

**Q-FILE**  
**LIGHTING CONTROL SYSTEM**

**Operators Handbook**

**Kliegl Bros. Lighting Inc.**  
**32-32, 48th Avenue,**  
**Long Island City, New York, U.S.A.**

**Q-FILE**  
**LIGHTING CONTROL SYSTEM**  
**Series 2000**

**Operators Handbook**

## INTRODUCTION

The Q-FILE Stage and Studio Lighting Control System employs electronic computer techniques to control and memorise the selection of large numbers of lighting circuits and their brightness levels. Up to one hundred (optionally two hundred) different lighting situations can be recorded at rehearsal, and during a production these individual memories can be recalled, substituted, added, subtracted and generally manipulated in a fashion which enables the most complex lighting effects to be achieved with extreme ease.

The system comprises a very compact control panel linked by cables to a control rack containing solid state data processing and data storage equipment. This control rack is in turn linked to a group of cabinets housing thyristor type dimmers. These are capable of controlling tungsten (or tungsten/halogen) lamps of any rating up to 2.5kW, 5kW or 10kW depending on the type of dimmer supplied.

The design of the system is flexible in that any number of lighting circuits can be accommodated and this will obviously vary from one installation to another. Also, the basic control facilities may be supplemented by a number of optional extras or alternatives giving increased scope and versatility.

The Series 2000 version of Q-FILE makes full use of modern integrated circuit technology while retaining all the features proved by its predecessors. Certain operational effects are even easier to achieve but the method of use is little changed from that of the many Q-FILE systems already in use throughout the world.

One benefit of the new design is the availability as an optional feature of a Group Master Control facility. This adds four group master faders which allow independent memory playback under manual master control. The master controlled groups may be memorised individually or in combination and the memories include the effect of the master fader settings. A typical application is the colour balancing of cyclorama lighting.

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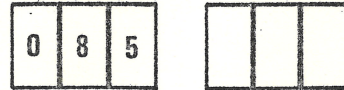
Fan Power Supply  
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### MEMORY CONTROLLER

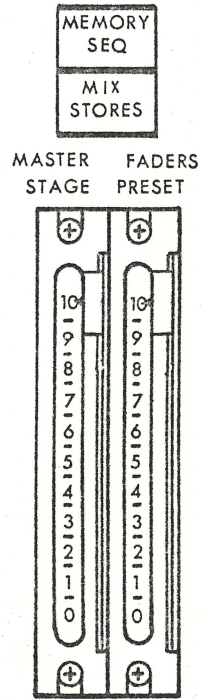
MEMORIES IN USE



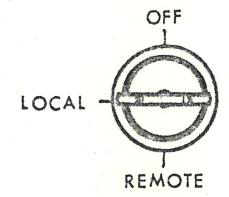
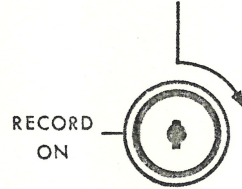
STAGE PRESET

MEMORIES

	9	9
	8	8
	7	7
	6	6
	5	5
	4	4
	3	3
	2	2
1	1	1
0	0	0

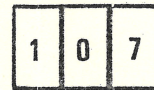


CLEAR SYSTEM



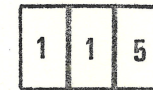
### FADE CONTROLLER

MEMORY IN USE



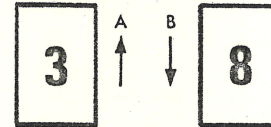
A B FADE

MEMORY IN USE

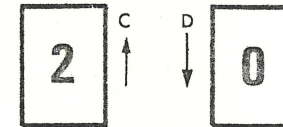


C D FADE

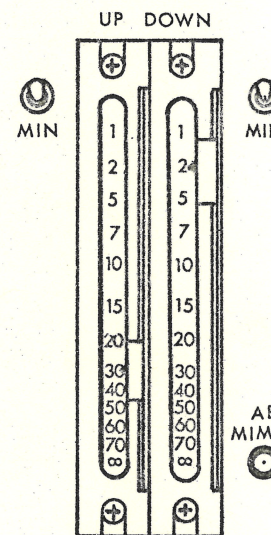
FADE PROGRESS



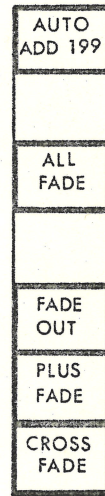
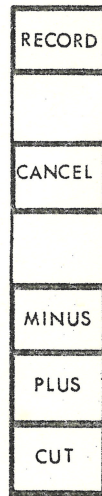
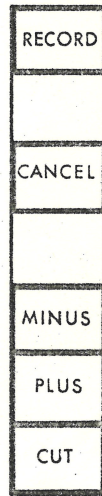
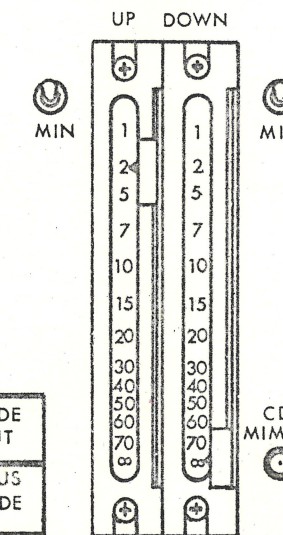
FADE PROGRESS



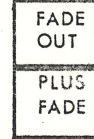
FADE DURATION



FADE DURATION



AB MIMIC



CD MIMIC

CIRCUITS

	9	9
	8	8
	7	7
	6	6
	5	5
	4	4
3	3	3
2	2	2
1	1	1
0	0	0

# CIRCUIT CONTROLLER

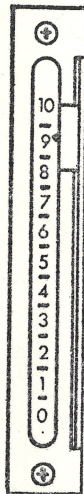
## CIRCUITS

9	9	
8	8	
7	7	
6	6	
5	5	
4	4	
3	3	3
2	2	2
1	1	1
0	0	0

RECORD IN 199
SET
CANCEL
SELECT PRESET
SELECT STAGE
ON / OFF

CLEAR  
199

## CIRCUIT FADER



## OPERATING INSTRUCTIONS

This section describes step by step the simple basic procedures involved in setting up lighting, memorising the scene to scene changes and recalling these memories for use during a production. At this stage, complex lighting effects and technical explanations are avoided as unnecessary to the basic operation. These are fully covered in a later section of this handbook, and study of this more advanced information will enable the operator to realise the full potential of the system.

### SWITCHING ON THE SYSTEM

#### 1. Switch on Power at the Control Racks

*This will normally involve the operation of two push button switches labelled AUXILIARY and CONTROL respectively.*

#### 2. Turn Control Console Key-Switch to LOCAL

The key may now be removed.

*When the system is switched Off, any memories previously recorded are retained indefinitely and become immediately available when the equipment is next switched on. If these particular memories are no longer required, they may all be cancelled by inserting the key in the record key-switch, holding this in its clockwise position and depressing the associated CLEAR SYSTEM push button.*

*In practice it is not essential to carry out this operation since the memorising of a new lighting situation automatically cancels that already recorded (as in a tape recorder).*

*It should also be noted that if the console key-switch is returned to its OFF position, all the console controls are rendered inoperative but the previous lighting situation can be restored by reselecting the LOCAL position. This provides a convenient means of protecting the console against unauthorised use during a temporary break in proceedings.*

3. Turn the Record Key-Switch to the RECORD ON Position  
Using the Key Removed from the Console Key-Switch

The key cannot then be removed without switching back to the upright position.

*If this switch is in the upright position any existing memories may be used, but these cannot be altered nor can new memories be prepared. The memories are therefore protected against unauthorised modification.*

#### PRELIMINARY CHECK LIST

1. Check that the following buttons are in their Off (i.e. non-depressed) position as indicated by absence of internal illumination. A second pressure will release any button which is On.

MIX STORES

MEMORY SEQ

AUTO ADD 199 (99 in 100 memory systems)

2. Check that the two MASTER FADERS are in their fully up position as indicated by absence of red scale illumination.
3. Press both the Stage and Preset CANCEL buttons.

#### SETTING UP THE LIGHTING

*The following operations involve the use of the CIRCUIT CONTROLLER of which two or more may be fitted in certain installations. In such cases, the controllers may be used individually or simultaneously on the same or different circuits.*

1. To Switch on Selected Lighting Circuits at a Common Starting Level

(i) Depress the SELECT STAGE button on the circuit controller panel.

*Operation of this button produces white illumination of the circuit selector buttons.*

(ii) Adjust the CIRCUIT FADER to any desired common level between 0 and 10.

(iii) Press the SET button.

(iv) Select any required circuit number(s), as described in the note below.

*Circuit numbers are always represented by three digits in the hundreds, tens and units columns of buttons respectively. (Or by two digits in the tens and units columns for systems with less than 100 circuits.) Thus, circuit No. 1 is selected as 001. When selected, the individual buttons become internally illuminated, and this illumination persists until the original selection is cancelled by operation of any other button in the same column. However, if finger pressure is maintained on a button which is already illuminated, the self cancelling action does not occur, and any number of simultaneous selections can be made in the same column.*

*It should also be noted that when making a new selection, (e.g. from 001 to 002) there is no need to depress buttons which are already correctly illuminated (i.e. the 0 buttons in the quoted example).*

(v) Press the ON/OFF button.

*The ON/OFF button has a reversing action in that its operation will switch on all selected circuits which are Off, and at the same time switch Off all selected circuits which are already On. This changeover action provides a convenient means of 'flashing' between alternate groups of lights.*

*The button and CIRCUIT FADER scale are internally illuminated whenever the circuit with the lowest serial number in a selected group is On.*

## USE OF THE MIMIC DIAGRAM (Stage Mode)

The 'On' state of any circuit is indicated by illumination of the correspondingly numbered window on the Circuit Mimic Diagram. With certain types of mimic, the brightness of this illumination varies with the dimmer level.

### 2. To Adjust the Dimmer Level of Individual Lighting Circuits or Groups of Circuits

(i) Select the required circuit number(s).

