RANK STRAND TECHNICAL PUBLICATION

OPERATORS HANDBOOK FOR MMS LIGHTING CONTROL SYSTEM

BBC CARDIFF STUDIO C2

BBC TV CENTRE STUDIO TC5

RANK STRAND HANDBOOK

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FOR
MMS LIGHTING CONTROL
SYSTEM
BBC CARDIFF STUDIO C2
BBC TV CENTRE STUDIO TC5

RANK STRAND

RANK STRAND ELECTRIC

PO Box 70 Great West Road Brentford Middlesex TW8 9HR
Telephone 01-568 9222 Telex 24408 Cables Rankaudio Brentford

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9. DRAWINGS

1. THE PROBLEM

For the type of rehearsal and performance timetable now standard in BBC Television Studios, an ideal Production Lighting Console must satisfy all the following operational requirements.

1.1 The control must be easy to learn, and once learned, the consequences of any action or the best way to achieve any result must be obvious.

1.2 The control should help the TM to use his time effectively to equal or, occasionally, to improve the lighting standards of the industry. This means that the system should itself note as many of the routine adjustments arrived at during the course of rehearsal as possible, and should not enforce time wasting routines or rehearsals to achieve everyday cues. It should never be necessary to carry out similar lengthy cue building operations twice. The results of the first attempt should be available for re-use and modification.

1.3 The control should not impose an unwelcome operational discipline. There must be a minimum of rules to be observed. One of the most important tests will be when production problems or technical faults enforce changes to the running order requiring extemporised alterations. The operator must feel confident that he can take these problems in his stride.

1.4 The control should offer as full a range of 'party tricks' as can be fitted into the basic operating philosophy, but it must be easy to ignore them when dealing with normal daily problems. The machine

should clearly show when it is liable to produce unfamiliar results.

1.5 The control should be totally reliable, and when it does fail, the emergency procedures should be equally easy to use.

The various versions of the Thorn Q-File have become the standard for comparison within the BBC for all these points.

2. THE EQUIPMENT

MMS: MODULAR MEMORY SYSTEM

2.1 THE MODULAR IDEA

Early electronic dimmer level memory controls were designed and wired as complete systems, and as a consequence, once the first prototype had been tested and put into production, any changes to suit individual customer requirements were either very expensive or impossible.

MMS is an electronic dimmer level memory system designed on a modular basis so that the customer can choose from a wide variety of control options. This handbook describes the options chosen for BBC studios. Because of the modular nature, the positions of control panels on the desk can be interchanged or alternative types of module, within a given classification, can be substituted for maintenance reasons or as new designs become available. Section 3A describes the system as installed in Cardiff Studio C2. Section 3B describes that in Television Centre, Studio TC5.

MMS gives full dimmer level memory control using up to date integrated circuits. Digital techniques are used throughout. Unlike earlier systems, nearly all the electronic components are contained within the modules in the control desk. Spare modules are provided for immediate substitution if faults occur. A Pin Patch Module and ten emergency faders are provided in case of total failure of the electronic system.

As far as possible, familiar BBC names have been used for all control labels and to describe operational actions. The BBC also asked that the panel layouts should match existing systems and the result of pressing a control button is, as far as possible, the same as elsewhere.

These requirements are especially important at Television Centre where the MMS has to be used next door to Q-File studios. There are still a few differences: these are listed in Section 6.

2.2 MODULE TYPES

Six types of module and a bay-mounted power supply are necessary for a complete BBC type MMS. These are:

A Channel Control Module - This gives direct adjustment to individual dimmers or for presetting. BBC systems use two of these.

A Core Store Module - This contains the long term memory stores, called Files, in a ferrite core store.

A File Selector Module - This is used to select a File by number before memorising or re-using prepared dimmer levels.

A Playback Module - This controls how Files are brought back into use, and contains two output stores used to send control voltages to dimmers.

A Pin Patch Module - This gives emergency control, allocates an effects flasher, and houses, beneath the panel, the connections leading away to the dimmers.

An Auxiliary Fader Module - This contains ten faders used with the Pin Patch Module for emergency control. For TC5, these faders are in a movable box for use on the plot areas of the desk.

Figs. 1 & 3 show the normal layout for TC5.

Figs. 2 & 4 show the normal layout for Cardiff C2.

A Channel Mimic Module is also provided for both Studios mounted in the Moniter Stack. It can show which channels are on in either of the two Playback output stores.

2.3 CONTROL PRINCIPLES

Thyristor dimmers of the type used with MMS require the presence of a control signal whenever light in the studio is required. This control signal is obtained from the lighting console and comes from a part of the Playback Module known as a Store. The MMS contains several stores and each has the property of holding a control signal level for every dimmer. Stores are the electronic equivalent of a set of fader levers that would be necessary on a manual system.

Of course, all the stores are not connected simultaneously to the dimmers. With a Manual Playback Module, as provided for Cardiff, the dimmers are controlled by either the A or the B Store depending on the position of the AB Fader levers. With a Rate Playback Module, as provided for TC5, the Studio Store always controls the dimmers but it can itself be controlled by the Preset Store.

Fig.5 (TC 5) and Fig.6 (Cardiff C2) show how these stores are related to other controls and to the dimmers.

The Files are special stores designed to keep their information secure even when power is switched off. The File stores use ferrite core storage devices and the module containing them is therefore called the Core Store Module. All other stores use semiconductors and lose their memory when power is switched off.

To change a dimmer level, it follows that the output of the controlling store has to be altered. The BBC has chosen the version of MMS that

provides dimmer control from single-channel Channel Control Modules following the tried and proven method first used with Q-File. See Figs. 3, 4 and 11.

To alter a channel level by hand, its number has first to be punched up on an adding machine type keyboard, and when the wanted number shows in the CHANNEL window above, the meter will show the present channel level; and the level controlling wheel, the On/Off switch and other controls will provide immediate response.

To control a dimmer, the Channel Control Module must be connected to the store connected to the dimmers. In TC5, using the Rate Playback, this is always the Studio Store. If the Manual Playback is fitted as at Cardiff, either the A Store or the B Store could be faded up but the recommended routine is to keep the AB Faders at the A end, so the A Store must be selected. Levels can still be stored for every channel in the Preset, or the B Store, but will not influence the dimmers. This facility is used for 'Blind' preparation of Files and fade cues.

Files, the long term memory of the system, are made up by copying either the Studio or the Preset Store in TC 5, or the A or the B Stores in Cardiff, into the Core Store. They are recalled as required using the CUT, PLUS or MINUS buttons. The FILE button for the store to be copied is used to make up the chosen File number and only these two File buttons can change the contents of a File. The CUT, PLUS and MINUS alter the playback stores, but only copy the Filed information.

The actions of CUT, PLUS, MINUS and ZERO, and the Fade

functions on the Rate Playback Module, follow the rules already familiar for BBC London Q-File systems, and are explained in detail in Section 4 and on the detailed module drawing (Fig. 15). The manual Playback Module offers somewhat reduced facilities but is correspondingly less expensive (see Fig. 14).

On the Rate Playback Module, fades are set up by loading the new lighting into the Preset Store and operating one of the UP, DOWN or CROSSFADE buttons (arrow symbols are used on the panel) to start the change. The fade is achieved by slowly altering the channel levels in the Studio Store until they match the levels loaded into the Preset Store. The Preset Store does not itself change or take control of the dimmers. The time taken to adjust each channel is controlled by the setting on the Fade Time levers and is independent of the amount of change necessary. The necessary rate of change is automatically calculated digitally at the start of every fade, and whenever conditions change.

The Manual Playback Module is somewhat simpler, and at first sight resembles a pair of opposed master faders. But that arrangement would be unsatisfactory in that any dimmer required to maintain a constant level during the fade could fall by about 50% as the levers passed through the mid point. The MMS avoids this problem by making one fader always control lights that have to get brighter, and the other only controls lights fading to lower levels. Channels at the same level in the A and the B Stores are therefore not affected at all. A Grand Master Fader and Dead Blackout Switch are fitted to satisfy theatre customers.

Single fade cues on the Manual Playback Module will interchange the functions of the A and the B Stores. If the operator has got used to thinking of the A Store as controlling the dimmers and the B Store

as being the safe presetting store, a single fade exchanging these functions could introduce a risk of operational errors. The COPY B button has therefore been provided so that the AB Fader levers can be safely returned to the A end as soon as the cue is complete. The A Store can thus be regarded as the normal working or Studio Store and the B Store as the Preset if a routine to always return the faders to the A end is studiously observed.

The Rate Playback Module has a Modification (MOD) Store to permit late modifications to dimmer levels to be used in preference to earlier approximations. This is equivalent to the "Take 99" facility on Q-File.

2.4 NEW FACILITIES

MMS Channel Control Modules have two new controls.

HOLD gives the Module more or less exclusive control over the selected channel.

With the Rate Playback Module, HOLD will give priority over all the MMS functions but will not prevent response to controls beyond the main output of the MMS, e.g. the Effects Flasher, the Auxiliary Faders and the Studio Test Panel.

With the Manual Playback Module, the AB Faders, the Grand Master Fader, and the Blackout Switch are also not subject to the HOLD action.

RETurn is a push button and indicator which lights to show whenever the selected channel level has been altered from the level existing at the moment when it was last selected on that Channel Control Module. If the push is operated, the channel is reset to that original level.

On the Rate Playback Module, a GROUP facility is provided which allows channels selected On in the Preset Store to be dimmed or brightened proportionally from their initial levels in the Output Store.

All these controls are described in more detail on the detail Module Drawings (Figs. 11 - 17) and their operational use is explained in Section 4.

2.5 MIMICS

A simple lamp mimic module is provided to show which channels are active in the important stores. This module was designed to fit in the desk top alongside the other modules, but the BBC chose to position it with the Monitor Stack.

Push buttons on the Auxiliary Control Panel select display of the Output Store, the Preset Store or the Mod Store in TC 5. In Cardiff these buttons select the A Store, the B Store or the combined output of both of these stores to the Studio, duly modified by the Master faders & D.B.O.

3. THE INSTALLATION

3A. CARDIFF STUDIO C2

The seven operational MMS modules are laid out in the control desk as shown in Figs. 2 & 4. Their controls are described in detail on the detailed Module Drawings (Figs. 11-15 and 17). Details of the Auxiliary Control Panel are shown in Fig. 8.

200 memory Files are provided controlling 80 dimmer channels.

A Mimic Module (Fig.16) is mounted above the Monitor Stack together with meters and legends confirming the presence of mains power to the dimmers and warning of earth fault.

A Fader Panel controlling the Studio Annexe lighting through an independent dimmer rack is also constructed in the MMS Modular form and occupies the eighth space on the control desk.

Many of the modules contain internal switches to alter the behaviour of some of the controls. The responses described in this handbook are the recommended mode of operation.

A spare Manual Playback Module is available. Inside the desk are essential 'bus-terminator' units and interconnecting wiring (Fig.9). Each Control Module contains its own electronics and may be fitted in any desk position. Power supplies are bay mounted in the adjacent Apparatus area.

The dimmers are controlled via the Studio Test Panel and are in another part of the Apparatus area. There is no power patch panel: the dimmers connect direct to the studio circuits.

3B. TELEVISION CENTRE, STUDIO TC5

3B.1. MMS

The six operational MMS modules are laid out in the control desk as shown in Figs. 1 and 3. Their controls are described in detail on the detailed Module drawings (Figs. 11-15 and Fig.17). At the top of the desk are Auxiliary Controls (Fig.7) and monitor selection and communications control panels.

The Auxiliary Faders are in a free-standing box for use on the plot space.

150 memory Files are provided controlling 104 dimmer channels. The dimmers are connected to the studio circuits through a power patch panel in the dimmer room.

An MMS Mimic Module (Fig.16) is mounted on pull-out runners in the Monitor Stack. Above the Monitor Stack is a Geographic Studio Mimic connected to show the output of the Power Patch Panel as in other studios at Television Centre. Meters and indicator legends are mounted alongside the Studio Mimic to confirm the presence of power at the dimmer racks and the MMS power bay and to warn of earth faults, ventilation failure or operation of the 'dead patch' switch.

A spare Manual Playback Module and a Core Store block are held by Studio Maintenance. Inside the desk are essential 'bus-terminator' units and interconnecting wiring (Fig.9). Each Control Module contains its own electronics and may be fitted in any desk position. Power supplies are bay mounted in the adjacent Vision Apparatus Room.

Many of the modules contain internal switches to alter the response of some of the controls. The behaviour described in this handbook is the recommended mode of operation.

3B.2. Dimmers

The dimmers are controlled via the Studio Test Panel and are installed in a dimmer room at the side of the Studio.

3B.2.1. Special Dimmer Trays

Two special dimmer trays are provided, and these can replace the normal 5 KW dimmers as required. The trays are :

a. A "Straight Through" dimmer tray which allows a selected socket outlet in the studio to be supplied at full mains voltage. This circuit can only be disconnected from the supply by removing the dimmer tray.

b. A "Switched only" dimmer tray which contains a solid state circuit controlling a contactor. The contactor is operated when the drive from the MMS to the tray exceeds a (Meter indicated) level above $4\frac{1}{2}$. The contactor is opened whenever the drive drops below a level of $3\frac{1}{2}$. The contactor delivers power to whichever lighting socket is connected to the tray.

