or timing circuits which cause the appropriate operations to take place. However, in Rank Strand System DDM operational switches and buttons are connected to a computer. The best analogy which can be given is to imagine the computer as being at the hub of a high-speed electronic (telephone-like) exchange with each control, mimic light, dimmer output, and so on, having an individual telephone number (or "address" in computer parlance). The computer is able to interrogate each control at least twenty-five times per second. When a push-button on a control desk is depressed, the computer calls up its identification code on the address line whereupon information is relayed back along the data lines to advise the computer whether the push-button is open or closed. Similarly, if a mimic light is to be illuminated then its corresponding address will be set up by the computer and the outgoing data line will be energised. Obviously this is a completely different concept from the conventional system. A further result of this philosophy is that interconnecting cables become minimal in number and size.

Having seen how the central brain (computer) communicates with each part of the system, it is possible to examine how the lighting control functions are performed. The address and data lines described above are used to interconnect the computer to every part of the system. The computer itself thus comprises three main assemblies: 'Central processor,' 'Programme store' and 'Local store(s)'. In addition there is of course the Main ferrite store situated beneath the computer where actual lighting cues are memorised.

It is the central processor which performs the computing operations, the most important required for the DDM system being:

(*a*) To act as the nerve centre of the electronic exchange, connecting each part of the system to the computer.

(*b*) To retrieve, modify and sort files of recorded cues (the Main and Local stores are used as the files).

(*c*) To perform arithmetical operations such as addition, subtraction, multiplication, etc.

The first two of these functions are self-explanatory. The arithmetical operations of (*c*) are required for instance when one cue is added to another (ADD NEXT function) and also during the crossfades when a pseudo-multiplication is performed.

The Local store configuration basically comprises: 1 'Next store,' 2 'Destination store' and 3 'Output store'.

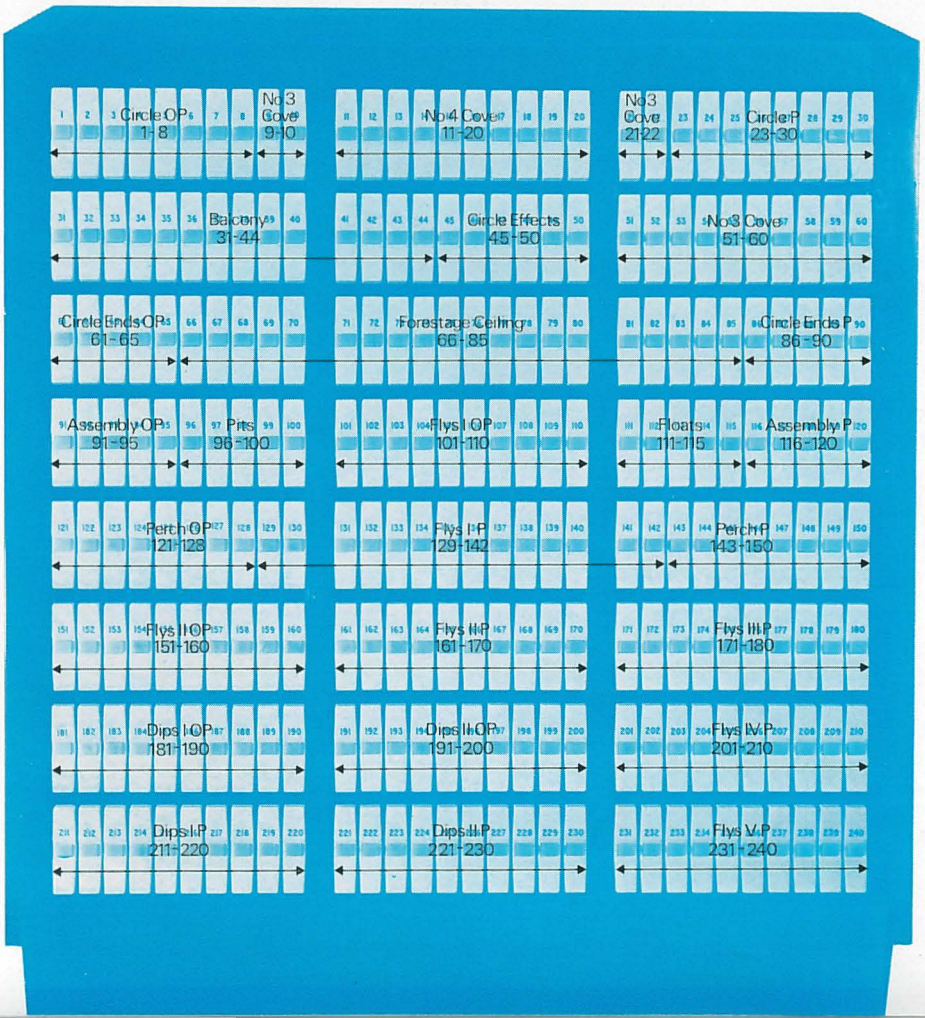
The memories which go to make up the next scene are obtained from the Main store and placed in the Next store. Where the ADD NEXT function is used, the "greatest takes precedence" principle is applied. Destination defines the end-of-fade conditions. This can only be determined after the type of fade required has been selected (i.e. CROSSFADE, MOVE or DIM). Using this information the computer can up-date the levels fed into the Output store as the fade proceeds.