(ii) Adjust the servo-fader manually for optimum lighting level. This will, of course, be the same for all circuits selected at that time.

(iii) Continue the selection and adjustment until the required overall lighting effect is achieved.

*When a new circuit selection is made the previously adjusted circuits remain unaltered.*

3. To Read the Dimmer Level of Any Circuit at Any Time

- (i) Simply select the appropriate circuit number. The servo-fader will then move automatically to indicate the existing level of the corresponding circuit.

*The level and ON/OFF state of all circuits are independently controlled and the equipment can therefore 'remember' a level for a circuit which is either On or Off. When a recalled circuit is already On, this fact is indicated by automatic illumination of the ON/OFF button.*

*If a number of circuits are selected simultaneously, the servo-fader will read the level of that circuit which has the lowest number.*

PREPARING MEMORIES

1. To Memorise the State of Lighting at Any Time

- (i) Select any convenient memory number.
- (ii) Press the Stage RECORD button.

2. To Prepare Subsequent Memories

Either:

- (a) Modify the existing lighting as required and memorise as (1) above, or,
- (b) Cancel the existing lighting by use of the Stage CANCEL button and repeat the setting up and memorising process.

*In case (b) use of the Stage CANCEL button switches off all circuits which are in use at that time, but their individual dimmer levels are still 'remembered' until such time as they are deliberately altered (e.g. by use of the SET button). These circuits may therefore be individually switched On again at their previously adjusted levels and in some circumstances this procedure may be preferable to setting a new common level.*

3. To Modify a Previous Memory

- (i) Select the required memory number.
- (ii) Press the Stage CUT button to recall the memory as a state of lighting.
- (iii) Carry out modifications by selecting and adjusting the affected circuits. (Modifications may also be carried



out by the addition or subtraction of other memories as described later.)

- (iv) Press the Stage RECORD button to memorise the corrected lighting either in the original memory or in a separate memory for comparison purposes. (See also the next section - Blind plotting.)

### USE OF THE PRESET FACILITY

#### 1. Blind Plotting

States of lighting may be planned and memorised independently of any lighting which is already in use at that time. Also, the lighting represented by any previously prepared memories may be examined in terms of circuit On/Off states and levels without affecting the existing situation.

If necessary, the memorised data may be modified before such memories are recalled for actual use. All the above actions are carried out using the Preset store facility as follows.

- (i) First ensure that the fade process is not running, i.e. that the travel meters are at zero and no fade button is illuminated. (See FADES and CROSSFADES.)
- (ii) Depress the SELECT PRESET button on the CIRCUIT CONTROLLER panel.

*Operation of this button produces green illumination of the circuit selector buttons.*

- (iii) Carry out any required operations as listed in the previous section but substitute the Preset RECORD and Preset CUT buttons where appropriate. The memories are common to both the stage and preset modes of operation. Thus, a memory prepared 'in preset' can be subsequently recalled 'in stage' and vice versa.

#### USE OF THE MIMIC DIAGRAM (Preset Mode)

As in the case of the stage store, the mimic diagram will indicate which circuits are On in the preset store. However, irrespective of the type of mimic the preset circuit indication does not vary with the individual dimmer levels. A special aspect of the preset mimic display is discussed under the section concerning fades and crossfades.

2. To Prepare Separate Memories of Groups of Lights in Use at the Same Time

The previously described procedures enable groups of lights to be set up and memorised group by group. It may, however, be preferable to set up a complete pattern of lighting as a single exercise, but to memorise separately a group of circuits representing say, the cyclorama lighting.

This can be achieved by use of the MIX STORES facility which gives the normally 'blind' Preset store the ability to exert direct control of the dimmers simultaneously with the Stage store. Notwithstanding this mixing of control function, the lighting represented in Stage and Preset can still be memorised separately.

The procedure is therefore as follows:

- (i) Depress the MIX STORES button.

*This button is of the 'latching' type and remains in its depressed position until released by a second pressure. It displays red internal illumination when in its depressed position.*

- (ii) Set up the first group of circuits in Stage in the usual way.

- (iii) Set up the second group of circuits in Preset. With MIX STORES in use, the Preset controls will produce the same direct result as the Stage controls. The resulting lighting will therefore represent contributions from both stores simultaneously.

- (iv) Select a memory number and memorise the first group by pressing the Stage RECORD button.

- (v) Select another memory number and memorise the second group by pressing the Preset RECORD button.

- (vi) Release the MIX STORES button.

*This action will remove those circuits contributed by the Preset store. This can, however, be prevented by previously adding the corresponding newly prepared memory to the Stage store. (See next chapter Recalling and Using Memories.)*

RECALLING AND USING MEMORIES

The following describes the various ways in which previously memorised states of lighting can be recalled for use.

1. To Recall a Memory as an Instant Action

(i) Select the required memory number.

(ii) Press the Stage CUT button.

*This action replaces all existing lighting with that represented by the new memory.*

2. To Add a Memory as an Instant Action

(i) Select the number of the memory which is to be added to the existing lighting.

(ii) Press the Stage PLUS button.

*This action adds to the existing lighting all circuits which are On in the added memory. If any of these added circuits were already in use, their previous dimmer levels will be increased or decreased to correspond to their levels in the added memory.*

3. To Subtract a Memory as an Instant Action

(i) Select the number of the memory which is to be subtracted from existing lighting.

(ii) Press the Stage MINUS button.

*This action removes from the existing lighting all circuits which are On in the subtracted memory.*

FADES AND CROSSFADES USING THE AB\* CONTROL GROUP

*\*To distinguish between the basic and supplementary groups of fade controls, the former are generally identified as Group AB and the latter as Group CD. The individual controls are grouped as follows:*

MAIN FADE DURATION CONTROLS	A (Up) & B (Down)
SUPPLEMENTARY FADE DURATION CONTROLS	C (Up) & D (Down)
CROSSFADE BUTTON	AB Group
MAIN PLUS FADE BUTTON	AB Group
MAIN FADE OUT BUTTON	AB Group
ALL FADE BUTTON	AB Group
SUPPLEMENTARY PLUS FADE BUTTON	CD Group
SUPPLEMENTARY FADE OUT BUTTON	CD Group

1. To Carry Out a Simple Crossfade (i.e. to substitute one memory for another as a fade process.)

- (i) With the first memory in use, select any other memory in the usual way.
- (ii) Set the FADE DURATION controls A and B to the required time in seconds or minutes as determined by the time range switches.

*Two controls are provided since the times for fade up and fade down are independently adjustable.*

- (iii) Press the CROSSFADE button.

The crossfade will now commence and will be completed simultaneously for all circuits in the predetermined time. Any common circuits which have the same level in both memories will remain at this level throughout the fade, thus avoiding the 'down and up' transition common in other systems.

The progress of the fade is shown by two 0 - 10 indicators (10 represents 100%, i.e. fade completed).

*On completion of the lighting change the electronic fade process will continue to run but will stop automatically when the Stage CUT, Stage CANCEL or Preset CANCEL buttons are next operated. This automatic provision avoids the necessity of a deliberate action on the part of the operator.*

*Each of the fade action buttons is internally illuminated when the corresponding fade process is operating.*

2. To Adjust the Fade Rate during a Fade

- (i) Simply readjust the FADE DURATION controls as required.

3. To Interrupt and Resume a Crossfade

- (i) Move both FADE DURATION controls to their infinity ( $\infty$ ) positions. To resume the fade return the controls to their original settings. The resumed crossfade will then be completed in the balance of the predetermined time.

4. To Delay the Start of Either the Up or Down Phase of a Crossfade

- (i) Set the delayed fade duration control to infinity and the other control to the required running time.

- (ii) Press the CROSSFADE button to start the first stage of crossfade.
  - (iii) After the appropriate delay, move the delayed fade control to the required running time.
5. To Carry out 'Build' Fades by Adding New Memories as a Continuation of an Existing Fade or Crossfade
- (i) Having commenced the original fade, select the memory which is to be added.
  - (ii) With the original fade still in progress, press the A group PLUS FADE button. The added lighting will then commence to fade in and will become fully effective in the time set by the fade duration controls. This new fade will therefore overlap the original fade by a period equal to the delay in its commencement.

This process can be repeated indefinitely and the fade action will continue until the last addition has become fully effective.

6. To Subtract a Memory as a Continuation of a Crossfade

- (i) Select the required memory number.
- (ii) Operate the B group FADE OUT button while the original fade is still in progress. The circuits which are On in the subtracted memory will now fade to Off as an extension of the original fade (compare with 5 above).

IT SHOULD BE APPRECIATED THAT WHEN MEMORIES CONTAINING COMMON CIRCUITS ARE ADDED OR SUBTRACTED IN SEQUENCE, THE FINAL STATE OF THESE CIRCUITS IS ALWAYS DETERMINED ENTIRELY BY THE LAST ACTION.

7. To Add New Circuits or to Change the Levels of Particular Circuits in Use as a Fade Action

- (i) Select the memory representing the new circuits or the new levels for certain active circuits.
- (ii) Set the FADE DURATION controls A and/or B to the required fade times for the increasing or reducing circuit levels.
- (iii) Press the PLUS FADE button.

*This action automatically cancels any existing Preset store data, recalls the new memory and initiates both the up and down fade actions. Active circuits which are not in the new memory remain unchanged.*

8. To Fade Out a Memorised Group of Circuits

- (i) Select the memory representing the circuits to be faded out.

*The corresponding circuits need only to be On in the new memory - their levels are immaterial.*

- (ii) Set the FADE DURATION (DOWN) control B to required fade time.
- (iii) Press the FADE OUT button.

8. To Fade Out ALL Lighting

- (i) Set the FADE DURATION (DOWN) control B to the required fade time.
- (ii) Press the ALL FADE button.

INDEPENDENT FADES AND CROSSFADES  
USING THE CD CONTROL GROUPS

The following actions can take place irrespective of whether or not the AB group controls are in use at that time. For the purpose of explanation it is assumed that an 'AB' fade is already in progress.