3B.2.2. Headlamp Dimmers

These are provided on the same scale as TC 7, (4 circuits). A separate 4 way fader box is supplied. Indicators on the Geographic Mimic in the Lighting Control Room illuminate in sympathy with the Headlamp Dimmer Outputs, assuming control has been provided by Studio Engineering Staff to the Lighting Desk.

3B.2.3. 10 KW Dimmer Circuits (Dimmers 101 to 104)

Four 10 KW Dimmers are provided. Each dimmer can be switched to one of 3 systems :

a. A 10 KW Socket outlet in the grid (101 H to 104 H).

b. A 10 KW Socket outlet at gantry level (101 G to 104 G).

c. Two 5 KW Socket outlets at floor level, both in parallel. One outlet is situated in the middle of wall 2 and the other in the middle of wall 4.

These are 101 A and B
102 A and B
103 A and B
104 A and B

Each outlet is separately mimicked on the Geographic Mimic in the Lighting Control Room. It is to be noted that the A and B outlets will respond in unison.

3B.3. The Patch Panel

This is laid out, for the first time, to suit the "Standard" lighting plot. The standard plot assumes that, in general, two luminaires will be required on each lighting hoist and these will be plugged to the A and B outlets on each hoist.

Normally, the dimmer number which feeds the A outlet will be identical with the hoist number, and the dimmer number which feeds the B outlet will correspond to the hoist number plus 50.

e.g. hoist 23: A outlet 23
B outlet 73

If this system is adhered to, patching is made almost automatic and patching faults are easy to locate.

The C outlets on each hoist, or floor or gantry outlets, can be

patched to dimmers which are "spare" on the standard plot. These are :

43 - 50 plus 10K dimmers (see 3B.2.3.)

93 - 100

Hoist 4 is only fitted with A and B outlets due to its reduced length and therefore luminaire handling capacity.

4. OPERATING INSTRUCTIONS

4A. MANUAL PLAYBACK SYSTEM AS CARDIFF STUDIO C2

4A.1. Safety Precautions

Before switching on the system, ensure that work is not being carried out on the equipment, dimmers or luminaires. Also ensure that no luminaire represents a fire hazard (e.g. is dangerously close to a cyclorama or other scenery) or is so positioned as to cause injury or inconvenience to personnel.

4A.2. Switching On the System

Check that power is available at the M.M.S. Power Supply Bay in the Apparatus Area.

Check that power is available to the dimmers. This is confirmed by the green LIGHTING POWER ON legend above the monitor stack. If not, operate the STUDIO LIGHTING Power push button switch on the Auxiliary Control Panel.

Check that the switches on the Studio Test Panel are set to route control to the M.M.S. Desk.

Turn On the MAIN LIGHTING Console key switch on the Auxiliary Control Panel (Fig.8). Several of the MMS indicators and pushes will light. (These will be a standard starting condition and may not be the same as when the system was switched off.) Check that the white A push and green B push on the Manual Playback Module and the white A buttons on both the Channel Control Modules are lit. The yellow Overflow Indicator (!) will light briefly.

Turn on the AUX key-switch on the Auxiliary Control Panel if the Auxiliary Faders or the Effects Flasher are to be used.

Transfer the key to the Core Store Module key-switch and turn On if the Files are to be altered.

Note: Turning off the system, or loss of power for any other reason, destroys the control information in the A and B stores and also in the hidden stores. Any information to be retained must therefore be transferred to the Core Store - the Files - before switching off.

4A.3. Preliminary Checks - Normal Starting Conditions

Check that: The Auxiliary Faders are all at zero.

The Effects Flasher is Off.

The pins in the Pin Patch Module are in the parking holes and not in the connecting holes.

SEQuence is Off.

The Master Fader is at 10.

The D.B.O. Switch is central.

The AB Faders are at the A end.

All indicator windows are blank or read O.

The EARTH FAULT orange legend above the Monitor Stack is not lit.

Select the Mimic to show the STUDIO condition using the yellow button on the Auxiliary Control Panel.

Note: There are no facilities on the Cardiff MMS to clear all Files. This should never be necessary since Filing new memories always erases the previous contents of the File and because Cardiff expects to keep some files for use over long

periods, a Clear All Files control would be impossible to use.

4A.4. Preparation and Rehearsal

The Luminaires to be used for each studio area will usually be known at the start of rehearsal and they can be grouped together as Files as soon as the studio is available.

4A.4.1 To make up Files at the start of rehearsal

a. Decide which Channel Control Module to use and check that the A Store button is lit.

b. Select the first Channel Number required using the keyboard until the number appears in the CHANNEL window. Move the Wheel until the required dimmer level is shown on the Meter. Check that this channel now indicates on the Mimic.

c. If the dimmer level shown on the meter is suitable for the starting level for subsequent channels, operate the SET ALL button.

d. CLEAR and select the next channel number required. Provided SET ALL was used in step (c), this channel can be turned On to the starting level simply by pressing the ON button. The meter will show this level, the ON button will light, and the Mimic indicator will come on. Channels turned on by mistake can be turned off again by again pressing the ON button.

e. Repeat (d) until all channels to be used in the first File are on.

f. Preselect a File number on the File Selector Module. Operate the white A Store FILE button on the Manual Playback Module. Check that the button lights briefly when pressed. Check that the A display window and the window on the Core Store Module now show the preselected File number.

g. Turn Off all channels using the white OFF button on the Playback Module (unless the next File is to be only a slight variation of the present lighting).

h. Repeat (d), (e), (f), (g), using new File numbers each time until all the initial Files have been assembled.

Note: The method described above will light the luminaires in the studio. If this is inconvenient use the green B Store controls instead of the A Store in the above instructions, leaving the AB Faders at the A end. The Mimic Module will have to be switched to Monitor the B Store. Take care to use the green B Store FILE Button. Making up Files can now continue even though the A Store may be needed to hold lights in the Studio for fine setting or balancing.

4A.4.2. To use Prepared Files at the start of Camera Rehearsal

As rehearsals get under way, the TM or Director may request lights for new studio areas. These will probably correspond with the Files already prepared. Bring these into use by pre-selecting the required File number on the File Selector Module and operating the white CUT button. This removes earlier lighting and replaces it by the chosen new lighting. If the new lights are required in addition to the existing lighting use the PLUS button. The MINUS button can be used to turn the added lights off again or the earlier lights can be removed later on by using CUT.

4A.4.3. To Balance prepared Files during Rehearsal

Dimmer levels can be adjusted at any time using a Channel Control Module.

a. Select a Channel Control Module to control the A Store (assuming that the AB Faders are still at the A end).

b. Select the channel number to be adjusted. It should appear in the CHANNEL window and the meter will show the present dimmer level. The ON button will be alight.

c. If there is any doubt that the effect on the screen is due to the channel number selected, operate the ON button twice to turn the channel Off and then On again to the same level. This should make things clear.

d. Move the wheel to vary the light level - away to make the light brighter, toward you to dim it.

e. If a comparison with the original setting is wanted, press the RETurn button.

f. New channels can be introduced by selecting the required number, turning ON and balancing. If a channel is to be discarded, move the wheel until the meter reads zero or simply press the ON button once.

g. Whenever a better balance has been achieved, re-File. Pre-select either the original File number or allocate a new number if the old balance might prove to be of further use. Operate the white A Store FILE button. Check that the FILE button lights momentarily and that the correct File number appears in the A Store and Last Recorded File windows.

4A.4.4. To use Prepared Files as 'building bricks' to create later Files

If the initial files are chosen intelligently, a lot of subsequent labour can be saved by combining them using the PLUS and MINUS controls.

e.g. If the lighting for two parts of a composite set are made

into Files P & Q, these will probably have to be assembled lamp by lamp. But when the two parts are to be seen together, there is no need to create a new memory by again switching every lamp individually. The PLUS facility should be used :

Pre-select File P

CUT File P (Either the A or B Store can be used)

Pre-select File Q.

PLUS File Q.

The result is the total lighting for the composite set. The result can be Filed by selecting a file number - R - and operating the FILE Button for the Store being used.

Slightly less obviously, if File P and File R exist from the above example, File Q can be obtained :

Pre-select File R

CUT File R

Pre-select File P

MINUS File P

The result is the lighting for area Q.

i.e. if P + Q = R then R - P = Q

But BEWARE: When there are common lamps at different levels in the two Files, P PLUS Q will not give the same result as Q PLUS P. These are the unavoidable consequences of manipulating items of different magnitude. The Rule is that the latest instruction always takes precedence. Only lamps common to both Files will be affected and, in practice, the problem seems to cause little difficulty. (See Section 7).

4A.5. Cues

The earlier part of Section 4 has been concerned with preparing and perfecting "steady state" lighting conditions. In this section, changes between previously prepared balances performed at agreed times in the running order are considered under the general title of Cues. Some cues will be necessary to provide an effect called for by the script, but others may be introduced to save power or to provide different lighting balances for different camera positions.

4A.5.1. Single Channel Changes

If a single lamp has to be adjusted or switched off on cue, this can easily be done using a Channel Control Module.

a. Before the cue is due, select one of the Channel Control Modules to control the Store controlling the dimmers - this will usually be the A Store if the recommended operational routine is observed.

b. Use the keyboard to select the channel to be adjusted. Its number must appear in the CHANNEL window. The meter will show the present dimmer level.

c. On Cue, move the wheel until the meter gives the required new dimmer level, or you see the required effect on the screen. If the lamp has to be switched off, simply press the ON button once.

If the lamp has to be switched On on cue to a critical pre-arranged level, moving the wheel quickly to give the noted meter reading may be satisfactory. If not, a special memory containing only the new lamp at the required level can be used and brought into use with the PLUS control. The Channel Control Module ON button cannot be used with confidence,

unless it can be checked first, because the level appearing when the ON button is pressed might have changed between rehearsal and performance as a consequence of one of the actions listed on Fig. 11 - Last Store table.

To prepare and check the level that will appear when the channel is turned On:

a. Shortly before the cue is due, select the Channel Control Module to control the non-active store, i.e. usually the B Store.

b. Select the Channel to be adjusted.

c. Use the Wheel to set the level required for the 'turn on' cue.
A note of the meter reading must have been made at rehearsal.

d. Turn the channel Off using the ON button. Turn On again to check that the required level re-appears.

e. Change the Channel Control Module to control the Active Store, i.e. the A Store.

The level now waiting to appear when the ON button is next used has now been correctly set, and the Cue can be performed with confidence by pressing the ON button.

4A.5.2. Multi-Channel Changes - Instant Changes

The majority of television lighting cues will be changes between lighting balances already stored in the Files. If these changes are to take instant effect use the CUT, PLUS or MINUS buttons on the active store - usually the A Store.

a. Before the cue is due, preselect the File next required on the File Selector Module.

b. On Cue, operate the white A Store CUT, PLUS or MINUS button to effect the type of change required.

CUT will give a total change to the new lighting. PLUS will add the new lighting without turning off any of the old. New levels will replace earlier levels. MINUS will turn off the lights that are on in the new File.

c. Repeat from (a) for the next cue if necessary.

If there is any need to check or to make minor changes to a File before bringing it into use, use the passive store first - usually the B Store.

a. Before the cue is due, preselect the File next required on the File Selector Module.

b. Operate the green B Store CUT button.

c. Select the Mimic to monitor the B Store to check which channels are on (non zero).

d. Select a Channel Control Module to control the B Store and select and modify any required channel using the meter and Mimic to monitor the result.

e. If a Cut change is required :

On Cue, operate COPY B.

If a Plus or Minus change is required, re-file into a convenient File number (File OOO is very convenient) using the green B Store FILE button. Leave this file selected.

On Cue, operate the white A Store PLUS or MINUS button.

4A.5.3. To Prevent a Single Channel Obeying Cut, Plus or Minus actions

The Playback Module CUT, PLUS and MINUS normally have overriding control of all channels. But if the HOLD button on a Channel Control Module is put On, then the channel selected on that module will not be influenced, in the Store controlled by that module, by CUT, PLUS or MINUS or by the other Channel Controller. HOLD is automatically turned off if the channel number is changed or if the other store is selected. HOLD does not protect against AB or Master fader changes, or controls beyond the main output of the MMS, e.g. the Effects Flasher, the Auxiliary Faders and the Studio Test Panel.

4A.5.4. Multi-Channel Changes - Slow Changes

The AB Faders on the Manual Playback Module are used for slow changes and operate by progressively transferring control of the dimmers from the A Store to the B Store, or vice versa. Hence, when the A Store is controlling the dimmers, the next lighting must be set up in the B Store. Once rehearsals have progressed far enough, this next lighting should be waiting in the Files and can be Cut into the B Store as though for an instant change. On Cue, the faders are moved from the A end to the B end and the lighting changes in the studio. The rates of fade-down and fade-up can be controlled separately by moving the black and white levers at different speeds.

Both faders must always be moved completely to the same end before a new change can be set up, or there will be a risk of the lighting 'jumping'.

4A.5.4.1. To Carry out a Cross-Fade

A Cross-Fade is a total change to new lighting - the slow version of a Cut.

a. Before the cue is due, preselect the File next required on the File Selector Module.

b. CUT the preselected File into the B Store using the green CUT button.

c. On Cue, move the black and white AB Faders from the A end to the B end.

At this point the green B Store is now in control of the dimmers and any Channel Control Module selected to the B Store will now have direct control of the dimmers. A Channel Control Module selected to the A Store that would have had control of the dimmers at the start of the fade will now have lost it. This reversal of the normal state of affairs is the reason for recommending keeping the AB levers at the A end whenever possible and for the following routine:

d. Operate COPY B. This makes the A Store exactly the same as the B Store.

e. Move the AB levers back to the A end. There will be no further lighting change.

f. Repeat from (a) if the next change is also to be a Cross-fade.