It is also required of DDM that if channel levels are modified individually then the previously unmodified levels still have to be retained in case the operator should wish to return to the original state. Furthermore, a Cut facility is incorporated and stores have to provide two completely independent playbacks as well as Auto-Mod. It is this high degree of sophistication that characterises DDM but fortunately it is both easily and economically catered for by the ferrite store within the computer itself.

Rank Strand System DDM
at The Royal Shakespeare Theatre

The Rank Strand lighting control described on these two pages represents initial thinking as liberated by the DDM computer and applied to the particular needs of the Royal Shakespeare Theatre. Not only the nature and needs of the productions—which range from a summer season of the world-famous Shakespeare repertoire to those of an ordinary touring house in winter—but the confined space in which the control was to be housed was a key factor. This latter accounts for the decision to position the 240 channel rockers on a near vertical wing.

The illustration below shows how the location of the various lighting outlets relates to the eight rows of thirty rockers used for this theatre. The result is literally a mimic diagram of the stage lighting installation with the difference that this diagram can actually be used to work the stage lighting as displayed. No translation in to numerical terms is necessary. Moreover this layout facilitated the design of the portable control, for rehearsal in the stalls (and at other times for lantern setting backstage), where a single row of rockers is used to scan the main wing row by row for display and modification.



Channel Control

(*a*) Rocker with top, bottom and centre contacts in association with speed and level control levers for setting channel levels.

(*b*) Meter indication of channel level whenever top, bottom or centre push of rocker is touched.

(*c*) Momentary flash to full or flash to zero of channel output by touching rocker top or bottom respectively in conjunction with FLASH master.

(*d*) Green and Red mimic lamps in each rocker show which channels on Green and Red playbacks are in use on stage. This display also gives preview of next cue and content of a CUT cue.

(*e*) Amber centre push lights up to show modified channels and AUTO MOD channels.

(*f*) Rocker control normally affects the active playback but the operation can be limited to either.

Record and Cue-Select

(*a*) Cue selection is by push-button switches. Zeros are automatically inserted if only a unit, or ten and unit, is selected.

(*b*) **Instant magnetic memory** giving 64 discrete steps in respect of each dimmer for 250 presets.

(*c*) RECORD is interlocked to prevent recording on a used cue number. An audible warning is provided to indicate when this occurs and a second attempt overrides the interlock.

(*d*) Individual record pushes are provided for each playback as well as an overall record control.

(*e*) The cue number is shown on a numerical display together with an indication when a recording has been made.

Playbacks

(*a*) Two similar but independent playbacks Green and Red are provided, the outputs of which pile together on a "highest takes precedence" basis.

(*b*) Separate control of raise and dim speeds is possible for cues on each playback. Normal speed ranges are 1 second to 60 seconds and 10 seconds to 10 minutes.

(*c*) Normal cue functions are:

(i) CROSSFADE: substitute all memory levels.

(ii) MOVE to new levels except to zero.

(iii) DIM: subtract from existing state and fade.

The Royal Shakespeare Theatre at Stratford-upon-Avon which opened in 1932 has a new lighting installation with Rank Strand's System DDM as part of the 1972 modernisation scheme. The Theatre now seats 1,430, with a pros. opening of 8.84 m and an extensive forestage. The Shakespeare season runs from April to the end of November and during the winter months the Theatre becomes a touring house.

The main DDM control desk is housed in a box in the centre of the rear of the dress circle. The channel controls are on a wing to the left of the master desk. In a room immediately below are the two DDM racks containing the computer and the magnetic tape cassette equipment for Dump storage and Repertoire programming. (Later models of System DDM require only one rack.) The racks for the 240 thyristor dimmers are in a room at one side of the theatre.

(iv) ALL DIM.
(v) REV. Reverse last cue action.
(vi) INST. When pressed in conjunction with (i) to (v) above completes the action instantaneously.

(*d*) Any change can be interrupted, stopped or started at will and the cue function changed during a cue.

(*e*) The progress of cues on each playback is shown by "travel" meters.

(*f*) A CANCEL push clears the playback.

(*g*) A new cue number may be selected either in or out of sequence by a NEXT push and this cue may be previewed and modified prior to being used.

(*h*) Cues may be added together before starting, or during the progress of a cue.

(*i*) In addition to fade cues, CUT IN and CUT OUT cues can be carried out on Green playback without affecting any fade in progress. Common channels retain their independent levels and add together on a highest takes precedence basis.