1. To Add New Circuits, or to Change the Levels of Particular Circuits in Use, as a Fade Action which is Independent of an Existing AB Group Fade

- (i) Select the memory representing the new circuits or the new levels for certain active circuits.
- (ii) Set the FADE DURATION controls C and/or D to the required fade times for the increasing or reducing circuit levels.
- (iii) Press the CD group PLUS FADE button.

2. To Fade Out Selected Circuits in Use, Independently of an Existing AB Group Fade Action

- (i) Select the memory representing the circuits to be faded out.

*The corresponding circuits need only to be On in the new memory - their levels are immaterial.*

- (ii) Set the FADE DURATION (DOWN) control D to the required fade down time.

(iii) Press the CD group FADE OUT button.

*As in the case of the AB fade controls the CD fade action can be stopped at any time by setting the C and/or D FADE DURATION control(s) to the infinite position. Another parallel with the AB group controls is the ability to use the CD group PLUS FADE and FADE CUT button as a means of introducing further memories into a CD fade action already in progress. Overlapping builds or fades are possible by this means.*

#### IDENTIFICATION OF MIMIC CIRCUITS UNDER AB AND CD CONTROL

When both the AB and CD controls are in use, the Preset store contains information representing all the circuits involved, and these are simultaneously displayed on the Preset mimic. However, the stored information is electronically identified as originating from the AB or CD controls and two push buttons labelled AB MIMIC and CD MIMIC have the ability of extinguishing the mimic lamps relevant to the other group. The AB and CD controlled circuits may thus be separately identified.

#### USE OF THE PRESET PUSH BUTTONS DURING A FADE ACTION

Whenever any AB or CD fade process is in operation, the Preset CUT and PLUS buttons are rendered inoperative. The Preset MINUS button will stop any further change of circuits represented in the selected memory. The Preset CANCEL button will stop all fade processes and restore the normal function of the other Preset push buttons.

#### 3. To Switch On Practical and Fill Lights During any Fade or Crossfade Action

- (i) Select the memory representing the circuits concerned.
- (ii) Switch On by operating the Stage PLUS button.
- (iii) Switch Off by operating the Stage MINUS button.

The above actions are entirely independent of the fade process except, of course, where certain circuits involved in the fade are also included in the added memory. In such cases, these common circuits are automatically removed from the fade process.

Individual lights may be switched On and Off at any time as described in the following section.

4. To Adjust, Add or Switch Off Individual Circuits at any Time

Direct access to individual lighting circuits is always possible through use of the CIRCUIT CONTROLLER which exerts an overriding influence. Thus, even though a particular circuit is changing its level during a fade, it can be 'seized' by the circuit controller, removed from the fade process and manually adjusted.

The procedure is simply as follows:

- (i) Depress the SELECT STAGE button on the CIRCUIT CONTROLLER.
- (ii) Press the appropriately numbered circuit selector buttons. The servo-fader will now move to the present level of the selected circuit.
- (iii) Assume manual control by taking hold of the servo-fader lever, and adjust the level as required.

OR

- (iv) Switch Off by pressing ON/OFF button.

It should be noted that the CIRCUIT CONTROLLER can be used to add circuits at any time in either Stage or Preset as determined by use of the appropriate selector button on the CIRCUIT CONTROLLER panel. In the Stage mode the addition is immediately effective in terms of actual lighting. In the Preset mode, a circuit added during a fade will be included in the AB fade process in the same way as an added memory. (See Fades and Crossfades, paragraph 5.)

*New individual circuits cannot be added into the CD fade process but circuits already under CD control can be switched Off, or adjusted for level by means of the servo-fader.*

AUTO ADD 199  
(99 in 100 memory systems)

In a practical lighting exercise, it is quite common for an identically balanced group of lamps to be used repeatedly in different scenes. Under these circumstances, any late stage rebalancing of these lamps could necessitate the correction of every memory in which they have been already included. AUTO ADD avoids this necessity by automatically substituting corrected levels whenever a memory which includes these lamps is recalled for use by a CUT or PLUS action. This action arises from the allocation of a special automatic function to Memory No. 199 which is at other times a normal memory.



A special 'short cut' provision enables the new levels of any circuits requiring correction to be recorded directly in Memory 199. The AUTO ADD function is then switched On and memories recalled for use in the normal way. Whenever a recalled memory contains circuits which are also On in Memory 199, the revised levels in Memory 199 take control and the lighting is automatically corrected.

It should be noted that AUTO ADD modifies the store to which a memory is recalled but does not automatically correct the memory itself. From an operational viewpoint the effect is the same, but if it is wished to correct individual memories, this can be simply achieved by recalling each memory in turn with AUTO ADD in use, and re-recording the corrected lighting.

The AUTO ADD function involves a momentary action RECORD IN 199 button on the circuit controller panel.

1. To Record Corrected Circuit Levels in Memory 199

This operation may be carried out in either Stage or Preset as convenient.

- (i) Cancel any existing data in Memory 199 by pressing the CLEAR 199 button.
- (ii) Select, switch On and readjust the first circuit requiring modification.
- (iii) Press the RECORD IN 199 button.
- (iv) Repeat (i) and (ii) for all other affected circuits in turn.

2. To Use AUTO ADD

Depress the AUTO ADD 199 button which will remain in its On state until released by a second depression. Any memory recalled for use in either the Stage or Preset store will now be automatically compared with Memory 199, and the circuits which are On in both memories will be represented in the store at their Memory 199 levels. Other circuits will remain unchanged.

*This action does not alter the contents of the individual memories.*

3. To Correct the Contents of Individual Memories by Use of AUTO ADD

This operation may be carried out in either STAGE or PRESET as convenient.

- (i) With AUTO ADD in use, select the required memory number.
  - (ii) Press CUT button
  - (iii) Press RECORD button
- } Stage  
or  
Preset

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*This action does not alter the contents of the individual memories.*

3. To Correct the Contents of Individual Memories by Use of AUTO ADD

This operation may be carried out in either STAGE or PRESET as convenient.

- (i) With AUTO ADD in use, select the required memory number.
  - (ii) Press CUT button
  - (iii) Press RECORD button
- } Stage  
or  
} Preset

*Under some conditions, the Preset store may include circuits which are 'On at Zero' (See Section 2) and these should not be subject to the AUTO ADD action. To avoid this, use is made of the fact that working circuits to be subject to AUTO ADD will normally have a level substantially above zero. It is therefore arranged that the AUTO ADD action will only take place if an existing circuit is both On and has a stored level equivalent to a fader setting which is at least fractionally above the lower end stop position.*

### SEQUENTIAL MEMORY SELECTION

This facility is available in Stage and both Fade groups.

In the normal usage of the system it is necessary as a manual action to select each memory before it is recalled for use. The selection can take place in any order or may represent a simple numerical sequence (O1, O2, O3 etc).

In the latter case, the need for manual selection of memory numbers can be avoided by use of the 'sequential' facility, which automatically selects the following memory whenever the previous memory is recalled for use. This action follows operation of any of the following buttons: Stage CUT, PLUS & MINUS CROSSFADE, PLUS FADE & FADE OUT.

A latching type button labelled MEMORY SEQ is included and this influences both the Stage and Fade groups of control buttons.

#### 1. Operating Procedure

- (i) Depress the MEMORY SEQ button which will remain in its active state until released by a second pressure.
- (ii) Manually select the first memory in the required series.

*The sequence can commence from any required memory number.*

- (iii) Recall the first memory by use of the Stage CUT, Stage PLUS, Stage MINUS CROSSFADE, PLUS FADE or FADE OUT buttons as appropriate. On release of this button the next memory number will be automatically pre-selected and the corresponding memory selector buttons will be illuminated in the usual way.
- (iv) Repeat until the required sequence of memories has been used.

If the progression of numbers reaches Memory 199, the sequence will automatically restart at 000. The sequence can however be restarted from any memory number at any time by manual selection of the first memory in the new series.

Also, if any memory is selected and finger pressure is maintained on the 'tens' button, the sequence will cyclically select each memory in that particular decade. This provides a convenient way of recycling ten memories in rapid succession (e.g. in time to music).

#### AUXILIARY FADERS, PLUG MATRIX AND FLASHER FACILITY

The auxiliary fader system operates directly into the dimmer control circuits and is therefore independent of the electronic memory system. Its function is two fold:

- (a) To provide conventional manual control of any circuits which:
  - (i) change infrequently during a production and need not be included in the memory sequences,
  - or,
  - (ii) require direct manual manipulation to meet special operational needs.

Examples in the first category are house lights, orchestra lights etc., and in the second, follow spots and special effects.

- (b) To provide standby control should a failure ever occur in the electronic memory system.

In the latter context it should be noted that the auxiliary system is permanently connected into the dimmer circuits and no changeover switching is involved. In the event of any dimmer receiving simultaneous instructions from the main auxiliary systems, that instruction representing the higher intensity level becomes effective. Hence, if either system is Off or at Zero level, the other exercises full control.

#### Description

A desk mounted panel carries 10 or 20 fader levers which are identified by letter headings A B C D etc. These faders are each associated with a similarly lettered column of holes in a plug matrix assembly which also forms part of the desk installation. Since these holes are equispaced, they can also be regarded as a large number of horizontal rows each of which carries a lighting circuit number. Thus, the insertion of a contact pin in any hole uniquely associates a particular dimmer with a particular fader.

In this way, any fader can be given control of any dimmer or group of dimmers by inserting the appropriate number of contact pins in that particular column.

Conversely, any number of faders can be given control of the same dimmer, and under these circumstances the fader with the highest setting takes overriding control.

Below each of these faders is mounted a push button, operation of which switches Off all circuits 'patched' to its associated fader. These buttons have a momentary Off action under light finger pressure but latch in the Off state under heavier pressure. Each fader scale is internally illuminated when its associated push button is in its On state.

#### MASTER FADERS

When 20 auxiliary faders are fitted these are arranged in two rows of 10 and each row is provided with a master fader. In the case of the 10 way version, provision of a master fader is optional.

#### FLASHER UNITS (OPTIONAL)

Two types of automatic flasher unit are available. The standard model (type LK2014) controls two groups of circuits while the dual (B.B.C. type) flasher, LD2171, is a double unit containing two flashers which may be used independently, or in inverse synchronism.