Note: If the cue following step (c) is to be a fade back to the lighting just relinquished, but still held in the A Store, then it will probably be convenient to accept the reversal of the A and B Store functions until the AB levers can be moved back to the A end to achieve this cue.

4A.5.4.2. To Fade In Additional Lights

Assuming, as always, that the AB faders are at the A end, the B Store must first be made the same as the A Store. This can some-

times be done by doing the same series of CUT, PLUS and MINUS actions into the B Store that still affect the A Store - often just the last CUT. If COPY B has just been used, A and B are automatically the same. On other occasions, make up a File from the A Store (File 000 obtained by pressing CLEAR can conveniently be kept for this type of transitional use) and CUT it into the B Store.

a. Add the extra lights into the B Store. Use PLUS to add lighting from a File; or a Channel Control Module can be used to make unrehearsed additions.

b. On Cue, move the AB Faders to the B end. Operate COPY B and return the AB Faders to the A End.

4A.5.4.3 To Fade Out Selected Lighting

Make sure that the B Store is the same as the A Store as described in 4A.5.4.2.

a. Use MINUS or a Channel Control Module to remove the unwanted lights from the B Store.

b. On Cue, move the AB Faders to the B End. Operate COPY B and return the AB Faders to the A End.

4A.5.4.4. To Change Selected Lights to New Levels

Make sure that the B Store is the same as the A Store as described in 4A.5.4.2.

a. Use PLUS (for new levels or for additional channels) or a Channel Control Module to set the required new levels in the B Store.

b. On Cue, move the AB Faders to the B End. Operate COPY B and return the AB Faders to the A End.

4A.5.4.5. General Fade Technique

It should now be obvious that 4A.5.4.1. - .4 are all examples of the same technique: that of using the normal instant action controls to change the B Store to the next lighting state and then to Cross-fade to it, followed by the routine to get the AB levers back to the A end. Other, somewhat similar, effects can sometimes be obtained by moving only one of the AB levers, but this can 'lock-up' the system so that further cues cannot follow with proper effect.

Fader splitting is a proper technique when used during a cue, but a cue should always end with both faders together against an endstop, preferably, after using COPY B, at the A end.

Effects requiring new lighting changes to start moving while existing lighting changes continue can only be done by dividing the sequence into steps each involving a complete movement of the AB Faders over their full travel.

Note: The effect of the AB Faders and of the Grand Master Fader is not recorded in the Files. The Files always record the state of the Store and it is the output of the Stores that are taken through these faders before connecting to the dimmers. It is thus not possible to File a proportional reduction to prepared lighting.

4A.5.5 Alterations During a Fade

Last minute corrections to a channel level may be made from a Channel Control Module without difficulty as described in 4A.5.1. except when the AB Faders are being moved between Stores. If correction or overriding control is necessary during a fade either, or both, of the A and B Stores may have to be altered.

4A.5.5.1. To Prevent a Channel Appearing after a Crossfade Has Begun (A to B)

a. Select a Channel Control Module to control the B Store.

b. Select the unwanted channel number.

c. Move the Wheel to bring the meter to zero.

4A.5.5.2. To Introduce a Forgotten Channel After a Crossfade Has Begun (A to B)

a. Select a Channel Control Module to control the B Store.

b. Select the forgotten channel number.

c. Move the Wheel to bring the meter to the required ultimate dimmer level. If the adjustment has to be done visually, remember that the white AB Fader will not pass the full B Store level until it reaches the B end stop. Any adjustment set by eye before the AB levers complete the change may have to be brought down again to maintain the required balance.

.5.1 and .5.2. both obviously use the same technique to alter the end point of the fade. Similarly by controlling the A Store, the starting point of the fade can be altered to hurry up or to hold back the change. However, the A Store influence falls to zero as the faders reach the B end, and it is never possible to take true overriding control. HOLD does not encompass the AB faders and is of no help here.

4A.5.5.3 To Switch On or Off Groups of Lights from a File during a Crossfade

Since the switched lighting must not fade up or down it must be made the same in both Stores.

a. Preselect the File to be switched On or Off.

b. On Cue, operate the PLUS (for switch-on) or MINUS (for switch-off) buttons on both A and B Stores simultaneously.

4A.6 Special Tricks

The first five parts of Section 4A have dealt with all the steps needed for a normal television production. This Section covers the minor facilities on the Cardiff MMS installation that may occasionally prove of value.

4A.6.1 Sequence

If cues can be organised to permit using the Files in exact increasing numerical order, then the preselected File number can be made to step on automatically ready for the next cue at the completion of the previous cue.

a. At some convenient time before the first cue in the sequence, set the File Selected on the File Selector Module to show the first number in the sequence and then turn On the red SEQuence button on the File Selector Module.

b. At the first Cue, operate the white A Store CUT button and the new lighting will immediately appear. The number shown in the File Selected window on the File Selector Module will simultaneously increase by one ready for the next cue.

All of the CUT, PLUS and MINUS buttons on both the A and B Stores will cause the preselected File number to increase, so the various types of cue described in 4A.5.2 can all be included in the sequence. (But this can sometimes be a trap because the same File number cannot be used twice).

c. Take care to turn off SEQuence when its use is finished.

4A.6.2 Fade Sequence

The AB Faders can also be made to step-on the preselected File and to CUT the next File in the sequence into either the A Store or the B Store ready for the next Crossfade.

a. At some convenient time before the first cue, turn On SEQuence. Then turn On FADE SEQuence on the Manual Playback Module.

b. Preselect the next File to be used on the File Selector Module and CUT into the B Store, (assuming that the AB Faders are at the A end).

The A Store window will now show the File number for the present lighting. The B Store window will show the next File number and the File Selected window will show the File to follow.

c. On Cue, move the AB Faders to the B end.

When both faders reach the B end, the A Store will automatically CUT to the next File and the File Selected window will increase by one.

d. On the following Cue, move the AB Faders back to the A end.

Repeat as necessary. CUT, PLUS or MINUS changes may be included in the sequence but, in general, the sequence will then get out of step.

e. Turn Off SEQuence when its use is finished. This also turns off FADE SEQuence.

This routine has the disadvantage of alternating the A and B Stores to control the dimmers with the attendant risk of confusion when using a Channel Control Module. The following Fade Sequence With Copy routine should be safer.

4A.6.3 Fade Sequence with copy

a. At some convenient time before the first cue, turn on SEQuence.

b. Preselect the next File to be used on the File Selector Module and CUT into the B Store.

c. On Cue, move the AB Faders to the B End, turn On FADE SEQuence and then operate COPY B.

d. Move the AB Faders back to the A end.

When the AB Faders reach the A end, the next File in the sequence will be cut into the B Store ready for the next fade and the File Selected window will step on one.

e. The next Cue is obtained by moving the AB Faders to the B end to effect the change and then returning to the A end to be ready for the next change. COPY does not have to be used again.

If instant CUT, PLUS or MINUS actions have to be included in the sequence use the B Store while the AB Faders are at the B end so that the sequence is not broken, but operate COPY B before moving the Faders back to A.

To fade composite effects, use the B Store CUT, PLUS or MINUS buttons after the AB Faders have returned to the A end.

f. Turn off SEQuence when its use is finished. The Copy routine will also be broken.

4A.6.4 To Reorganise Files into a new Numerical Sequence

This operation is best done in the B Store to leave the A Store free to control the studio lighting.

a. Unless the reorganisation is very simple, draw up a table showing the present and desired File number for each lighting cue. If a block of unused Files exists, use these for the new numbers in preference to trying to rearrange within existing numbers. This avoids erasing the prototype Files so that any mistake can still be remedied.

b. CUT the first File for the new sequence into the B store using its original number. Preselect the number to be allocated in the new sequence and operate the B Store FILE button.

c. Repeat for the second, and all subsequent, Files.

If a new cue has to be inserted into an existing sequence, all the later numbers have to be moved up. This may best be done using the technique described above but starting with the highest number in the existing sequence and moving it up one place. The + 1 and - 1 buttons on the keyboard will be helpful. The operation must proceed with care, as the old Files are over-written and lost after they have been moved up.

When the desired gap has been reached, the new cue is brought from its existing storage File and FILED with a new number.

4A.6.5 Reverse and Shuttle Sequences

For short sequences, the + 1 and - 1 buttons on the File Selector Module keyboard may be used to step the Selected File. When held down, either button will respond to any CUT, PLUS or MINUS button and step-on the File Selector Module.

Quick changes in either direction can be made using one hand to hold down one of the + 1 or - 1 buttons and using the other hand to operate white CUT, PLUS or MINUS. Changing from + 1 to - 1 and back during the sequence will cause the numbers to shuttle up and down.

4A.6.6 Switching a sequence of Channels

In early rehearsal, the + 1 and - 1 buttons on the Channel Control Module can be used to reduce the labour of turning On or Off a sequence of channels. The 'Last Store' must contain a level for any channel to be switched on. If it does not, use SET ALL.

a. Select the first channel of the sequence using the channel controller keyboard.

b. Use the ON button to turn the channel on and hold the button down.

c. Operate +1 repeatedly to step through and turn on the sequence of channels.

Channels can be turned off in the same way and the -1 button can be used to run backwards.

4A.6.7 File OOO

Because MMS suppresses leading zeros in the File Display windows, it might appear that this File does not exist. It is present and is immediately available on operating CLEAR on the File Selector Module. It is recommended that this File is reserved for transitional operations of the sort described in 4A.5.4.2. where ease of access is important and there is no need to keep the result for future use.

4A.6.8 Split Working

If lighting is required simultaneously in different parts of the

studio for different purposes, it will be convenient if the two components remain separately controllable, especially when re-filing.

This can be done by moving only the white UP fader from its normal A end to the B end.

Both the A and B Stores now control the dimmers but the CUT, PLUS, MINUS and FILE actions remain independent. The Channel Control Modules can be allocated one to each Store to give total duplication.

Of course, cross-fades are temporarily impossible.

Any channel appearing in both the A Store and the B Store will take the higher dimmer setting.

4A.6.9 Flasher Effects

An effects flasher unit is incorporated in the Cardiff MMS installation. It operates on dimmer channels selected on the Pin Patch Module. It can operate to force channels On using the yellow patch pins, or to force channels Off using the red patch pins.

4A.6.9.1 To Flash a Channel Independently of the Main MMS System

a. Ensure that the AUX Lighting Console keyswitch is On.

b. Turn On the Flasher using the push button on the Auxiliary Control Panel.

c. Insert a yellow control pin at the intersection of the L row with the channel number to be flashed. The channel will now begin to flash between full-on and any level set by the MMS Playback Stores. Hence flashing channels will normally be kept turned off in the A store.

d. Adjust the Flash PERIOD and MARK-SPACE ratio using the controls on the Auxiliary Control Panel.

e. Insert other yellow pins into row L to control other channels required to flash in sympathy.

f. When the effect is no longer required, turn off the white On/Off Flasher Push on the Auxiliary Control Panel. The flashing channels will now come under the control of the Auxiliary Fader L which may be used to hold the channels On or at any other steady level required.

Note: Red and Yellow control pins must not be used simultaneously with the same control channel or interaction may result.

4A.6.9.2 To Flash a Channel Controlled by the MMS System

a. Ensure that the AUX Lighting Console keyswitch is On.

b. Turn On the Flasher.

c. Turn On the channel to be flashed using the MMS Channel Control Module and the A Store in the usual way.

d. Insert a Red control pin at the intersection of the L row with the channel number to be flashed.

The channel will now begin to flash to out.

e. Adjust the Flash PERIOD and MARK-SPACE ratio.

f. Insert other Red pins into row L to control other channels required to flash in sympathy.

Since the Flasher is now being used to turn the flashing channels off, their presence and level can come from the MMS A or B Stores in the usual way. When flashing is no longer required, turning the flasher Off at the Auxiliary Control Panel replaces the flasher with the L Auxiliary Fader. If this is at zero it will act to prevent the MMS turning on the flashing channels.

If the channels are required without flashing, the L fader must be set at full.

Note: || Red and Yellow control pins must not be used simultaneously with the same control channel or interaction may result. ||

4A.6.10. Manual Override

The Auxiliary Faders may be used to hold up or to hold down the level of any channel or group of channels.

4A.6.10.1. To prevent Channels Falling Below a Chosen Level

Use the yellow pins in the Pin Patch Module and connect the chosen channel(s) to one of the Auxiliary Faders. Set the Auxiliary Fader to give the required minimum level.

The MMS A and B Stores can now only increase the dimmer level since the higher signal takes precedence.

4A.6.10.2. To prevent Channels Rising Above a Chosen Level

Use the Red pins on the Pin Patch module in place of the yellow pins specified in 4A.6.10.1.

The MMS A and B Stores can now only control the dimmer up to the Auxiliary Fader level since the lower signal takes precedence.

Note: || Red and Yellow pins must not be used simultaneously with the same channel or interaction may result. ||

4A.6.10.3. To use the Auxiliary Faders as Direct Manual Controls for Selected Channels

Use the Yellow pins in the Pin Patch Module and connect as required. Ensure that these channels are never brought on in the MMS Stores. The chosen channels will obey the Auxiliary Faders as normal manual controls.

Any channel patched to more than one fader will obey the highest setting.