(*j*) TRANSFER and copy facilities are provided to enable cues to be combined or split at any time—including during a fade.

(*k*) Playback cue numbers are shown on a numerical display together with an indication if the cue has been used and in what manner.

Blind Setting and Record

Either playback may be used for setting, modifying and recording cues without affecting lights on stage, the other playback being used quite normally.

Modification

A channel can be modified at any time by means of the appropriate channel rocker.
A modified channel is indicated by the amber rocker mimic. Each channel can be returned automatically to the original level at any time without recalling the original cue. AUTO MOD facility enables a channel level to be modified temporarily whenever that channel appears in a playback cue.

Stalls Control (left)

The complete Green playback and numerical selector is repeated as a portable desk. A single row of thirty rockers used in conjunction with eight Shift pushes allows all channels to be monitored or modified from there. A keyswitch on the Main control delegates complete (in parallel) or partial control. In the latter case the stalls position is restricted to channel modification and recording thereof—only cue numbers above 200 then being available.

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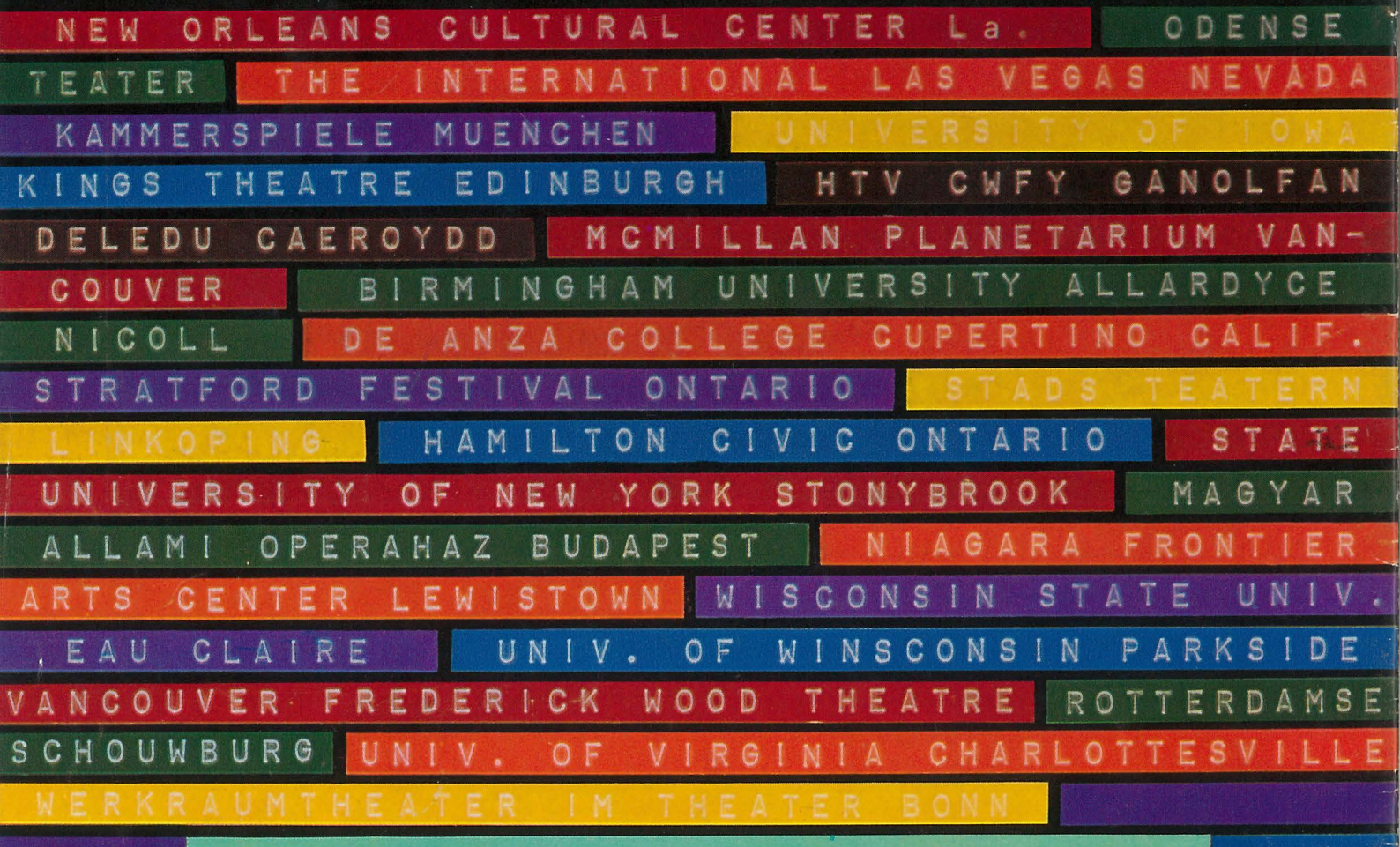

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