##### Flasher Type LK2014

This unit offers two operational possibilities:

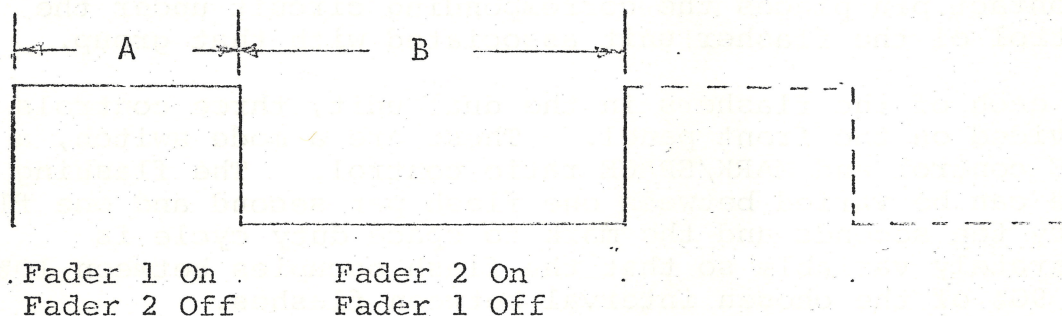
- (a) It permits rhythmic alternate switching between any two groups of circuits.
- (b) It enables any required circuit or circuits to be switched rhythmically between two preset intensity levels. The switching rate and 'on to off' ratio are independently variable.

The flasher unit comprises an electronic pulsing circuit which energises alternately the two faders at the extreme right hand end of the auxiliary fader group. Thus, when the flasher facility is in use, groups of circuits 'patched' to these two faders switch On and Off alternately. When On, the intensity

level of all circuits in each group is determined by the corresponding fader setting.

If the groups contain common circuits, these will obviously remain On, but will alternate in intensity between the levels determined by the two faders. When the flasher facility is not in use, both faders are energised and thus revert to their normal auxiliary function.

The function of the flasher system can be shown diagrammatically as follows:



Time for complete flashing cycle A + B can be varied between 0.5 and 10 seconds (approx.).

Ratio  $\frac{A}{B}$  is variable in five steps (1:4, 1:2, 1:1, 4:1 approx.).

#### Method of Switching On the Flasher Unit

This may be achieved in two ways.

- (a) As a direct manual action.
- (b) By the switching on of a specially allocated Q-File control circuit which can be memorised and recalled in the same way as the normal dimmer controlling circuits. Since the servo-fader adjusted level of the specially allocated circuit determines the flashing rate, both the instruction to flash and the speed of flash may be included in any Q-File memory. As previously stated, the circuits required to flash are allocated by means of the auxiliary fader/plug matrix system.

*It should be understood that one of the Q-File circuit numbers is permanently allocated to this function and is therefore not available for normal dimmer control purposes.*

#### Dual (B.B.C. Type) Flasher, LD2171

The dual flasher unit provides the user with the facility of flashing any two groups of circuits at selected *independent* rates and mark-space ratios. The flashers may be controlled

manually or by Q-File and the further facility exists to make flasher 'B' produce a 'Mirror-image' of the output of flasher 'A', so that the lamp(s) controlled by 'A' are On when those controlled by 'B' are Off, and vice-versa. Special circuit design ensures that the flash sequence starts in the 'Dimmer On' state and ends with a complete flash cycle, even if switched off in mid-flash.

This type of flasher, together with its special plug matrix board, is supplied as a rack mounted unit. The plug matrix is divided into left-hand and right-hand groups labelled FLASHER 'B' and FLASHER 'A' respectively. Each group includes one hole for each dimmer control circuit, and the insertion of a contact pin places the corresponding circuit under the control of the flasher unit associated with that group.

For each of the flashers in the dual unit, three controls are provided on the front panel. These are a mode switch, a RATE control and MARK/SPACE ratio control. The flashing rate can be varied between one flash per second and one flash every ten seconds and the mark to space duty cycle is separately variable so that the flash occupies between 10% and 90% of the chosen interval between flashes.

The mode switches determine the method by which the flashing rate is controlled. When a switch is set to MANUAL, control of that flasher is achieved by means of the panel mounted RATE control as described above. Setting the switch to Q-FILE places the flash rate for that flasher under the control of a specially allocated Q-File channel. For this installation the following channels have been allocated to flasher control.

Flasher A -	Channel No. ....
Flasher B -	Channel No. ....

These two channels can be adjusted and memorised in the usual fashion and their stored level determines the flashing rate of the associated flasher unit.

*If a control channel is Off, no flasher action occurs, and the dimmer circuits 'patched' to the flasher will function in their normal fashion. The flasher function operates irrespective of whether the flashed circuits are controlled from the Q-FILE desk or the auxiliary faders.*

A third position on the flasher 'B' mode switch is labelled INVERSE 'A'. Use of this setting allows flasher 'B' to generate flashes which are the inverse of those produced by flasher 'A'.

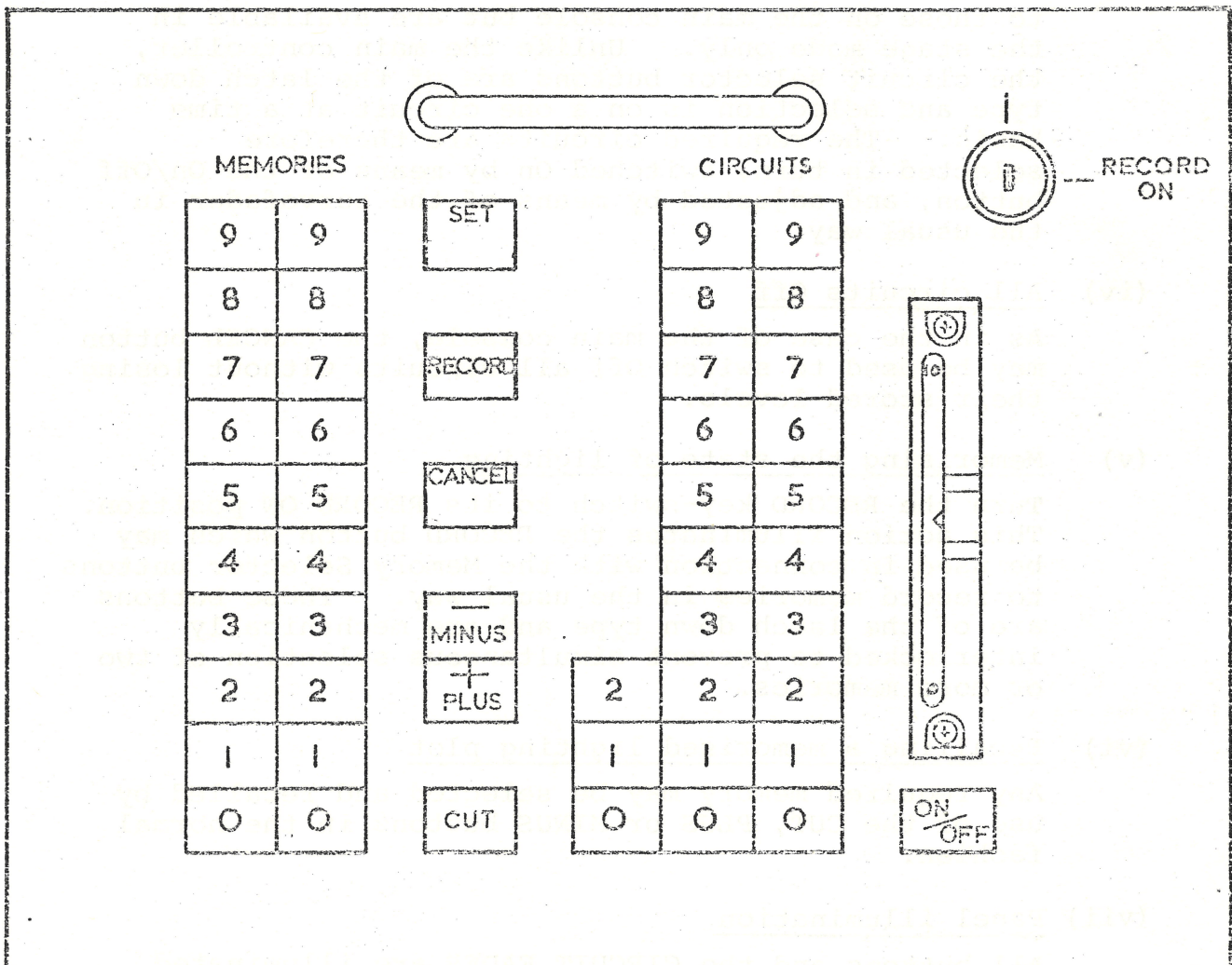
#### Flasher ON Indicator

A pilot lamp on the flasher control panel is illuminated whenever the flasher is in operation.

REMOTE CONTROL UNIT

(Optional)

This portable device enables the basic Q-FILE operations to be carried out from any convenient position in the theatre or studio. Any individual lighting circuits may be switched On and adjusted for level, and the resulting lighting can then be recalled as a Stage 'Cut', 'Plus', or 'Minus' action. Since it is not intended that the remote unit be used during an actual production, fade and Preset control facilities are omitted.





## 1. Presentation

The remote unit normally takes the form of a small metal cabinet which can, with advantage, be mounted on a portable stand or trolley (not supplied).

Its connection is by means of a flexible cable which can be plugged into a theatre/studio wall socket wired to the main equipment. Two or more of these sockets may be provided, enabling the unit to be used wherever required without the necessity of an inconveniently long cable.

## 2. Operating Procedure

(i) Switch On the system in the usual way but turn the control console key-switch to its REMOTE position.

(ii) A common starting level for all circuits may be set up by moving the CIRCUIT FADER to the required level and pressing the SET button.

### (iii) Setting up lighting

The remote circuit control facilities are similar to those on the main console but are available in the stage mode only. Unlike the main controller, the circuit selector buttons are of the latch down type and selection is on a one circuit at a time basis. The required circuits are therefore selected in turn, switched On by means of the On/Off button, and adjusted by means of the servofader in the usual way.