4A.6.11. Internal Switches

Internal switches are fitted for the convenience of the System Manufacturer which can alter some of the responses described in Section 4. The Maintenance Handbook will give details.

4A.7 Emergency Procedure

If a serious fault occurs on the main MMS that cannot be repaired immediately, there are three main alternative methods of control:

Operation from the Studio Test Panel.
Operation from the Auxiliary Faders through the Pin Patch Module.
Substitution of spare modules giving reduced facilities.

4A.7.1 Operation From The Studio Test Panel

If power is available to the dimmers, the Studio Test panel should be able to bring lamps on using the 'Studio' switch position. This On level is set for all dimmers at about 200 volts - about 3000K. Clearly, only the simplest power shedding cues will be possible.

4A.7.2 Operation From the Auxiliary Fader Panel

The power supply for these faders and associated pin patch panel are separated from the main MMS controls and can be kept on even if the main system has to be shut down.

The ten Auxiliary Faders can be patched up using Yellow pins to give ten groups of lights on the ten faders, and the faders brought up singly or several at a time to the level giving the best compromise balance.

Alternatively, the faders can be set at different levels and channels patched to whichever gives the best balance.

Any channel fed from more than one Yellow pin will obey the level from the highest fader setting.

4A.7.3 Substitution and Reduced Facilities

In the event of significant failure to just one module, the following options might be acceptable.

4A.7.3.1. Failure of a Channel Control Module

This should not cause any problem since the second module can carry out all the necessary functions. A failed module can be unplugged and removed.

4A.7.3.2. Failure of the Playback Module

This module is critical in the MMS system and total failure can only be remedied by substitution. A spare module is provided.

If the fault affects only the A or the B Store the AB Faders can be set at the end connecting the working store to the dimmers and only fade cues and blind plotting facilities will be lost.

4A.7.3.3. Failure of the Core Store or File Selector Modules

Total failure of either of these modules will prevent further use of any Files. The A Store and B Store in the Playback Module can still hold lighting but will have to be set up again, channel by channel, whenever power is switched off.

The spare Playback Module can only be used if it is inserted in place of the faulty Core Store or File Selector Module. The system will then have four output stores more or less equivalent to four presets. The AB Faders and DBO switches will have to be used to determine which of these stores controls the dimmers.

When two Playback Modules are in use, only one of their A and one of their B Buttons can be alight at a time. These buttons must be used to direct the Channel Control Modules to adjust the A or B store required.

4A.7.3.4. Failure of the Pin Patch Module

This contains the output connections to the dimmers and must always be present. However, the electronics have been sub divided to minimise the risk of total failure.

4A.7.4 Spares from other Systems

All MMS modules of the same category are designed to be interchangeable for their main functions, although minor facilities are not always wired. Spares from other studios, Rank Strand Electric or local theatres can therefore be expected to work.

4B RATE PLAYBACK SYSTEM AS T.C.5.

4B.1 Safety Precautions

Before switching on the system, ensure that work is not being carried out on the equipment, dimmers or luminaires. Also ensure that no luminaire represents a fire hazard (e.g. is dangerously close to a cyclorama or other scenery) or is so positioned as to cause injury or inconvenience to personnel.

4B.2 Switching on the System

Check that power is available at the M.M.S. Power supply Bay in the Apparatus Room. The 'Mains' & 24 volt pilots should be on at this Stage.

Check that power is available to the dimmers. This is confirmed by the green LIGHTING POWER ON legend above the monitor stack.

Check that the switches on the Studio Test Panel are set to route control to the M.M.S. Desk.

Turn On the MAIN Lighting Console key switch on the Auxiliary Control Panel (Fig.7). The green CONTROL SYSTEM ON legend above the monitor stack should now light and several of the MMS indicators and pushes will light. (These will be a standard starting condition and may not be the same as when the system was switched off).

Check that the white STUDIO push and green PRESET push on the Rate Playback Module and the white STUDIO buttons on both the Channel Control Modules are lit. The yellow Overflow indicator (!) will light briefly.

Turn On the AUX key-switch on the Auxiliary Control Panel if the Auxiliary Faders or the Effects Flasher are to be used.

Transfer the key to the Core Store Module keyswitch and turn On if the Files are to be altered.

Note: Turning off the system, or loss of power for any other reason, destroys the control information in the Studio and Preset stores and also in the hidden stores. Any information to be retained must therefore be transferred to the Core Store - the Files - before switching off. Special buttons are provided to do this for the MOD Store.

4B.3 Preliminary Checks - Normal Starting Conditions.

Check that: The Auxiliary Faders are all at zero.
The Effects Flasher is Off.
The pins in the Pin Patch Module are in the parking holes and not in the connecting holes.
SEQuence is Off.

MIX STORES is Off.

Take MOD is Off in both stores.

The Fade Time levers are at Suitable settings - e.g. 5 secs.

All indicator windows are blank or show zero.

The EARTH FAULT, VENTILATION OFF and OVERVOLT orange legends above the Monitor Stack are not lit.

Select the Mimic to show the STUDIO conditions using the white button on the Auxiliary control Panel.

Erase all Files left from previous productions by putting the second key into the Keyswitch on the File Selector Module, turning and holding against the spring, and then holding the CLEAR FILE button down until the adjacent Overflow (!) lamp lights.

The Keyswitch on the Core Store Module must also be On.

Remove the key from the File Selector Module Keyswitch.

4B.4 Preparation and Rehearsal

The luminaires to be used for each studio area will usually be known at the start of rehearsal, and they can be grouped together as Files as soon as the studio is available.

4B.4.1. To make up Files at the start of rehearsal

a. Decide which Channel Control Module to use and check that the Studio Store button is lit.

b. Select the first Channel Number required using the keyboard until the number appears in the CHANNEL window. Move the Wheel until the required dimmer level is shown on the Meter. Check that this channel

now indicates on both the MMS and Geographic Mimics.

c. If the dimmer level shown on the meter is suitable for the starting level for subsequent channels, operate the SET ALL button.

d. CLEAR and select the next channel number required. Provided SET ALL was used in step (c) this channel can be turned On to the starting level simply by pressing the ON button. The meter will show this level, the ON button will light and the Mimic Indicator will come on. Channels turned on by mistake can be turned off again by again pressing the ON button.

e. Repeat (d) until all channels to be used in the first File are on.

f. Preselect a File number on the File Selector Module. Check that the two FILE buttons are lit to show that the Core Store keyswitch is ON. Operate the white Studio Store FILE button on the Rate Playback Module. Check that the Studio display window and the window on the Core Store Module now show the preselected File number.

g. Turn Off all channels using the white OFF button at the top of the Playback Module (unless the next File is to be only a slight variation of the previous lighting).

h. Repeat (d), (e), (f), (g) using new File numbers each time until all the initial Files have been assembled.

Note: The method described above will light the luminaires in the studio. If this is inconvenient, use the green Preset Store controls instead of the Studio Store in the above instructions.

The Mimic Module will have to be switched to monitor the Preset Store. Take care to use the green Preset Store FILE button. Making up Files can now continue even though the Studio Store may be needed to hold lights in the studio for fine setting or balancing.

4B.4.2. To use Prepared Files at the start of Camera Rehearsal

As rehearsals get under way, the TM or Director may request lights for new studio areas. These will probably correspond with the Files already prepared. Bring these into use by pre-selecting the required File number on the File Selector Module and operating the white CUT button. This removes earlier lighting and replaces it by the chosen new lighting. If the new lights are required in addition to the existing lighting, use the PLUS button. The MINUS button can be used to turn the added lights off again, or the earlier lights can be removed later on by using CUT.

4B.4.3. To Balance prepared Files during Rehearsal

Dimmer levels can be adjusted at any time using a Channel Control Module.

a. Select a Channel Control Module to control Studio Store.

b. Select the Channel number to be adjusted. It should appear in the CHANNEL window and the meter will show the present dimmer level. The ON button will be alight.

c. If there is any doubt that the effect on the screen is due to the channel number selected, operate the ON button twice to turn the channel Off and then On again to the same level. This should make things clear.

d. Move the wheel to vary the light level - away to make the light brighter, towards you to dim it.

e. If a comparison with the original setting is wanted, press the RETurn button.

f. New channels can be introduced by selecting the required number, turning On and balancing. If a channel is to be discarded, move the wheel until the meter reads zero or simply press the ON button once.

g. Whenever a better balance has been achieved, re-File. The NOT FILED indicators will show whenever re-Filing might be necessary.

Pre-select either the original File number or allocate a new number if the old balance might prove to be of further use. Operate the white Studio Store FILE button.

Check that the correct File number appears in the Studio Store and Last Recorded File windows.

4B.4.4. To Use Prepared Files as 'building bricks' to create later Files

If the initial files are chosen intelligently, a lot of subsequent labour can be saved by combining them using the PLUS and MINUS controls.

e.g. If the lighting for two parts of a composite set are made into Files P and Q these will probably have to be assembled lamp by lamp. But when the two parts are to be seen together, there is no need to create a new memory by again switching every lamp individually. The PLUS facility should be used:

Pre-select File P

CUT File P (Either the Studio or Preset Store can be used).

Pre-Select File Q

PLUS File Q

The result is the total lighting for the composite set. The result

can be Filed by selecting a file number - R - and operating the FILE button for the Store being used.

Slightly less obviously, if File P and File R exist from the above example, File Q can be obtained :

Pre-select File R
CUT File R
Pre-select File P
MINUS File P.

The result is the lighting for area Q.

i.e. If P + Q = R then R - P = Q

But BEWARE: When there are common lamps at different levels in the two Files, P PLUS Q will not give the same result as Q PLUS P. And P PLUS Q, MINUS Q will not be exactly P. These are the unavoidable consequences of manipulating items of different magnitude. The Rule is that the latest instruction always takes precedence. Only lamps common to both Files will be affected and, in practice, the problem seems to cause little difficulty. (See Section 7).

4B.5. Cues

The earlier part of Section 4 has been concerned with preparing and perfecting "steady state" lighting conditions. In this section, changes between previously prepared balances performed at agreed times in the running order are considered under the general title of Cues. Some cues will be necessary to provide an effect called for by the script, but others may be introduced to save power or to provide different lighting balances for different camera positions.

4B.5.1. Single Channel Changes

If a single lamp has to be adjusted or switched off on cue, this can easily be done using a Channel Control Module.

a. Before the cue is due, select one of the Channel Control Modules to control the Studio Store.

b. Use the keyboard to select the channel to be adjusted. Its number must appear in the CHANNEL window. The meter will show the present dimmer level.

c. On Cue, move the wheel until the meter gives the required new dimmer level, or you see the required effect on the screen.

If the lamp has to be switched off, simply press the ON button once.

If the lamp has to be switched On on cue to a critical pre-arranged level, moving the wheel quickly to give the noted meter reading may be satisfactory. If not, a special memory containing only the new lamp at the required level can be used, and brought into use with the PLUS control. The Channel Control Module ON button cannot be used with confidence, unless it can be checked first, because the level appearing when the ON button is pressed might have changed between rehearsal and performance as a consequence of one of the actions listed on Fig. 11 - Last Store Table.

To prepare and check the level that will appear when the channel is turned On:

a. Shortly before the cue is due, select the Channel Control Module to control the non-active store, i.e. usually the Preset store.

b. Select the Channel to be adjusted.

c. Use the Wheel to set the level required for the 'turn on' cue.
A note of the meter reading must have been made at rehearsal.

d. Turn the channel Off using the ON button. Turn On again

to check that the required level re-appears.

e. Change the Channel Control Module to control the Active Store, i.e. the Studio Store.

The level now waiting to appear when the ON button is next used has now been correctly set, and the Cue can be performed with confidence by pressing the ON button.

4B.5.2. Multi-Channel Changes - Instant Changes

The majority of television lighting cues will be changes between lighting balances already stored in the Files. If these changes are to take instant effect, use the CUT, PLUS or MINUS buttons on the Studio Store.

a. Before the cue is due, preselect the File next required on the File Selector Module.

b. On Cue, operate the white Studio Store CUT, PLUS or MINUS button to effect the type of change required.

CUT will give a total change to the new lighting.

PLUS will add the new lighting without turning off any of the old. New levels will replace earlier levels.

MINUS will turn Off the lights that are On in the new File.

c. Repeat from (a) for the next cue if necessary.

If there is any need to check or to make minor changes to a File before bringing it into use, use the Preset Store first.

a. Before the Cue is due, preselect the File next required on the File Selector Module.

b. Operate the green Preset Store CUT button.

c. Select the Mimic to monitor the Preset Store to check which channels are on (non-zero).

d. Select a Channel Control Module to control the Preset

Store and select and modify any required channel, using the meter and Mimic to monitor the result.

e. If an instantaneous CUT change is not essential: Set the Fade Time levers to minimum time.

On Cue, operate CROSSFADE - the change will take about one second.

If an instant Cut, Plus or Minus change is required, re-file into a convenient File number (File 000 is very convenient) using the green Preset Store FILE button. Leave this File selected.

On Cue, operate the white Studio Store CUT, PLUS or MINUS button.

4B.5.3. To Prevent a Single Channel Obeying Cut, Plus or Minus Actions

The Playback Module CUT, PLUS and MINUS, normally have overriding control of all channels. But if the HOLD button on a Channel Controle Module is put On, then the channel selected on that module will not be influenced, in the Store controlled by that module, by CUT, PLUS, MINUS or ZERO, or by the other Channel Controller. HOLD is automatically turned off if the channel number is changed or if the other store is selected. HOLD does not protect against MIX STORES or against controls beyond the main output of the MMS, e.g. the Effects Flasher, the Auxiliary Faders and the Studio Test Panel.

4B.5.4. Multi-Channel Changes - Slow Changes

The Rate Playback Module uses an internal automatic system for slow changes which operates by slowly altering the Channels in the Studio Store to match the lighting balance in the Preset Store. Hence, the new lighting to be faded into use

must always be set up in the Preset Store. Once rehearsals have progressed far enough, this next lighting should be waiting in the Files and can be Cut into the Preset Store as though for an instant change. Then, on cue, one of the Fade Action buttons (viz: CROSSFADE - Marked with crossed arrows; UP-FADE - Marked with an upward sloping arrow; DOWN-FADE - Marked with a downward sloping arrow) is turned On and the Studio Store is slowly and automatically matched to the Preset Store. The time that individual lights take to get dimmer or brighter can be set separately on two lever controls calibrated in seconds. All lights moving in the same direction take the same time to complete the change even though some may only have to alter a few per cent while others travel the full range. Columns of red Fade Progress lamps show how far the change has progressed (see Fig.15).

4B.5.4.1. To Carry Out a Crossfade

A Crossfade is a total change to new lighting - the slow version of a Cut.

a. Ensure that the UP, DOWN and CROSSFADE buttons are Off.

b. Before the cue is due, preselect the File next required on the File Selector Module.

c. Cut the preselected File into the Preset Store using the green CUT button. PLUS, MINUS or ZERO can also be used and will give effects described later.

d. Set the Fade Time Levers.

e. On Cue, turn on the CROSSFADE button.

The studio lighting will immediately start to change. The speed of the change can be varied at any time by moving the UP and DOWN Time Levers. At the ⓪ positions the fade will be stopped. Alternatively, the fade can be stopped and restarted by turning

Off and On the CROSSFADE button. When all the red Fade Progress indicators are On, the change will be complete and the Studio Store window will change to show the same as the Preset Store window.

f. Turn Off the CROSSFADE unless further fade cues are to follow immediately.

Operation of the white CUT or OFF buttons will automatically turn Off any Fade.

4B.5.4.2. To Carry Out a Succession of Crossfades

Follow the instructions in 4B.5.4.1. above as far as (e) to obtain the first Crossfade. Do Not do (f).

g. Preselect the File next required on the File Selector Module.

h. On the second Cue, Cut the preselected File into the Preset Store using the green CUT button.

This can be done at any time, before or after the previous cue has finished. If the previous cue is not complete, the studio lighting will still move smoothly towards its new settings.

i. Repeat (g) and (h) for all further Crossfade cues adjusting the time controls if necessary.

j. Turn Off the CROSSFADE button when the sequence of Crossfade cues has been completed.

4B.5.4.3. To Fade in Additional Lights from a File

This operation will give the same final result as Plus in the Studio Store.

4B.5.4.3.1. If the CROSSFADE button is already On:

a. Ensure that the CROSSFADE button is On:

Note: If Crossfade is not on, it can only be safely turned On without unwanted effect if the Preset Store is first made exactly the same as the Output Store.

b. Preselect the File to be added on the File Selector Module.

c. Set the Fade Times.

d. On Cue, operate the Green PLUS button.

The lights in the new File will now come on in the time set on the Up Time control. If the new File contains lamps that are already lit, these will change to the levels in the new File. Changes to higher levels will take the time set on the Up lever; changes to lower levels will take the time set on the Down lever. The change can be stopped and restarted either by moving the Time levers to 0 or by turning CROSSFADE Off and then On again. (But see the Note in 4B.5.4.6.)

e. Turn Off CROSSFADE unless required for further changes.

4B.5.4.3.2. If the CROSSFADE button is Off the following method will be better:

a. Ensure that CROSSFADE, UP-FADE and DOWN-FADE are off.

b. Preselect the File to be added on the File Selector Module.

c. CUT the File to be added into the Preset Store.

d. Set the Fade Times.

e. On Cue, turn On the UP-FADE and DOWN-FADE buttons. The change can be stopped and restarted using the Time levers or by turning Off and On again the UP-FADE and DOWN-FADE buttons.

Channels in the Output Store that are On (i.e. non-zero) in the New File will now slowly alter to their new levels in the times set on the Up and Down Time levers. But channels not On (i.e. at zero) in the new File will not change.

If the CROSSFADE button had been used, channels in the Output

Store that were not On in the new File (more correctly - in the Preset Store) would have faded out.

f. Turn Off the UP-FADE and DOWN-FADE buttons when the Fade Progress Lamps are all lit or when the desired effect has been achieved.

4B.5.4.3.3. If the effect wanted is that lights should only get brighter

In this case any lower levels contained in the added File might give an unsatisfactory effect. This can be avoided by using the UP-FADE button only in 4B.5.4.3.2.(e). (The effect obtained will be similar to fading up two preset-master faders simultaneously on a manual board. Highest levels will take precedence. When both UP-FADE and DOWN-FADE, or CROSSFADE, are used, the latest level will take precedence - a much more predictable effect.)

4B.5.4.4. To Fade Selected Lights to New Levels

This is the same problem as dealt with in the first two parts of 4B.5.4.3. above. If most of the lights put into the Preset Store are new channels, the effect will look like fading in new lights. If most of the lights in the Preset Store are already lit, the effect will look like a change to new levels. To obtain either effect set only the lights to be changed into the Preset Store and use the UP-FADE and DOWN-FADE buttons.

4B.5.4.5. To Fade out a Set of Lights Defined by a File

This operation will give the same final result as a Minus in the Studio Store.

4B.5.4.5.1. If the CROSSFADE button is already On:

a. Ensure that the CROSSFADE button is On.

b. Clear the Preset Store using the green OFF button.

c. Preselect the File to be faded out.

d. Operate the green ZERO button to set the channels to be faded out into the Preset Store at zero level, but set to move in the Move Store.

e. Set the Fade Time. (Only the Down lever will be effective).

f. On Cue, turn On the DOWN-FADE button.

g. When the fade is satisfactorily completed, turn Off the DOWN-FADE button.

Either the Down Fade Time ⓪ position or the DOWN-FADE button can be used to stop and restart the fade out.

4B.5.4.5.3. To bring the lights on again to the levels in the selected File

If the levels in the File selected for either of the alternative ways of obtaining a selective fade out, described above, are the same as the balance in the Studio Store, the lights faded out can be immediately faded back in as follows :

Using Method 4B.5.4.5.1 (above):

Do (a) and (b) as described.
Do (c) but set the Fade-up Time as well.

Do (d) on Cue.
On the second Cue, fade up the lighting again by operating the green PLUS button.

Using Method 4B.5.4.5.2. (above):

Do (a), (b), (c) and (d).
Do (e), but set the Fade-Up time as well.
Do (f) on Cue turning On both DOWN-FADE and UP-FADE.

On the second Cue, fade up the lighting again by operating the green PLUS button.

4B.5.4.6. To Stop Lights Changing Further during a Fade

Any channel turned Off in the Preset Store when only UP-FADE and DOWN-FADE are in use, or are turned Off after CROSSFADE has been turned On, will remain at the levels reached at the moment of turn-off. For Files, MINUS will give this effect. (ZERO will initiate a fade-out as explained above). For individual channels, turning Off in the Preset Store using a Channel Control Module ON button, or by fading to zero using the wheel, will also stop any further change in the Studio Store.

Note: If MINUS is used in the Preset Store to stop channels moving and the CROSSFADE subsequently turned Off and then On again, the channels stopped by the MINUS action will then fade out.

Similarly, channels taken out of a Fade because they have been turned On in the Studio Store using PLUS, or Off using MINUS, will fade out if the CROSSFADE is turned Off and then On again (see below).

4B.5.4.7. General Fade Theory

To understand why the above processes work it may be helpful to carry out a few simple experiments.

Set up the two Channel Control Modules to control the same channel: one in the Studio Store; one in the Preset Store. Switch the MMS mimic between the two Stores occasionally during the experiments. Check the changes to the studio lighting on the Geographic Mimic.

4B.5.4.7.1. An UP Fade

Set the Studio Channel Control Module Off and the Preset Channel Control Module at a fairly high level. Set the Up time to about 5 seconds so that the change can be followed easily.

Turn On the UP-FADE.

The meter on the Studio Store Channel Control Module will move to match the level in the Preset Store in about 5 seconds.

Repeat and observe that :

a. The change always takes 5 seconds whatever the starting levels in the Studio and Preset Stores.

b. There is no change if the Studio Store level is higher than the Preset Store.

c. The Studio Store ON button lights almost immediately the fade begins.

4B.5.4.7.2. A DOWN Fade

Set the Studio Channel Control Module meter at a fairly high level and the Preset Store level fairly low.

Set the Down Time at about 5 seconds.

Turn On the DOWN-FADE. (The UP-FADE should be Off).

The meter on the Studio Store Channel Control Module will move to match the Preset Store level in about 5 seconds.

Repeat and observe that :

a. The change always takes 5 seconds whatever the starting levels in the Studio and Preset Stores.

b. There is no change if the Studio Store level is lower than the Preset Store.

c. The Studio Store stops changing immediately the Preset Store ON button is set Off or the meter set to less than 7% using the wheel.

d. That the ON button in the Studio Store is never turned Off because the level cannot get down below 7%.

4B.5.4.7.3. An UP and DOWN Fade

Try similar experiments with both UP-FADE and DOWN-FADE On. Note that the Studio Store now always moves to match the Preset Store except when the channel is Off (less than 7%) in the Preset Store. Note that the channel cannot move unless it is On on the Preset Store Mimic.

Set the Fade Times to their fastest and note that the Studio Store Meter follows the Preset Store wheel with very little lag.

Note that the Fade Progress Lights on the Rate Playback Module do not start again whenever a new destination level is set in the Preset Store, (this is different to Q-File).

CUT a small number of new channels into the Preset Store from a File, and note that only these channels come On in the Preset Channel Mimic and that they fade to their Filed levels.

Note that this time the Fade Progress Lights do start again. Note that lights not included in the new File do not fade out.

4B.5.4.7.4. A CROSSFADE

Set the UP-FADE and DOWN-FADE Off.

Set the channel to a fairly high level in the Studio Store.

Set the same Channel Off in the Preset Store.

Turn On CROSSFADE while watching the Preset Store Mimic

and the Studio Store Meter.

Note that the channel immediately turns On on the Preset Mimic, although still showing zero on the Preset Store meter, and begins to fade down.

The Preset Store Mimic actually shows which channels are allowed to move, although in most circumstances this is the same as showing which channels are On (above 7%). But the special feature of Crossfade is that all channels that are On in the Studio Store and which do not have levels in the Preset Store are required to fade out, so every time the CROSSFADE button is turned On it sets all such channels to move, and hence to fade out. This Move information is held in a special hidden 'Move' store but its state can be seen on the Preset Store Mimic. This means that all the old and all the new Channels in the Studio Store must be lit on the Preset Store Mimic when CROSSFADE is first put On because, while the new channels are moving to new non-zero levels, all the rest are fading out.

Keep CROSSFADE On, change the Fade Times to 20 seconds and now CUT the same File as used at the end of the Up and Down Fade experiment, into the Preset Store. This will change the destination levels of all channels so that the new lights move to their balance and all other lights begin to fade out. (Channels already set to fade out will have this instruction confirmed).

The Preset Store Mimic will now show all the new channels Cut in from the File and also any channel already on in the Studio Store and now set to fade out.

Now, while the above change is still happening, MINUS the

preselected File into the Preset Store. This stops the change of the lights in the File at the point reached, although the other lights will continue to fade out. This can be seen on the Studio Store Channel Meter or on the Geographic Mimic. The lamps for these channels on the Preset Store go out to confirm that they can no longer move.

Use, CUT, PLUS and ZERO on the Preset Store to confirm that they bring in and fade out the lights on the preselected File and that all other lights remain instructed to fade out.

Use PLUS and MINUS on the Studio Store and confirm that they give instant changes to the studio lighting, and that they prevent further fade changes on these channels by turning them Off in the Move Store as shown on the Preset Mimic. Note that turning CROSSFADE Off and then On again will restart channels set not to move, and these now fade out.

4B.5.4.8. General Fade Technique

It should now be clear that channels set into the Preset Store by any means will act as a pattern for the Studio Store during a Fade, and the Studio Store will move to match them unless the Preset Store level is below the critical 7%.

Channels below 7% are also instructed to move by the action of turning On CROSSFADE or operating Preset CUT when CROSSFADE is already On. These channels will then fade out in the Studio Store. Preset ZERO also instructs all channels defined by the File to fade Out when CROSSFADE or DOWNFADE is on.

Operating Preset MINUS or Studio PLUS or MINUS when CROSSFADE is On will stop all channels defined by the File used from moving further and sets their levels to zero in the Preset Store. All these actions obey the 'Latest takes Precedence' rule. Studio CUT and OFF both stop any fade action but do not prevent immediate restart.

The Preset Mimic will always show which channels are permitted to change.

4B.5.5. Alterations during a Fade

Last minute corrections to a channel can be made from a Channel Control Module at any time. If the correction has to be made during a Fade, it can have immediate effect if the Studio Store is selected, or delayed effect if the Preset Store is selected. To exclude further influence from the Fade action HOLD can be used.

4B.5.5.1. To Prevent a Channel Appearing after a Fade has Begun

Either: a. Select the required channel and the Preset Store on a Channel Control Module and use the wheel to fade to just above zero (7%). Any effect that has already appeared in the Studio will immediately fade out.