### (iv) All circuits Off

As in the case of the main console, the CANCEL button may be used to switch Off all circuits without losing their stored levels.

### (v) Memorising the state of lighting

Turn the RECORD key-switch to its RECORD ON position. This action illuminates the RECORD button which may be used in connection with the Memory Selector buttons to record memories in the usual way. These buttons are of the latch down type and are mechanically interlocked to prevent simultaneous selection of two or more memories.

### (vi) Recalling a memorised lighting plot

Any required memory may be selected and recalled by use of the CUT, PLUS or MINUS buttons in the normal fashion.

### (vii) Panel illumination

All buttons and the CIRCUIT FADER are illuminated in full white under the following conditions:

Memory selector buttons  
Circuit selector buttons

} Illuminated when  
selected

PLUS  
MINUS  
CUT  
CANCEL  
SET

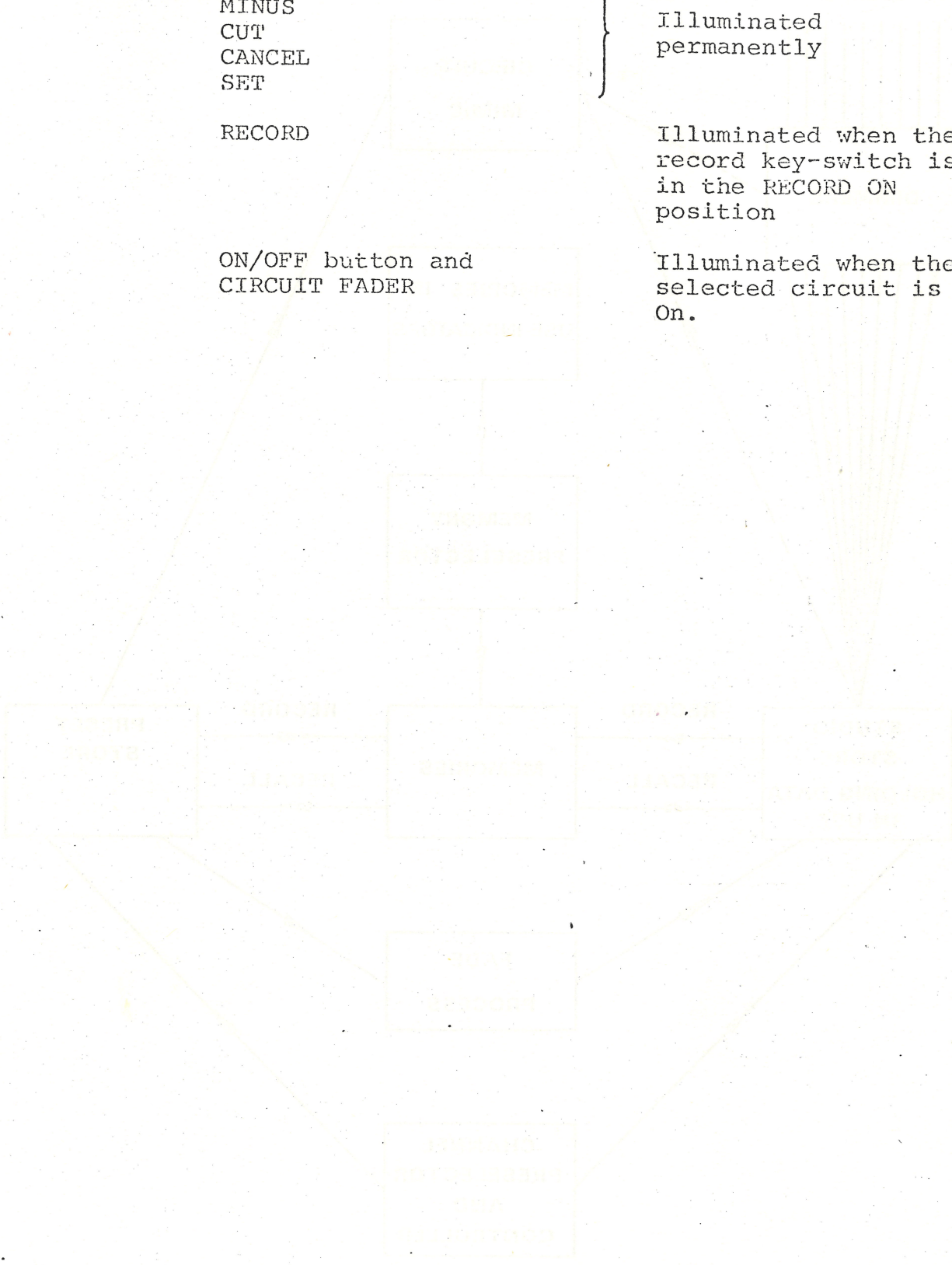
} Illuminated  
permanently

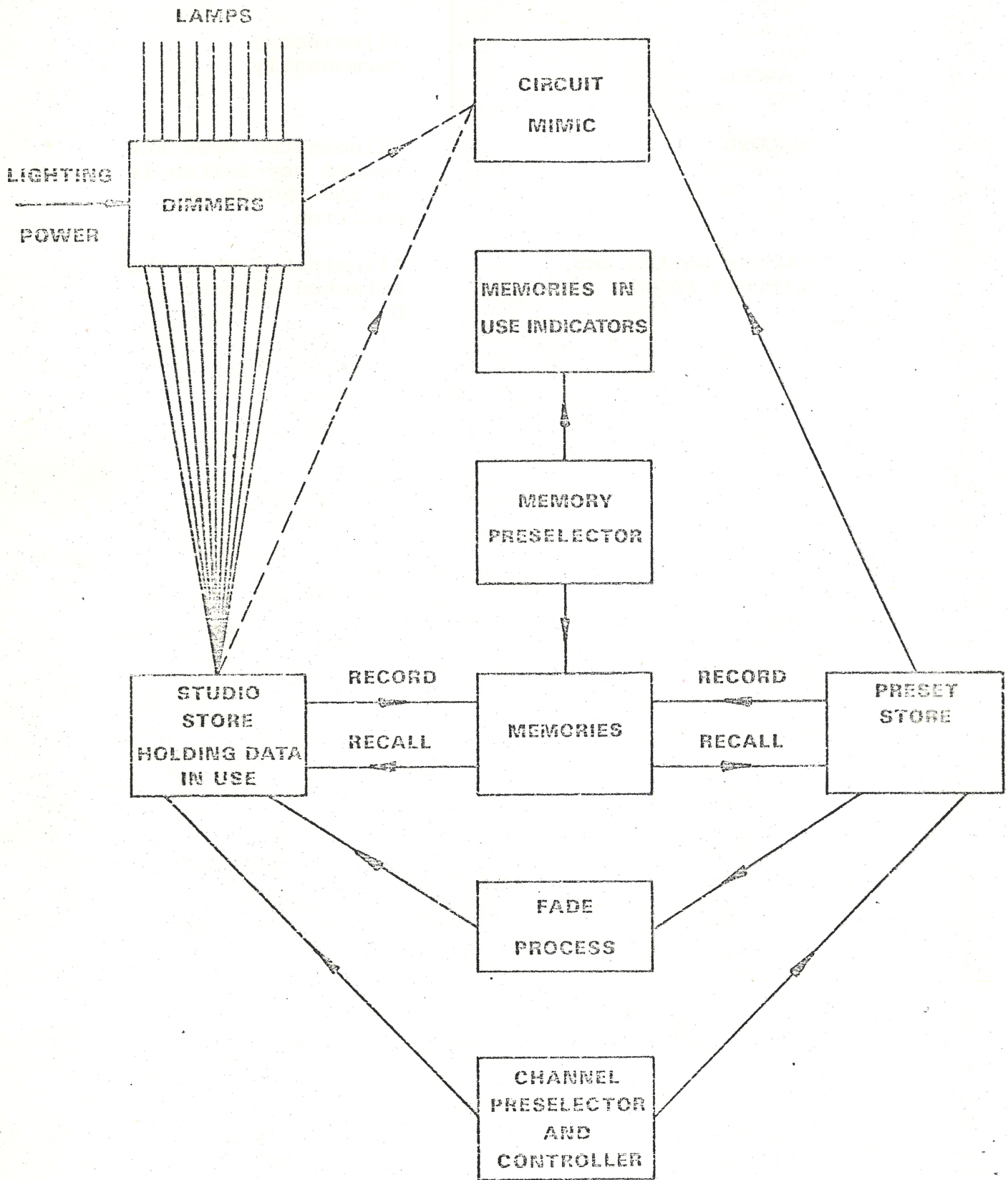
RECORD

Illuminated when the  
record key-switch is  
in the RECORD ON  
position

ON/OFF button and  
CIRCUIT FADER

Illuminated when the  
selected circuit is  
On.





Q - FILE BLOCK DIAGRAM

## THE PRINCIPLE OF Q-FILE

In all lighting systems using thyristor type dimmers the voltage supplied to an individual lighting circuit at any time is determined by the amplitude of a low voltage control signal applied to the dimmer which feeds that circuit. The function of a dimmer memory system is firstly to allow the individual control signals for all dimmers to be adjusted independently when setting up lighting and secondly to memorise, on the operator's instruction, the selection and amplitude of all control signals present at that time, and hence the state of lighting.

In the case of simple manual systems each control signal is derived from a hand operated fader and the state of lighting is determined by the position of a more or less large number of these faders. Since the fader settings will remain until deliberately altered, this system is in effect a mechanical memory, and in theory, one hundred separate groups of faders could memorise one hundred different lighting situations. For obvious reasons, this approach would be quite impractical but the electronic memory technique achieves the same end in a small space and without the need for mechanical memory devices.

In Q-FILE the electronic memory counterparts are known as 'Stores and Memories' representing intermediate and semi-permanent states of the electronic data in a store or memory.

In practice, the initial setting up of lighting is carried out by feeding data into the store which controls the dimmers, and altering this data until the desired lighting effect has been achieved. The final choice is then memorised for as long as required by selecting one of the hundred (or two hundred) memories and copying the store data into this memory.