Note: If the Channel is turned Off or faded right out in the Preset Store it will stop changing altogether. The residual error might not be acceptable.

Or: b. Select the required Channel and the Studio Store on a Channel Control Module and turn On HOLD. Fade the channel out using the wheel or turn Off.

When the fade is complete and turned Off, turn

HOLD Off again. If HOLD is released before the Fade is turned Off, the channel will again start to move.

4B.5.5.2. To Introduce a Forgotten Channel after a Fade has Begun

Either: a. Select the required channel and the Preset Store on a Channel Control Module and fade to the required final level. The Studio Store will imediately begin to change to this level.

Note: The Fade Progress Lights do not restart for the new manual adjustment and the altered channel will probably continue to change after all the Fade Progress Lights have come on. The Channel meter can be switched to Studio Store to observe actual completion.

Or: b. Select the required channel and the Studio Store on a Channel Control Module and fade to the required level.

If the Fade process is trying to fade this channel down, it will be necessary to turn on HOLD so that the forgotten channel is not faded out again.

When the fade is complete and turned Off, turn HOLD Off again.

4B.5.5.3. To Hurry Up or Slow Down a Fading Channel

Select the required channel and the Studio Store on a Channel Control Module and move the wheel, with or against the automatic fade, to obtain the effect required. The automatic fade will still try to reach a match with the Preset Store so, after the initial correction, the channel can be left to find the correct final level.

4B.5.6. To Switch On or Off Groups of Lights from a File During a Fade

To permit Switch Cues to be effected without interrupting a Fade, any channel turned On using the Studio Store PLUS, or Off using the Studio Store MINUS, when a Fade is running will also be turned Off in the 'Move' Store so that these channels will not try to fade back again.

With any fade running:

a. Preselect the File to be switched On or Off.

b. On Cue, operate the white PLUS button (for switch-On) or MINUS button (for switch-Off).

Note: The White Studio Store CUT will stop the fade.

4B.5.7 Group Fades

A proportional increase or decrease to a Group of studio lights can often be useful, when balancing a colour-mixed cyclorama for example. Operation of the GROUP button on the Rate Playback Module changes the Fade action described above so that the UP-FADE and DOWN-FADE controls act to increase or decrease the levels of channels in the Studio Store that are also On (not zero) in the Preset Store.

In the normal mode, channels On in the Preset store change to match this level, and their original level in the Studio Store is lost.

In the GROUP mode the levels in the Studio Store are magnified or diminished under the control of the UP and DOWN buttons if they are among the Group On in the Preset Store. The relative values of the lights remain constant and their original level can easily be regained. In effect, the Studio Store levels

multiplied by a factor that can be varied from O through 1 and upwards.

The CROSSFADE button does not operate when GROUP is On.

4B.5.7.1 To Change the Balance of the Separate Cyclorama Colours forming part of a Composite Studio Balance

Assume that all the studio lighting, foreground and cyclorama, is already on and reasonably well balanced in the Studio Store. Assume that Files R, G, B have already been made up and contain the Red, Green and Blue cyc. Channels. These channels need only be On: their level does not otherwise matter.

a. Preselect File R

b. Operate the GROUP button.

c. Use the UP and DOWN Fade buttons to brighten or dim the red component of the Cyc. (The buttons have to be held down to operate).

If the red cyc. channels are already set at different levels to give an even colour, as is often the case, they will maintain these relative levels although collectively getting brighter or dimmer.

The DOWN button may be held until all the red channels reach zero. The UP button may be held to increase the levels again. When any channel reaches full-on, further upward adjustment is prevented so that the relative balance is not lost.

The red Fade Progress lights show how the Group has been changed since the start of adjustment. They always start all off when GROUP is first turned on or when any CUT action is done in the Studio Store.
Lights in the Up Column come on to show that the Group

has been driven brighter. Lights in the Down column show when the Group has been made dimmer. When all lights are On in either column the maximum possible effect has been obtained, although the Up lights will stop when the first channel reaches 100%. Return to the original setting is, therefore, always a matter of getting the lights out in both columns. The rate of change is set using the Fade Time levers.

d. When a suitable level for the red group has been found, preselect File G and repeat (b) and (c) to get new levels for the green cyc. lighting.

e. Repeat for the Blue group and for any further adjustments to the Red and Green subsequently necessary.

f. FILE the result from the Studio Store for future use.

Normal action of the Fade controls is regained by operating any of the other green Preset Store buttons.

4B.5.7.2. To use Group as a Master Fader

If a file containing all the channels On in the Studio Store is available, Group can be used as a Studio Store Master Fader. This File is preselected and GROUP turned On. The UP and DOWN buttons will now proportionally brighten or dim all the studio lighting. The result, whether greater or less than the original, can be Filed using the white FILE button.

When GROUP is On, any channel can be made to obey or ignore the UP and DOWN Fade buttons by turning that channel On or Off in the Preset Store using a Channel Control Module. Any channels turned On in the Studio Store when the Group is not at its original balance (shown by the presence of red Fade Progress Lights) will appear at their proper level and subsequent Group UP or DOWN actions will operate from this point. Returning the Fade Progress Lights to All Off will then

inevitably move the added lights away from their starting point.

The Preset Store Mimic will always show which channels can respond to the UP and DOWN Fade buttons although, as must be obvious, if a channel is at zero in the Studio Store at the start of the process, no multiplication factor, however large, will bring that lamp on.

4B.6 Special Tricks

The first five parts of Section 4B have dealt with all the steps needed for normal television production. This Section covers the minor facilities on the TC 5 MMS installation that may occasionally prove of value.

4B.6.1. Sequence

If cues can be organised to permit using the Files in exact increasing numerical order, then the preselected File number can be made to step-on automatically ready for the next cue on the completion of the previous cue.

a. At some convenient time before the first cue in the sequence, set the File Selected on the File Selector Module to show the first number in the sequence and then turn On the red SEQuence button on the File Selector Module. Red warning indicators light on the Rate Playback Module.

b. At the first Cue, operate the white Studio Store CUT Button and the new lighting will immediately appear. The number shown in the File Selected window on the File Selector Module will simultaneously increase by one ready for the next cue.

All the CUT, PLUS and MINUS buttons on the Studio Store

will cause the preselected File number to increase; so the various types of cue described in 4B.5.2 can all be included in the sequence .

c. Take care to turn Off the SEQuence button when its use is finished.

4B.6.2 Fade Sequence

The CUT, PLUS, MINUS and ZERO buttons on the Preset Store also step-on the File selected when operated with SEQuence On. So a sequence of Fades is easily accomplished using any of the routines described in 4B.5.4.

a. Ensure that the UP-FADE, DOWN-FADE and CROSS-FADE buttons are Off.

b. Before the first cue is due, preselect the first File number on the File Selector Module.

c. Turn ON SEQuence.

Note that both of the SEQ.ON warning pilots light. It is not possible to select Sequence operation separately for the Studio and Preset Stores.

d. Cut the preselected File into the Preset Store using the Green CUT button.

The Preset Store window will show the first File number in the sequence. The File Selected window on the File Selector Module will show the File to follow.

e. Set the Fade Time levers.

f. On Cue, turn on CROSSFADE.
The Studio lighting will immediately begin to change.

g. On the second Cue, operate the green Preset CUT button again and the next effect will begin to appear.

h. Repeat (g) as often as necessary to complete the sequence.

i. Turn Off SEQuence and CROSSFADE when their use is finished.

The Green PLUS, MINUS and ZERO buttons may also be used at step (g) to achieve their usual effects.

The white PLUS and MINUS buttons can also take part in the sequence to give instant switch effects.

The white CUT button can be used, but this will turn Off the Fade process and, for further Fade cues, this will have to be turned On again by going back to step (d).

UP-FADE and DOWN-FADE can be used in place of CROSS-FADE at any time and will behave normally.

Hence, the only effect of having SEQuence On is to automatically present the next File number immediately the previous number has been used. All other controls act normally.

4B.6.3 To reorganise Files into a New Numerical Sequence

This operation is best done in the Preset Store to leave the Studio Store free to control the studio lighting.

a. Unless the reorganisation is very simple, draw up a table showing the present and desired File number for each lighting cue. If a block of unused Files exists, use these for the new numbers in preference to trying to re-arrange within existing numbers. This avoids erasing the prototype Files so that any mistakes can still be remedied.

b. CUT the first File for the new sequence into the Preset Store using its original number. Preselect the number to be allocated in the new sequence and operate the Preset FILE button.

c. Repeat for the second and all subsequent Files.

If a new cue has to be inserted into an existing sequence, all the later numbers have to be moved up. This may best be done using the technique described above, but starting with the highest number in the existing sequence and moving it up one place. The + 1 and - 1 buttons on the File Selector Module keyboard will be helpful.

The operation must be done with care, because the old Files are overwritten and lost after they have been moved up.

When the desired gap has been reached, the new cue is brought from its existing storage File and re-Filed with its new number.

4B.6.4. Reverse and Shuttle Sequences

For short sequences, the + 1 and - 1 buttons on the File Selector Module keyboard may be used to step the Selected File. When held down, either button will respond to any CUT, PLUS, MINUS or ZERO button and step-on the File Selector Module. Quick changes in either direction can be made using one hand to hold down one of the + 1 or - 1 buttons and using the other hand to operate white CUT, PLUS or MINUS.

Changing from + 1 to - 1 and back during the sequence will cause the numbers to shuttle up and down.

If the green CUT, PLUS, MINUS or ZERO buttons are used when a Fade is running, the sequence of changes can be made to appear slowly. Instant Studio Store actions can be included at any time, but Studio Store CUT will stop the Fade.

4B.6.5 The Modification Store

The MMS Rate Playback Module is provided with a method of introducing modified dimmer levels in place of levels originally recorded in a File. This is equivalent to the '99' facility on Q-File. Special File Selector and Channel Control Modules are also necessary.

Any channel level to be used in this way is put into a Modification Store using the SET MOD button on a Channel Control Module. These levels are then obtained in preference to the Filed level whenever a TAKE MOD button on the Rate Playback Module is On.

The Modified level will appear when CUT or PLUS is used and will replace the original Filed level provided that neither level is zero.

TAKE MOD cannot introduce new channels or completely eliminate the effect of channels present in the File being Modified.

The contents of the Mod Store are lost if the MMS is switched off, so provision is made to transfer these levels into a File for long term security.

4B.6.5.1. To Set Up the Mod Store

The need for a Modified level will usually be noticed when balancing levels in the Studio Store during rehearsal, but either Store can be used.

a. Ensure that the level shown on the Channel Control Module meter is the level required. Unless this is zero, (less than 7%) the SET MOD button will be lit.

b. Press the SET MOD button. This copies the preferred level into the Mod Store.

All channels put into the Mod Store can be seen on the MMS Mimic by operating the Yellow MOD button on the Auxiliary Control Panel.

If a level put into the Mod Store is subsequently found to be wrong, it can be over-written by setting the Channel Control Module meter to the new level and pressing the SET MOD button again.

If the SET MOD is operated when the channel is Off, i.e. when the ON button and the SET MOD button are not lit, the channel will be set Off in the Mod Store and the normal Filed level will be taken over when TAKE MOD is On.

4B.6.5.2. To Make Use of the Mod Store

The Mod Store is intended for use during late rehearsal and performance to ensure that levels decided upon in late rehearsal are used in preference to unbalanced levels Filed during earlier rehearsals. It is presumed that there is no time to change the Files themselves.

The preferred levels are first put into the Mod Store as described above, or they might be obtained from a File.

a. Turn On TAKE MOD for both the Studio Store and the Preset Store. (Either may be left Off, but cues introduced through that store will then be unmodified.)

b. Select Files and use CUT, PLUS, MINUS and Fades as normal.

Any channel put into the Studio or the Preset Stores from a File will now take the level from the Mod Store if the level in the File and the level in the Mod Store are both non-zero (greater than 7%). For channels for which this does not apply, the level in the File is taken.

The File itself remains unchanged, but it can be re-recorded to include the Modified levels by re-Filing from the modified Studio or Preset Store.

c. Turn Off the TAKE MOD buttons when the actual Filed levels are again required.

4B.6.5.3. To File and Reset the Mod Store Levels

To prevent loss of the Mod Store information if the MMS is switched off, it must be copied into a Core Store file.

a. Check that the Core Store Keyswitch is On. The FILE MOD button should be lit.

b. Preselect the File number to receive the Mod information.

c. Press the FILE MOD button.

The chosen File now holds a copy of the Mod Store levels.

To Reset the Mod Store from the File:

a. Preselect the File number containing the Mod levels.

b. Press the RESET MOD button.

This ability to reset the Mod Store from any File could be used to obtain a variety of Mod. levels to be used for different parts of the script.

Beware: Accidental operation of the RESET MOD button could destroy the Mod Store before a File record has been made.

4B.6.6. File OOO

Because MMS suppresses leading zeros in the File Display windows, it might appear that this File does not exist. It is present and is immediately available on operating CLEAR on the File Selector Module.

It is recommended that this File is reserved for transitional operations of the sort described in 4B.5.2 where ease of access is important and there is no need to keep the result for future use.

4B.6.7. Split Working

If lighting is required simultaneously in different parts of the studio

for different purposes, it will be convenient if the two components remain separately controllable, especially when re-filing.