The original store data can then be cancelled and the next lighting scene set up and recorded in the same way using, of course, a different memory.

When using memories prepared in this way, the reverse process applies, i.e. the required memory is selected and its data copied back into the store controlling the dimmers. Note that these copying processes do not lose the data in the donor memory or store. The above actions are shown diagrammatically in Fig. 1.

The recall of a memory can take place in three different ways.

1. By a CUT action which erases all data already in the store and substitutes the data in the selected memory.
2. By a PLUS action which retains the original data in the store but adds that in the selected memory. This will have the effect of switching On additional lighting circuits, or, if these are already On will change their dimmer levels to correspond to those in the added memory.
3. By a MINUS action which changes the data in the store by switching Off those lighting circuits which are represented in the new memory.

The store used in the above operations is known as the Stage store. A second or PRESET store is also included and the purpose of this is explained in the next section.

#### USE OF THE PRESET STORE

##### 'Blind' Plotting of a Lighting Scene

From the data storage viewpoint the Preset store operates in exactly the same way as the Stage store. The only difference is that in normal operation, the stored data has no direct control of the dimmers.

Through appropriate use of the store selector button, the circuit controller can be connected to the Preset store and lighting data prepared as before except that the dimmers do not respond. Any lighting already in use is not affected since it remains under the control of the Stage store.

##### Memorising a 'Blind' Plot

As in the case of the Stage store, the data in the Preset store can be copied into any one of these memories. Since these memories are available to both stores, that representing the Preset store data can then be copied into the Stage store where it immediately becomes effective as a pattern of lighting.

One function of the Preset store is now evident. Since a competent operator can form a good mental picture of the results of using certain lamps, he can often anticipate his next lighting cue by 'blind plotting'. Thus, he can light his first scene and then by using the Preset store, plan the second scene in advance without disturbing the actual lighting in use. He can also recall any existing memory to the Preset store, carry out modifications, and then re-record the corrected plot, again without disturbing the lighting in use at that time.

## Role of Preset Store During a Fade

Apart from its direct use referred to above, the Preset store plays an important automatic role in carrying out fade operations. The fade up, fade down and crossfade processes are carried out by what one can regard as electronic conveyor belts carrying data derived from the Preset store to the Stage store. This data will both add new lighting circuits to the Stage store and change the level of existing circuits until eventually the Stage store data exactly matches that in the Preset store. The speed of the 'conveyor belts' is under the control of the fade duration levers, and the transfer of information will continue as long as the data in the Preset store differs from that for the same circuits in the Stage store.

## Fade Procedure

The fade procedure is, therefore, to set the fade duration time, copy the new memory into the Preset store and start the fade process. These last two actions are both initiated by operation of the appropriate fade button. While the fade is in process, additional data can be fed into the Preset store, for example, by adding a second memory. This action does not affect the continuing transfer of the original data, but the fade process will continue at the same rate for the extended period necessary to communicate the added data to the Stage store. In the Series 2000 equipment, this additional data can be added under the independent control of a second pair of fade duration controls.

## SPECIAL ASPECTS OF THE FADE PROCESS

### Different Fade Rates for Individual Circuits

A feature of the fade process is the fact that the data transfer rate varies automatically depending on the differences between the dimmer levels of a given circuit at the beginning and end of a fade. Thus, the rate of fade for a circuit changing from zero to maximum is much faster than that of another circuit changing from say 80% to 90% of maximum. This difference in rate is necessary in order that a fade involving a number of circuits can be completed for all circuits at the same time. To return to the earlier analogy, the electronic 'conveyor belt' comprises a separate band for each circuit and the speed of these bands is adjusted automatically in order to transfer different amounts of data in the same specified time.

### The Significance of 'Off' and 'On at Zero'

During a fade from one lighting situation to another it is likely that certain lighting circuits are required to remain unchanged. This requirement is recognised in Q-FILE by the

fact that the only circuits affected by a fade are those which are On in the Preset store. Circuits which are Off in this store are not changed by the fade. The question may then be asked, 'If the Off state in the Preset store means no change, how is it possible to fade unwanted circuits to 'off'?' The answer is that such circuits are, in fact, switched On in the Preset store at zero level. In other words, the circuit is completed but the electronic equivalent of a fader is in its zero light output position. In consequence, corresponding circuits in use in the Stage store will fade to zero when a crossfade or down fade takes place.

On completion of the fade, the circuits involved are automatically switched Off in both stores. This special provision is necessary because, although 'OFF' and 'ON AT ZERO' are visually indistinguishable, the data processing system could produce misleading results if 'ON AT ZERO' was memorised in mistake for 'OFF'. This automatic action can be clearly seen by observing the mimic diagram while a fade is in process.

#### FADE OUT and ALL FADE buttons

The 'On at Zero' principle comes into play when all circuits represented in a new memory are removed from existing lighting by the use of either of the FADE OUT buttons. Irrespective of their memory levels, use of these buttons recalls all circuits which are On in the memory as 'On at Zero' in the Preset store. As explained above, a down fade or crossfade will then remove these circuits from the existing lighting. Thus, the end result is the same as that arising from use of the Stage store 'MINUS' button, except that the latter exerts immediate effect by switching Off in the Stage store all circuits which are On in the new memory.

The ALL FADE button sets all Preset store circuits to 'On at Zero' and initiates a down fade. Its effect can therefore be compared with a Stage cancel action taking place over a predetermined time period.

As in the case of the Stage store, the Preset store 'MINUS' button switches Off in that store all circuits which are On in the selected memory. Thus, a Preset minus action can be used during a fade to remove from the fade process all circuits represented in a new memory. Such circuits will then cease to change in the Stage store but will remain On in this store at their interrupted levels.

#### The 'REMAINDER ZERO' Action

From the foregoing, it will be appreciated that when a crossfade takes place only those circuits which are On in the Preset store will be affected. In a typical instance the lighting at a given time may involve, say, 100 circuits

and it is required to substitute by means of a crossfade, a memory representing perhaps only 25 circuits. In order to achieve the desired result, it is necessary for all the unwanted circuits to be added as 'On at Zero' in the Preset store. This occurs automatically whenever the crossfade button is operated.



## DESCRIPTION OF INDIVIDUAL CONTROLS

### CIRCUIT CONTROLLER

This comprises:

- (a) Circuit selector buttons.
- (b) SET ALL CIRCUITS button.
- (c) RECORD IN 99 button.
- (d) CANCEL button.
- (e) Store selector buttons.
- (f) ON/OFF button.
- (g) Circuit fader.

#### (a) Circuit Selector Buttons

The circuit selector buttons comprise three\* vertical columns representing from left to right the hundreds, tens and units digits of the circuit numbers controlled by the system. Thus, the first column will include a 0 button plus buttons labelled 1, 2 or 3 depending on the number of hundreds of circuits included in the particular installation. The second column represents 0 to 90 inclusive and the third column 0 to 9 inclusive. Thus, any required circuit number can be simply selected. Operation of any button results in its internal illumination which persists until any other single button in the same column is depressed.

*\*Except of course for systems with less than 100 circuits when two columns only are provided.*

*If the circuit selection is changed while holding the servofader, a risk could exist of unintentionally modifying an intermediately numbered circuit. To prevent this, operation of any button in the tens or hundreds column will automatically cancel the original circuit units selection. Depression of the new units column button will then complete the selection of the new circuit.*

## IMPORTANT OPERATIONAL NOTES

- (i) Circuit number selection always involves a digit in each column, e.g. 001, 010, 100.
- (ii) If a required button is already illuminated, it need not be reselected. For example, circuit No. 1 is selected as 001 but thereafter, circuits Nos. 2 to 9 may be individually selected as single button operations in the units column. There is no necessity to re-depress the already illuminated 0 buttons in the hundreds and tens columns.
- (iii) In the normal way, the selection of a new button in any column will cancel and extinguish the illumination in any other button previously selected in the same column. However, if finger pressure is maintained on the original button the cancelling action is inhibited and any number of additional buttons may be selected at the same time. The same result is achieved by depressing two or more buttons simultaneously.  
  
In this way, any number of circuits can be selected at the same time.
- (iv) The act of selection does not in any way affect the state of any circuit. It simply determines which circuits are subsequently to be controlled by the servofader or On/Off button.

### (b) SET ALL CIRCUITS Button

The SET ALL CIRCUITS button enables all circuits in the selected store to assume a common level determined by use of the circuit fader. Individual circuits may then be selected, and when switched On will become effective at this common level. Any circuits already in use will remain On but will assume the common level when the SET ALL CIRCUITS button is depressed.

### (c) RECORD IN 99 Button

The special facility this button provides is explained under AUTO ADD on page 12.

### (d) CANCEL Buttons

On the master control panel separate CANCEL buttons are provided for the Stage and Preset stores. On the circuit control panel a single CANCEL button operates on whichever store is selected at that time.

These CANCEL buttons provide a means of collectively switching all circuits to the OFF state without affecting the levels which may be stored for individual circuits at that time. If required, these circuits may be subsequently reselected and switched On again at their original dimmer settings.

Thus, the SET button changes the level without affecting the ON/OFF state, while the CANCEL buttons switch all circuits off without affecting their stored level.

To clarify the above, consider an analogy in which each store is represented by a bank of individual circuit faders, each of which has an associated ON/OFF switch.

On operating the SET button, all the imaginary faders would move to a common fader setting. Individual circuits could then be switched On at this setting.

Operation of the CANCEL button would have the effect of switching Off all the individual ON/OFF switches without affecting the individual fader positions. These switches could then be individually reclosed to restore the original circuit conditions.

(e) Store Selector Buttons

These determine whether the circuit controller exerts its control in the Stage or Preset store.

(f) ON/OFF Button

This is an alternate action push On - push Off button which operates on all circuits which are selected at that time. If these circuits were previously in the Off state, operation of the button will switch them On and vice versa. If a group of selected circuits has mixed initial On/Off states, the button will reverse these states. This action provides a convenient single button method of 'flashing' alternate groups of circuits for special lighting effects. If a circuit is selected while the ON/OFF button is held down, the circuit will change its On/Off state. The mimic diagram will, of course, indicate which circuits are On at any time.