This can be done by turning On MIX STORES. Both the Studio and Preset Stores now control the dimmers but the CUT, PLUS, MINUS and FILE actions remain independent.

The Channel Control Modules can be allocated one to each Store to give total duplication.

Of course, Crossfades are temporarily impossible.

Any channel appearing in both the Studio Store and the Preset Store will take the higher dimmer setting.

4B.6.8. Flasher Effects

An effects flasher unit is incorporated in the TC 5 MMS installation. It operates on dimmer channels selected on the Pin Patch Module. It can operate to force channels On using the Yellow patch pins, or to force channels Off using the Red patch pins.

4B.6.8.1. To Flash a Channel Independently of the Main MMS System

a. Ensure that the AUX Lighting Console keyswitch is On.

b. Turn On the Flasher using the push button on the Auxiliary Control Panel.

c. Insert a Yellow control pin at the intersection of the L row with the channel number to be flashed.

The channel will now begin to flash between full-on and any level set by the MMS Playback Stores. Hence flashing channels will normally be kept turned off in the Studio Store.

d. Adjust the Flash PERIOD and MARK-SPACE ratio using the controls on the Auxiliary Control Panel.

e. Insert other Yellow pins into row L to control other channels required to flash in sympathy.

f. When the effect is no longer required, turn off the white On/Off Flasher Push on the Auxiliary Control Panel. The flashing channels will then come under the control of Auxiliary Fader L and associated push button switch which may be used to hold the channels off or at any other steady level required.

Note: || Red and Yellow control pins must not be used simultaneously with the same control channel or interaction may result. ||

4B.6.8.2. To Flash a Channel Controlled by the MMS System

a. Ensure that the AUX Lighting Console keyswitch is On.

b. Turn On the Flasher.

c. Turn On the channel to be flashed using the MMS Channel Control Module and the Studio Store in the usual way.

d. Insert a Red control pin at the intersection of the L row with the channel number to be flashed.

e. Adjust the Flash PERIOD and MARK-SPACE ratio.

f. Insert other Red pins into row L to control other channels required to flash in sympathy.

Since the flasher is now being used to turn the flashing channels off, their presence and level can come from the MMS Studio Store in the usual way. When flashing is no longer required, turning the flasher Off at the Auxiliary Control Panel replaces the flasher with the L Auxiliary Fader.

If this is at zero or the L Push Switch is Off, it will act to prevent the MMS turning on the flashing channels. If the channels are required without flashing, the L fader must be set at full and the switch must be On.

Note: Red and Yellow control pins must not be used simultaneously with the same control channel or interaction may result.

4B.6.9. Manual Override

The Auxiliary Faders may be used to hold up or to hold down the level of any channel or group of channels.

The associated push button switches must be On.

4B.6.9.1. To Prevent Channels Falling Below a Chosen Level

Use the Yellow pins in the Pin Patch Module and connect the chosen channel (s) to one of the Auxiliary Faders.

Set the Auxiliary Fader to give the required minimum level.

The MMS Studio Store can now only increase the dimmer level, since the higher signal takes precedence.

4B.6.9.2. To prevent channels rising above a chosen level

Use the Red pins in the Pin Patch Module in place of the Yellow pins specified in 4B.6.10.1.

The MMS Studio Store can now only control the dimmer up to the Auxiliary Fader level since the lower signal takes precedence.

Note: Red and Yellow pins must not be used simultaneously with the same channel or interaction may result.

4B.6.9.3. To use the Auxiliary Faders as Direct Manual Controls for Selected Channels

Use the Yellow pins in the Pin Patch Module and connect as required. Ensure that these channels are never brought on in the MMS Playback Stores.

The chosen channels will obey the Auxiliary Faders and push button switches as normal manual controls.

Any channel patched to more than one fader will obey the highest setting.

4B.6.10. Internal Switches

Internal switches are fitted for the convenience of the System Manufacturer which can alter some of the responses described in Section 4. The Maintenance Handbook will give details.

4B.7. Emergency Procedure

If a serious fault occurs on the main MMS that cannot be repaired immediately, there are three main alternative methods of control:

Operation from the Studio Test Panel.
Operation from the Auxiliary Faders through the Pin Patch Module.
Substitution of spare modules giving reduced facilities.

4B.7.1. Operation from the Studio Test Panel

If power is available to the dimmers, the Studio Test panel should be able to bring lamps on using the 'Studio' switch position. This On level is set for all dimmers at about 200 volts - about 3000K. Clearly, only the simplest power shedding cues will be possible.

4B.7.2. Operation From the Auxiliary Fader Panel

The power supply for these faders and associated pin patch panel are separated from the main MMS controls and can be kept On even if the main system has to be shut down.

The ten Auxiliary Faders can be patched up using Yellow pins, to give ten groups of lights, and the push button

switches and the faders used to bring them up singly or several at a time to the level giving the best compromise balance.

Alternatively, the faders can be set at different levels, and channels patched to whichever gives the best balance.

Any channel fed from more than one Yellow pin will obey the level from the highest fader setting.

4B.7.3. Substitution and Reduced Facilities

In the event of significant failure to just one module, the following options might be acceptable.

4B.7.3.1. Failure of a Channel Control Module

This should not cause any problem since the second module can carry out all the necessary functions. A failed module can be unplugged and removed.

4B.7.3.2. Failure of the Rate Playback Module

A working Playback Module is critical in the MMS system, and total failure can only be remedied by repair or substitution. A spare Manual Playback is provided.

If the fault affects only the Studio or the Preset Store, MIX STORES can be turned On and only Fade cues and blind plotting facilities will be lost.

If the Manual Playback Module is substituted, the facilities obtained will be approximately the same as described for Cardiff, and it should be operated as described in Section 4A. There will be some discrepancies in labelling. 'A' buttons may be labelled Studio but both will be white. 'B' buttons may be labelled Preset but both will be green. The combined A and B Stores output through the faders cannot be

shown on the MMS mimic, although the Geographic Mimic will show nearly the same information. 'Mod' and Clear File will also be lost.

4B.7.3.3. Failure of the Core Store or File Selector Modules

Total failure of either of these modules will prevent further use of any Files. The Studio Store and the Preset Store in the Rate Playback Module can still hold lighting but will have to be set up again, channel by channel, whenever power is switched off.

The spare Manual Playback Module can also be used if it is inserted in place of the faulty Core Store or File Selector Module. The system will then have four output stores, more or less equivalent to four presets. The AB Faders, Grand Master Fader or D.B.O. switch on the Manual Playback Module, and MIX STORES on the Rate Playback Module, will have to be used to determine which of the stores controls the dimmers. Because the Studio Store cannot be disconnected from the dimmers, it should be used for the first balance so that the white OFF button can be used, or a CROSSFADE used, to remove its effect for later cues.

When two Playback Modules are in use, only one A or Studio Store and only one B or Preset Store can receive control signals from a Channel Control Module at a time. This selection is made using the A, B, Studio, Preset, buttons at the top of the Playback Modules. Only one white and one green button can be alight at a time. These buttons must be used to direct the Channel Control Modules to the Store to be adjusted.

4B.7.3.4. Failure of the Pin Patch Module

This contains the output connections to the dimmers and must always be present. However, the electronics have been subdivided to minimise the risk of total failure.

4B.7.4. Spares from Other Systems

All MMS modules of the same category are designed to be interchangeable for their main functions, although minor facilities are not always wired. Spares from other studios, Rank Strand Electric or local theatres can therefore be expected to work.

5. BBC CONTROLS (T.C.5.)

The following controls are fitted on the MMS Auxiliary Control Panel but were provided by the BBC.

5.1. HOUSE LIGHTS

The studio is illuminated by houselights arranged in two groups: 1A and 1B. Group 1A corresponds with the area between the control room and the centre of the studio. Group 1B corresponds to the far half of the studio. Each houselight group contains a number of relays which are controlled from momentary-action switches fitted to the Auxiliary Control Panel. These are self illuminated when the houselights are on for that group, and they are labelled 1A and 1B.

After either 1A or 1B or both are put on, the number of fittings available in each group may be doubled (thus doubling the houselight illumination) by operating the momentary action switch labelled BOOST, which is fitted to the same panel.

In order to save power, the Boost system is time clock controlled to a maximum (but adjustable) two hour On period when the lighting control desk is switched off. When the lighting control desk is switched on, the Boost period becomes independent of the time clock.

When Boost is under time clock control, the two hour period is initiated by operating a BOOST button, and this condition remains latched in until either the two hour period expires, or (within the two hour period) a BOOST button is again operated. When operation takes place within the two hour period, the unexpired portion of the period is still available.

When the Boost period is under the control of the lighting control desk, in effect, the contacts on the clock which provide the two hour limit are by-passed by a system which is activated from the CONTROL

SYSTEM ON annunciator circuit. Hence, whatever the condition of the time clock, its effect will be by-passed until the lighting desk is switched off.

The logic of the system is designed such that a group must be selected to On before the Boost for that group becomes available. Thus Boost can be switched off by operating either BOOST or a group switch.

The three switches on the Auxiliary Control Panel are reproduced at Studio floor level. Only Switches 1A and 1B are reproduced at Gallery level. Internal illumination of these switches is arranged so that if the studio is dark (houselights off) the switches are illuminated (to aid location).

5.1.1. To put houselights on:

a. Press 1A or 1B followed by BOOST if required. The houselight system is now operating with one end of the studio at maximum lighting level (i.e. Boosted).

b. Press 1A and 1B followed by BOOST. The whole studio is now lit to maximum houselights level (i.e. Boosted).

5.1.2. To put the houselights off:

5.1.2.1. Only One End (say 1A) is Boosted

Either:	Press BOOST	End 1A of the studio reverts to normal houselight level.
Or:	Press 1A	End 1A of the studio is switched off, (including boost) and is no longer illuminated.

5.1.2.2. Both ends of the Studio are in the Boost Condition

Either:	Press BOOST	Both ends of the studio revert to normal houselight level.
Or:	Press, say, 1A	This switches off end 1A (including Boost) leaving end 1B and its boost system on.

1B may then be changed to its normal condition by pressing BOOST.

OR 1B may be switched off completely by pressing 1B.

5.1.3. Illumination of Houselight Switches at the Auxiliary Control Panel

The internal illumination of the houselight buttons accurately mimics the studio houselight illumination under all circumstances.

5.1.4. Illumination of the Houselight indicators on the Geographic Mimic Panel

These indicators illuminate RED when the studio houselights are off providing a "danger" warning consistant with that available in other Television Centre Studios.

6. COMPARISON WITH Q-FILE

Part of the agreement between Rank Strand Electric and the BBC made when the MMS was ordered for TC 5, was that the differences between MMS and Q-File that might lead to operational confusion should be as few as possible. The remaining differences are therefore either very obvious, as for example, the difference between the Wheel Channel level control and the Servo-Fader, or fairly subtle as between the different results obtained when the Channel On button is operated. The paragraphs below discuss some of these less obvious differences.

One major cause of these differences is that the MMS does not recognise any difference between a channel being Off and being at zero control level, whereas Q-File identifies On and zero level as separate possibilities. Q-File can File a channel On at 7 or Off at 7. The former will produce immediate light if Cut into the Studio (Output) Store; the latter will only set up the level and the channel On button must then be used to bring the light On at the recorded level (7). The MMS simplification saves cost and may make the system easier to understand while it is still being used for simple cues. But the Q-File elaboration becomes necessary for the more complex cues involving selective fades, and the MMS has to generate similar information to achieve equivalent results.

6.1 CHANNEL CONTROL MODULE

6.1.1. SET ALL (MMS) : SET (Q-FILE)

SET ALL (MMS) has no immediate visible effect. It notes the meter level at the moment of operation, and stores it for all channels in the 'Last' Store, within the Channel Control Module, replacing all existing levels. The 'Last' Store is then used by the ON button to give the On level to put into the Studio or Preset Store. The 'Last' Store is

also altered for individual channels whenever ON is turned Off or when a channel is Filed (see table on Fig. 13).

In this way the level appearing when a channel is turned On by hand will be the most recent, and therefore presumably the most satisfactory, level yet determined for the channel.

The two Channel Control Modules may initially have different SET ALL levels, but subsequent FILE actions will bring them to correspondence as rehearsals proceed.

The main use of SET ALL will be immediately after switch-on at the start of rehearsal, when an approximate starting level is needed so that only the ON button has to be used to make up Memory 'bricks' as quickly as possible (see 4B.4.1.). Subsequently, the 'Last' Store level will be gradually improved to contain more accurate approximations to the optimum levels and these would be destroyed if SET ALL is used again.

SET (Q-File) changes all channel levels in the Output (Studio) or Preset Stores and the result will be immediately apparent for all channels already On. Existing levels in the Store are lost.

The main use of SET is the same as for SET ALL (MMS): for rapid assembly of channels at a common starting level to form memory 'bricks'. Q-File has no simple method of recording the latest level for any channel in a way that permits easy re-use when turning on these channels again in later rehearsal.

6.1.2. ON (MMS) : ON (Q-File)

On both systems this button allows a channel to be turned

Off and then On again without change of level.

On Q-File the level is stored and processed quite independently of the On-Off condition. A channel can be On at 7, or Off at 7. A channel On at O will give virtually no light but this condition is sometimes important because it is the instruction to fade the channel out when automatic fades are used. Normally a channel turned On will be set to a level between 5 and 10, to balance with the other lighting to achieve the effect required.