(g) CIRCUIT FADER

From the operator's point of view, this device is identical in appearance and usage to the familiar quadrant fader used in most conventional lighting control installations. However, this conventional function is combined with a servo mechanism which enables the fader lever to position itself automatically under control of the electronic memory system.

By use of the circuit selection buttons this fader can be 'addressed' to any desired circuit or many circuits simultaneously. The selected circuits are identified by illumination of the correspondingly numbered buttons.

Immediately a circuit is selected, the fader lever will move to the scale position corresponding to the existing level of that circuit in whichever store is in use at that time. At the commencement of a lighting exercise this level will normally be zero unless the common set level facility has been employed.

### Use as a level indicator

It will be evident that because of its self-matching action, the servo-fader provides a convenient means of reading the existing level of any circuit at any time, even during a fade. The need for a separate meter is thus avoided.

### Use as a level controller

The automatic drive to the servo-fader is immediately interrupted when the operator takes hold of the control lever. This action results from a proximity sensor coupled to the lever, and manual control is, therefore, an instinctive act involving no separate changeover switching.

Touching the fader lever instantly 'freezes' the level to which it is set at that moment, and thereafter adjustment of the selected circuit or circuits can take place by direct manual manipulation in the ordinary way. On releasing the lever, it will remain in its final position since the process of adjustment has already set up a matching level in the store. In other words, in the 'hands off' condition, the fader follows the stored level whereas with manual operation the stored level changes to match the fader.

### IMPORTANT OPERATIONAL NOTES

- (i) Unless manual contact is made with the lever, the servo-fader cannot exert any influence on circuit levels stored, i.e. it behaves simply as a slave indicator. Thus, although the fader requires about 0.6 secs to complete an automatic full scale traverse from 0-10, this delay is purely mechanical and does not influence the stored level.
- (ii) Any number of individual circuits can be set up at the same level by holding the fader at the appropriate setting and selecting the circuit numbers in turn. Under these circumstances, a short but finite time (up to 0.6 secs) will elapse before the selected circuit attains its new level.
- (iii) If a number of circuits having different existing levels are selected simultaneously, the fader will assume a position corresponding to that of the circuit having the lowest serial number. If manual contact is then made with the lever, all selected circuits will change to this same level.
- (iv) As previously stated, the stored level is independent of the On/Off state of individual circuits. Any

circuit may, therefore, be adjusted for level in its Off state and subsequently switched On at this new level.

- (v) If a stage store circuit is selected during a fade, the servo-fader will follow its changing level. Although the fade is visually smooth and continuous, the circuit levels are in fact changing in discrete small steps. The servo-fader will, therefore, move in a similar fashion. If, however, the operator takes hold of the control during a fade, the circuit to which the circuit fader is addressed will be instantly switched off in the Preset store. It will thus be removed from the fade process, but, may, of course be adjusted manually.

## MAIN MEMORY CONTROLS

### Memory Selection Buttons

As in the case of individual circuits, memory selection is on a decimal code basis involving two or three columns of ten buttons, each numbered 0-9 inclusive. Selection is always by means of one button in each column. Thus, any memory is selected as a two or three digit number between 00 and 99 for 100 memory systems and 000 and 199 for 200 memory systems. A mechanical interlock allows only one button in each column to be operated at any time.

Selected buttons are internally illuminated, and, as in the case of the circuit selector, there is no necessity to re-depress a button if this is already correctly illuminated when a new selection is required. The act of selection does not alter the 'state of board' but simply determines which memory will be influenced by a subsequent 'action' button operation.

### Memory Action Buttons

In general, two sets of these are provided on behalf of the Stage and Preset stores respectively. However, in the case of the fade groups the PLUS FADE and FADE OUT buttons are duplicated to accommodate the two independent fade processes. Unless otherwise stated, the action of similarly named buttons is identical.

#### (a) RECORD Button

Following the selection of any memory number, operation of a RECORD button will copy into this memory the lighting situation represented in the corresponding store at that time. This action is independent of the source from which the data has been acquired by the store, i.e. from another memory, from the circuit controller, or in consequence of a fade (which can still be in progress at the instant of recording).

(b) CANCEL Buttons

The function of these buttons is described under CIRCUIT CONTROLLER on page 29.

(c) CUT Button

This button has an exactly opposite action to that of the RECORD button, i.e. it cancels all existing lighting and copies into the store the lighting represented in any memory which is selected at that time.

(d) PLUS Button

Use of this button adds to the store any circuits which are On in any memory selected at that time. If a given circuit is already On in the store, its On state is retained but its level is changed to match that in the added memory. Thus, in the case of common circuits the result of addition is always determined by the data in the added memory, and a PLUS action can therefore either increase or reduce the level of a particular circuit.

(e) MINUS Button

Use of this button switches Off in the store any circuits which are On in any memory selected at that time. It will be appreciated that this action only involves the On/Off state, and the levels of the circuits in the subtracted memory are of no significance. By the same token, the levels of the affected circuits in the store remain unchanged and these circuits could subsequently be switched On again at their original settings by use of the circuit selector and ON/OFF button.

FADE CONTROLS

A fade will very frequently involve the simultaneous raising and lowering of dimmer level for different lighting circuits. Thus, although 'fade up' is a contradiction in terms, it is convenient to refer to the two states of fade as 'fade up' and 'fade down' respectively.

The fade controls comprise the following:

- (a) FADE DURATION controls. (Two pairs)
- (b) SEC/MIN switches. (Two pairs)
- (c) CROSSFADE button.
- (d) PLUS FADE buttons (AB and CD)
- (e) DOWN FADE buttons (AB and CD)
- (f) ALL FADE button.

(a) FADE DURATION Controls and SEC/MIN Switches

These are duplicated to accommodate the basic (AB) and supplementary (CD) fade facilities.

Each set comprises a pair of quadrant type controls calibrated 1 - 70 plus an infinity position ( $\infty$ ). This calibration can represent seconds or minutes as determined by use of the SEC/MIN switch associated with each fader.

The left-hand control of each pair determines the 'fade up' duration and, therefore establishes the time required for individual circuits to reach a predetermined higher level. The right-hand control operates correspondingly on those circuits which are to be faded down.

As previously stated, the duration of a fade is virtually independent of the starting and finishing levels of individual circuits.

(b) CROSSFADE Button

This combines a Preset 'Cut' action with a 'Remainder Zero' action and also initiates both the fade up and fade down processes. It operates in conjunction with the A & B fade duration controls.

If the CROSSFADE button is depressed a second time with the same memory selected, the *remainder* of the original fade action will be completed in the *full* time set by the fade duration controls. In other words, the overall fade time will be extended by the interval between the first and second operations of the CROSSFADE button.

If a new memory is selected and the CROSSFADE button depressed while an original fade is still in progress, the lighting which exists at that moment will crossfade to the new memory in the set time.

(c) PLUS FADE Buttons

Available in both the AB and CD fade groups, these buttons perform a Preset 'Plus' action and at the same time initiate the fade up and fade down processes. Their action is therefore to fade up any new circuits which are On in the selected memory and to increase or decrease the levels of already active circuits which are also On in this memory.

(d) FADE OUT Buttons

These are also available in both the AB and CD fade groups and combine a Preset 'Circuits On at Zero' action with initiation of the fade down process. Their action is therefore to fade to blackout all active circuits which are also On in the selected memory.

(e) ALL FADE Button

This is independent of any selected memory. Its operation sets every circuit in the Preset store to 'On at Zero' and initiates the fade down process. All active circuits then fade to blackout in the time set by the B fade duration control.

(f) The '∞' Position

As is to be expected, the '∞' position delays the start of a fade indefinitely and provides a convenient means of interrupting a fade already in progress.

MASTER FADERS

A pair of quadrant type faders provides overriding control over all circuit levels in the Stage and Preset stores respectively.

Functionally, each fader has the ability to scale down proportionally all the individual circuit levels for which data exists in the corresponding store. Thus, in the case of the Stage store, the master fader provides a means of manually fading to blackout all lighting in use at any time. During the fade the voltage applied to individual dimmers will reduce proportionally irrespective of initial dimmer settings.

The effect of the Preset store master fader is similar, except of course, that the dimmers are not directly affected.

IMPORTANT OPERATIONAL NOTES

- (i) Both master faders exert their influence independently of the memorising and recall processes. In other words, they do not affect the data in either store but modify the way in which this data is subsequently put to use. This has the following significance.

(a) Stage store

Consider a situation where an actual state of lighting has been set up with the Stage store master fader at maximum. Under this condition,



the dimmer levels of individual lighting circuits will be those set up in the store as indicated by the position of the servo-fader lever. If now, the overall illumination is reduced by bringing down the master fader, the store situation will not change. Thus, if a memory is now recorded, it will not take account of the modifying influence of the master fader, whose position should be noted if the present state of lighting is to be accurately recalled at some later stage. There is, however, a simple process by which the effect of the master fader can be incorporated in the memorised data. This is explained in the paragraph headed 'Transfer of Master Fader Setting'.

(b) Preset store

From the electronic point of view, the Preset store situation is exactly as described for the Stage store and the master fader setting becomes effective during an automatic fade or crossfade. As previously explained the automatic fade process modifies the Stage store data to match that in the Preset store, and this matching action takes account of the position of the Preset store master fader.

(c) Significance of the Preset store master fader

During all fade or crossfade operations the Preset master fader should be in its maximum position. If this is not the case, the fade will finish at the Preset store circuit levels as modified by the Preset master fader, but the fade duration will be considerably greater than that indicated by the fade duration controls. This is an abnormal condition offering no operational advantage except in the special circumstances described hereunder.

(d) Transfer of master fader setting

If the individual UP FADE and DOWN FADE buttons are operated with the fade duration controls in their top position, the fade process will run indefinitely at its fastest rate. Under these conditions, any data which is added or changed in the Preset store will immediately be matched by a corresponding change in the Stage store taking into account the modifying effect of the Preset master fader. If the position of this fader is then altered in either direction, \*all channel data in the Stage store will follow proportionally and this will, of course, have a corresponding immediate effect on the dimmers and thus the actual lighting.

In consequence, the Preset master fader now controls the actual lighting in a similar fashion to the Stage master fader, except that the changes of lighting are now due to changes of individual circuit levels in the stage store itself. It therefore follows that provided the Stage store master fader remains at maximum, a memory copied from this store will fully represent the actual lighting situation at that time.

*\* This assumes that all the data in the Stage store is the result of the transfer process. It would, of course, be possible for this store to receive data from other sources regarding circuits which are not represented in the Preset store. Such circuits would not be affected by the Preset master fader.*

(e) Colour balancing

This is a special application of the transfer process described in (d) overleaf.

It is assumed that a scene to be lit will involve a certain amount of general lighting plus two or more separate colour groups each involving several lighting circuits of the same colour. The problem is, therefore, to balance the circuits within each group to produce even illumination and then to adjust the mean levels of the separate groups to produce the correct overall hue.

An effective approach is to establish the transfer process at the commencement of the lighting exercise and to set the Preset store master fader at some reduced level, e.g. 7. The Stage store master fader will remain at maximum. Those circuits not requiring colour balancing are then set up in the Stage store in the usual way, but circuits requiring balancing are set up in the Preset store, one group at a time. Because of the transfer process the corresponding light sources will be immediately energised and the individual circuits can be adjusted for optimum visual effect by means of the circuit controller in the usual way. However, because of the modifying effect of the reduced master fader setting, the data set up in the Preset store will represent correspondingly higher circuit levels than are actually in use. The Preset store data is then memorised and the resulting memory will, therefore, represent a group of

circuits which are mutually balanced but at proportionately higher levels than are being used at that time. If the Preset store data is then cancelled, the existing lighting will remain unchanged and further colour groups can be added by repeating the above process for each new group.

This exercise will result in a fully illuminated scene with a first approximation to colour balancing. The memories representing the colour groups may then be 'cut' back into the Preset store one at a time, and their group contribution optimised by raising or lowering the Preset master fader. When the desired overall balance has been achieved this can be recorded by memorising the Stage store data.

#### GROUP MASTER FACILITY

This optional extra facility is particularly suitable for operations of the type described above.

#### MIX STORES Button

In the normal way, the Preset store has no direct control over the dimmers and can only exert its influence in consequence of some transfer process which adjusts the Stage store to correspond to the Preset store.

However, the alternate action MIX STORES button enables the Preset store to assume direct control of the dimmers should this be required. When this button is in its On state, the actual lighting is the combined result of the data in both stores. Nevertheless, the data in either store can still be memorised separately in the usual way.

This facility provides a convenient means of directly observing the effect of the Preset store data either separately or in combination with other data in the Stage store.

For example, use of this button enables a manual crossfade to be performed by complementary operation of the two master faders. It should, however, be appreciated that if a crossfade is carried out in this way, any common circuits at the same level in both stores will 'dip' during the fade. This effect does not occur when the more normal automatic crossfade is employed. Where the same circuit is contributed by both stores, the higher working level takes charge.

## MIMIC DIAGRAM, CONTROL ILLUMINATION

### AND INDICATORS

#### CIRCUIT MIMIC

This may take one of several forms depending on customer preference, and may be either desk or wall mounted. The purpose of the mimic is the same in every case, namely to indicate which individual circuits are active in either the Stage or Preset store.

In the Type LE2031 and LE2032 mimics the power to the Stage indicator lamps is derived from the actual dimmers, and the brightness of the indication varies approximately with that of the stage lamps supplied from each dimmer. Each type of mimic has serially numbered translucent windows for every circuit as explained below.

#### Type LE2011

A single window for each circuit displays constant level red illumination whenever that circuit is On in either the Stage or Preset store as determined by the circuit controller SELECT STAGE/PRESET buttons. Since the window colour is the same in each case, the store to which the display is relevant is identified by a row of white (Stage) or green (Preset) windows at the bottom of the mimic facia panel.

#### Type LE2021

This incorporates a double width window for each circuit and this displays either constant level white or constant level green illumination as determined by the circuit controller SELECT STAGE/PRESET buttons.

#### Type LE2031

This incorporates a double width window for each circuit and each window is divided into two sections and can simultaneously display white and green illumination representing both the Stage and Preset situations at the same time. The white illumination varies with the dimmer output level while the green illumination is of fixed intensity.

Type LE2032

This is functionally similar to the LE2031 version but takes the form of two separate groups of single windows mounted side by side. The left-hand group (white) represents the Stage situation and the right-hand group (green) the Preset situation.

CONTROL ILLUMINATION

1. CIRCUIT CONTROLLER

	<u>Unselected</u>	<u>Selected</u>
SELECT STAGE button	None	Full White
SELECT PRESET button	None	Full Green
CIRCUIT SELECTOR buttons		
Stage mode	Dim White	Full White
Preset mode	Dim Green	Full Green
	<u>Circuit Off</u>	<u>Circuit On</u>
ON/OFF button	None	Full Red
CANCEL and SET buttons } RECORD IN 199 button* }		Dim Blue
CLEAR 199 button		Dim Red
CIRCUIT FADER Scale	This displays red illumination whenever the selected circuit is On. If more than one circuit is selected, the fader will be illuminated if the circuit with the lowest number is On.	

2. MASTER CONTROLLER

	<u>Unselected</u>	<u>Selected</u>
MEMORY SELECTOR buttons	None	Amber
Stage CUT PLUS MINUS CANCEL and RECORD* buttons		White
Preset CUT PLUS MINUS CANCEL and RECORD* buttons		Green

\*The RECORD buttons are only illuminated when the Record Key-switch is On.

	<u>Not in Use</u>	<u>In use</u>
MEMORY SEQ button	None	Amber
MIX STORES button	None	Red
AUTO ADD button	None	Amber

	<u>Not in Use</u>	<u>Fade Running</u>
CROSSFADE button	None	White
PLUS FADE buttons		
FADE OUT buttons		
ALL FADE button		

CLEAR SYSTEM button This button becomes active when the Record Key-switch is turned to its fully clockwise position. It then shows red illumination.

	<u>Stage</u>	<u>Preset</u>
MASTER FADER Scales	White	Green

Each of these controls shows red illumination at the top of the scale when the fader is moved from its maximum setting.

	<u>Seconds Range</u>	<u>Minutes Range</u>
FADE DURATION Control Scales	White	Red

The scale illumination is extinguished when the controls are set to the infinity mark.

### INDICATORS

#### FADE PROGRESS Indicators

Four moving scale indicators show white numbers which change from 0 to 10 as the corresponding fade action proceeds from start to completion.

#### MEMORY-IN-USE Indicators

Four digital type indicators display the number of the *last* memory recalled by operation of memory action buttons in the following groups.

Stage Group Direction Action Buttons

Preset Group Direct Action Buttons

AB Group Fade Action Buttons

CD Group Fade Action Buttons

The Stage and Preset indicators also include red background illumination which appears whenever the data in the Stage or Preset store is not entirely represented by the indicated memory. This situation arises when memories are combined by Plus or Minus actions or in consequence of individual channel adjustment.

The colour of the indicated figures is white in the case of the Stage group and green for all other groups.

The behaviour of these indicators under various operational conditions is shown below.

1. Stage and Preset Memory-in-Use Indicators when using the Corresponding Direct Action Buttons

	RECORD	CUT	PLUS	MINUS	CUT (with AUTO-ADD)	CANCEL
Number Shown	Selected Memory					Blank
Back-ground	Black		Red			Black

2. Stage Memory-in-Use Indicator During Fade Actions

		CROSSFADE	PLUS FADE	FADE OUT	ALL FADE
Prior to Fade	Number Shown	Original Memory			
	Back-ground	Black or Red			
During Fade	Number Shown	Original Memory			Blank
	Back-ground	Red			Black
End of Fade	Number Shown	New memory*	Original Memory		Blank
	Back-ground	Black	Red		Black

*\*If any circuits in the Stage store are individually modified during a crossfade, the original memory number will be retained with red background illumination.*

3. AB and CD Memory-in-Use Indicators During Fade Actions

When the CROSSFADE, PLUS FADE or FADE OUT buttons are operated, the corresponding indicator shows the number of the selected memory. No background illumination is provided.



## DIMMERS AND DIMMER RACKS

### (TYPE LAG)

In the normal operation of the system the operator need only be aware that lighting power is available at the dimmer racks and that the individual dimmers are performing correctly. To this end the following information will be of value.

#### 1. Dimmer Power On Indicators

The availability of power to each individual dimmer is shown by the illumination of the red indicator lamp on the dimmer front panel.

#### 2. Fan Power Supply Indicators

The top panel of the rack carries a neon type indicator which is connected across the supply to the ventilating fan at the bottom of the rack. This indicator must be illuminated whenever the equipment is in operation. Absence of illumination indicates a blown fan circuit fuse.

*On this type of equipment, there is an auxiliary fuse of 15A rating and a fan fuse of 1A rating in series with this. In the case of a fan fault, both fuses should be checked.*

#### 3. Input Air Filter

Except where filtered underfloor forced draught is available, cooling air is admitted at the bottom of the rack. For this reason it is necessary to exclude floor level dust and a large area removable filter is provided for this purpose. The filter element should be periodically inspected, and when necessary, cleaned by washing with water to which some domestic washing-up liquid has been added. Rinse in clean water and ensure that the filter is dry before replacement. Carefully replace the filter and its holder the correct way up to ensure that the filter material is in contact with floor level.

#### 4. Dimmer Power Fuses

These have been especially designed for thyristor dimmer applications, and it is imperative that replacements be of the types listed below:

<u>Rating</u>	<u>Manufacturer</u>	<u>Type</u>
2 x 2.5kW	E.M.P. Electric	2 x LAPT 2
5kW	E.M.P. Electric	MANN/TE0155
10kW	E.M.P. Electric	MARW/TE30135