When turning an Off channel On on Q-File, the level obtained will be that already showing on the Servo-Fader. This will be :

a. Zero if the system has just been switched On.

b. The SET level if this has just been used.

c. The level from a File if CUT or PLUS has just been used or Zero if ZERO has been used.

d. A level set by moving a Servo-Fader lever.

On MMS, zero level is treated as Off. Hence Off at 7 is meaningless, as is On at O. Turning a channel On is therefore the action of giving that channel a level in the Studio or the Preset Store under control. The ON button on each Channel Control Module has a store to hold this level, known as the 'Last' store, and the level in this 'Last' store is determined by the most recent of the following :

a. Zero if the system has just been switched on.

b. The SET ALL level.

c. The last non-zero level Filed for the channel.

d. The level when the channel was switched Off by hand.

When a channel is turned On by hand, one of the above levels will be the level to appear on the meter. This will be the level from the last of these events related to this channel, and will come from the 'Last' Store. This level is therefore always changing (it is presumed that these changes will be improvements) although it will probably be the level last Filed. Because it is changing, and because a wanted level cannot be put into a File when Off, any cue to turn a channel On to a precise level is slightly more complicated than on Q-File (see 4A.5.1. and 4B.5.1.).

6.2. MIMIC MODULE

6.2.1. Studio Store Mimic (MMS - TC 5)

Channels are displayed in numerical order as an array of lights that turn on if the control signal to the dimmers exceeds 7%. It does not dim as does the Q-File output Store Channel Mimic in other TVC Studios. The same mimic is used for Preset and MOD Store display.

6.2.2. Preset Store Mimic (MMS - TC 5)

The MMS Mimic Module can display information for all control channels in the Preset Store that at first sight corresponds exactly with similar information from the Studio Store or with the Q-File Preset Store Mimic. The intended use for the Preset Mimic display is to give information for two operational situations :

a. When making up Files. The lamps lit on the Preset Store Mimic should tell the same story as when displaying information from the Studio Store, so that the operator can see which channels will influence future CUT, PLUS, MINUS and ZERO actions.

b. When preparing automatic fades. The lamp lit on the

Preset Store Mimic should identify the channels that are likely to change in the Studio once the fade is commenced.

On Q-File, the On state of each channel is used to define all these conditions, and so the presence of a green Preset Mimic lamp confirms: that the channel is On in the Preset Store; that it will be Filed On so that its level will replace the existing level if it is brought back using CUT or PLUS, or it will turn the channel Off if used with MINUS, or On at Zero if used with ZERO; and that it will enable changes to Output (Studio) Store levels if UPFADE DOWNFADE or AUTO-CROSS FADE are used.

On MMS, levels greater than 7% are used for most of these actions, but not all, and there may be occasions when the Preset Mimic does not entirely satisfy (a) above. This occurs when channels have to be faded out.

When AUTO-CROSSFADE is operated on Q-File, all unwanted channels already On in the Output (Studio) Store are automatically turned On at zero level in the Preset Store and fade out. These channels appear on the Mimic and if a memory is then made up from the Preset Store, these channels as well as earlier channels with finite levels will be recorded and can play their part when the File is subsequently re-used. Similarly, if ZERO is used on Q-File, the zeroed channels are turned On at zero in the Preset Store ready to fade out and the Preset Mimic shows this and also that they will be included in any File made up from the Preset Store.

On MMS the 7% level has to serve as ON information for the Preset Mimic and also to identify channels which must change when fading. But when CROSSFADE is operated, all unwanted channels already On in the Studio Store have to be set to fade out.

To do this a 'Move' Store is provided.

This store identifies channels in the Preset Store at levels greater than 7% and enables them to UPFADE or DOWNFADE and it can also be set to allow channels required to fade to zero as a consequence of CROSSFADE or ZERO to move. The so-called Preset Mimic is in fact a mimic of this Move store and therefore shows all channels that will obey fade instructions. The Penalty for this is that a channel On in the Move store and showing on the 'Preset' Mimic might have zero level in the Preset Store and channels at zero in the Preset Store will not be included in any significant way when Filed. So, in the unusual circumstance that the Preset Mimic is taken to be a true definition of the channels to be filed from the Preset Store as intended in (a) above, any channels that have been set to fade out as a result of CROSSFADE or ZERO will not be Filed although showing on the Preset Store Mimic.

This difference seems likely to be the least troublesome way of presenting the display and processing capabilities of MMS for use in BBC studios and will usually pass unnoticed.

7. EXAMPLES OF MMS CONTROL PROCESSING RULES

EXAMPLE	ACTION	LEVELS FOR CHANNELS 1 2 3 4 5 6	EXPLANATION
STARTING CONDITIONS	CUT P CUT Q	9 7 5 3 0 0 6 8 5 0 0 4	Typical Channel Levels to illustrate machine rules
1	CUT P, PLUS Q	6 8 5 3 0 4	Latest instruction (not zero) takes precedence. Note: Channels can get dimmer.
2	CUT Q, PLUS P	9 7 5 3 0 4	Ditto: Note: P Plus Q not equal to Q Plus P.
3	CUT P, MINUS Q	0 0 0 3 0 0	Channels not at zero in the second File are turned Off.
4	CUT Q, MINUS P	0 0 0 0 0 4	Note: P Minus Q not equal to Q Minus P.
5	CUT P, PLUS Q, MINUS Q	0 0 0 3 0 0	Equals P Minus Q
6	CUT P, MINUS Q PLUS Q	6 8 5 3 0 4	Equals P Plus Q
7	SS CUT P, PS CUT Q, UP.	9 8 5 3 0 4	Change to Q if Q greater than P. Highest takes precedence.

Note: SS = Studio Store PS = Preset Store

EXAMPLE	ACTION	LEVELS FOR CHANNELS 1 2 3 4 5 6	EXPLANATION
STARTING CONDITIONS	CUT P CUT Q	9 7 5 3 0 0 6 8 5 0 0 4	Typical Channel Levels to Illustrate machine rules
8	SS CUT P PS CUT Q, DOWN	6 7 5 3 0 0	Change to Q if Q less than P and Q not equal to O. Lowest takes precedence.
9	SS CUT P, PS CUT Q, UP & DOWN	6 8 5 3 0 4	Change to Q where Q not equal to O. Equals P Plus Q
10	SS CUT P, PS ZERO Q, DOWN	0 0 0 3 0 0	Change Channels not O in Q to O. Equals P Minus Q.
11	SS CUT P, PS CUT Q, CROSSFADE	6 8 5 0 0 4	Change All to Q. Equals P Cut Q.
12	SS CUT P, PS GROUP Q UP	$9\frac{9}{9}$ $7\frac{7}{9}$ $5\frac{5}{9}$ 3 0 0	Channels 4 & 5 are not in the Group. Fractions are added until Ch.1 reaches 100%. Equal to 10/9 of all channels in Group.
13	SS CUT Q, PS GROUP P, DOWN by $\frac{1}{2}$	3 4 $2\frac{1}{2}$ 0 0 4	Channels 5 & 6 are not in the Group. Equal to $\frac{1}{2}$ of all channels in the Group

8. GLOSSARY

Channel	All the storage and data transmission paths that may be used to control a single dimmer. Each channel is known by the number of its dimmer. All channels can store control signal levels in many stores. Only the Studio or the A Store usually feeds signals to the dimmers directly.
Channel Control Module	A Module containing all the controls necessary to control a single channel via a Control Store, e.g. the Studio Store.
Core Store	A Store using ferrite core elements that can retain stored information without external power being needed.
Dimmer	The Thyristor power regulator controlling the power to a studio lamp.
Fade	Any gradual change in brightness, whether to brighter or to dimmer conditions.
Level	Control Signal Level. The magnitude of the voltage controlling a dimmer. Usually on a scale of 0 to 10 for increasing brightness. The level usually varies linearly with Panel Control Displacement, but the studio light output varies as an approximate square of the level, e.g. Level 10 is 100% and Level 7 is about 49%, light in the studio.
Module	A more or less self contained unit of the control system.
Store	A part of the Control System able to hold an input for continuous or later use, even though the source of input is removed.

BLANK PANEL		AUX. CONTROL PANEL		L/S SELECT.	L/S TALKBACK		PREVIEW & CAMERA
CORE STORE MODULE	PIN PATCH MODULE	**FILE SELECTOR** MODULE	**RATE PLAYBACK** MODULE		**CHANNEL** CONTROL MODULE		**CHANNEL** CONTROL MODULE

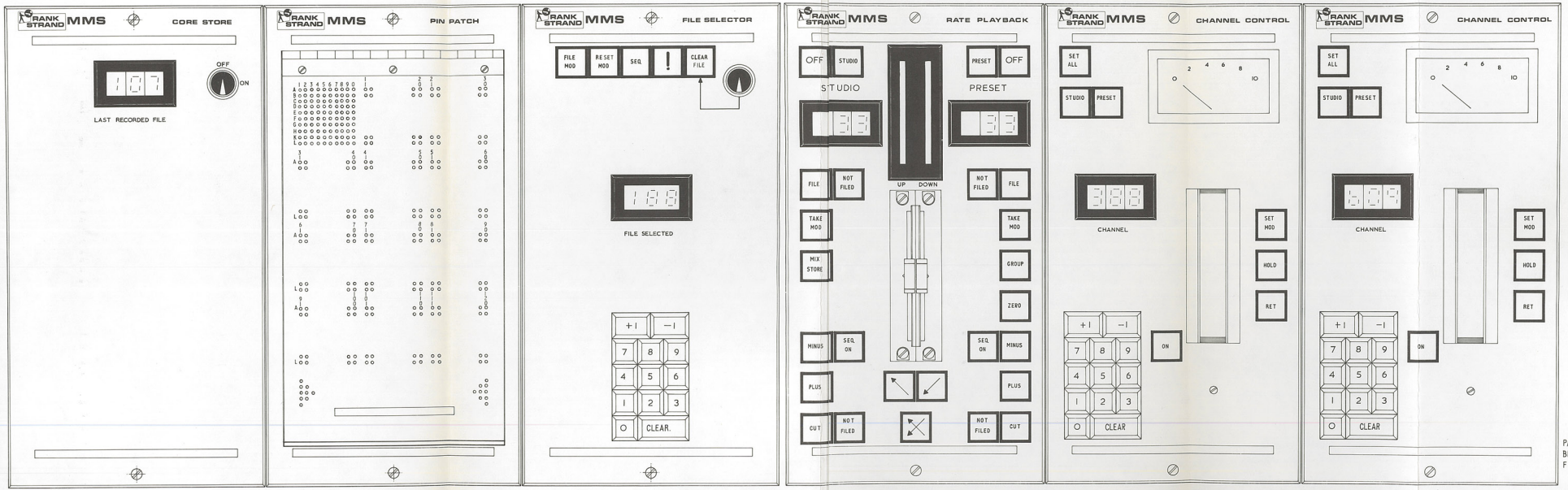
CONTROL DESK PANEL LAYOUT
MMS – BBC : TC5

FIG 1

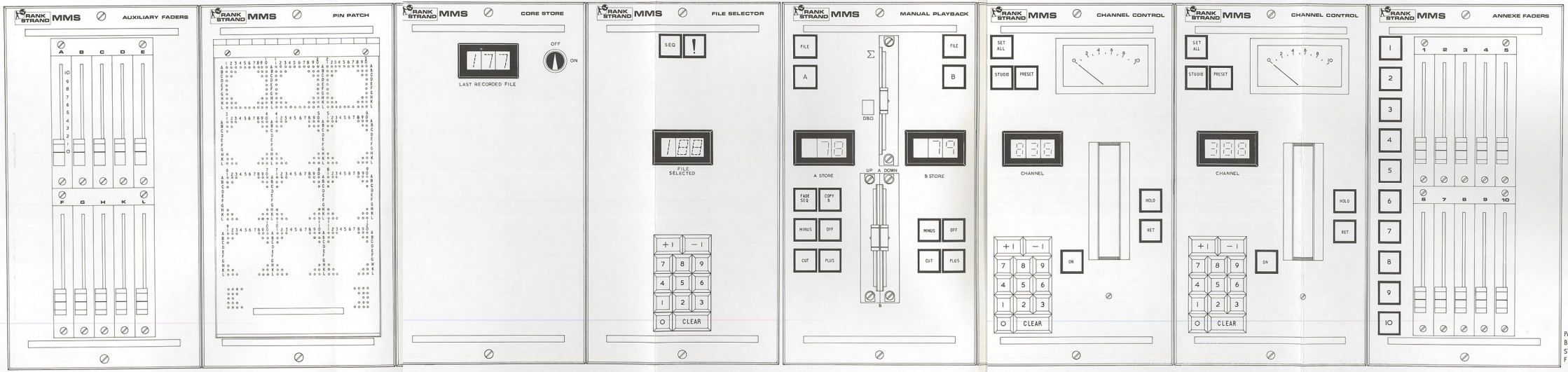
BLANK				AUXILIARY CONTROL PANEL			
AUXILIARY FADERS MODULE	PIN PATCH MODULE	CORE STORE MODULE	FILE SELECTOR MODULE	MANUAL PLAYBACK MODULE	CHANNEL CONTROL MODULE	CHANNEL CONTROL MODULE	ANNEXE CONTROL SPECIAL MODULE

CONTROL DESK PANEL LAYOUT
MMS BBC STUDIO C2 CARDIFF.

FIG.2



PANEL DETAILS
BBC TC5
FIG. 3



PANEL DETAILS
B.B.C. CARDIFF
STUDIO C 2
FIG. 4

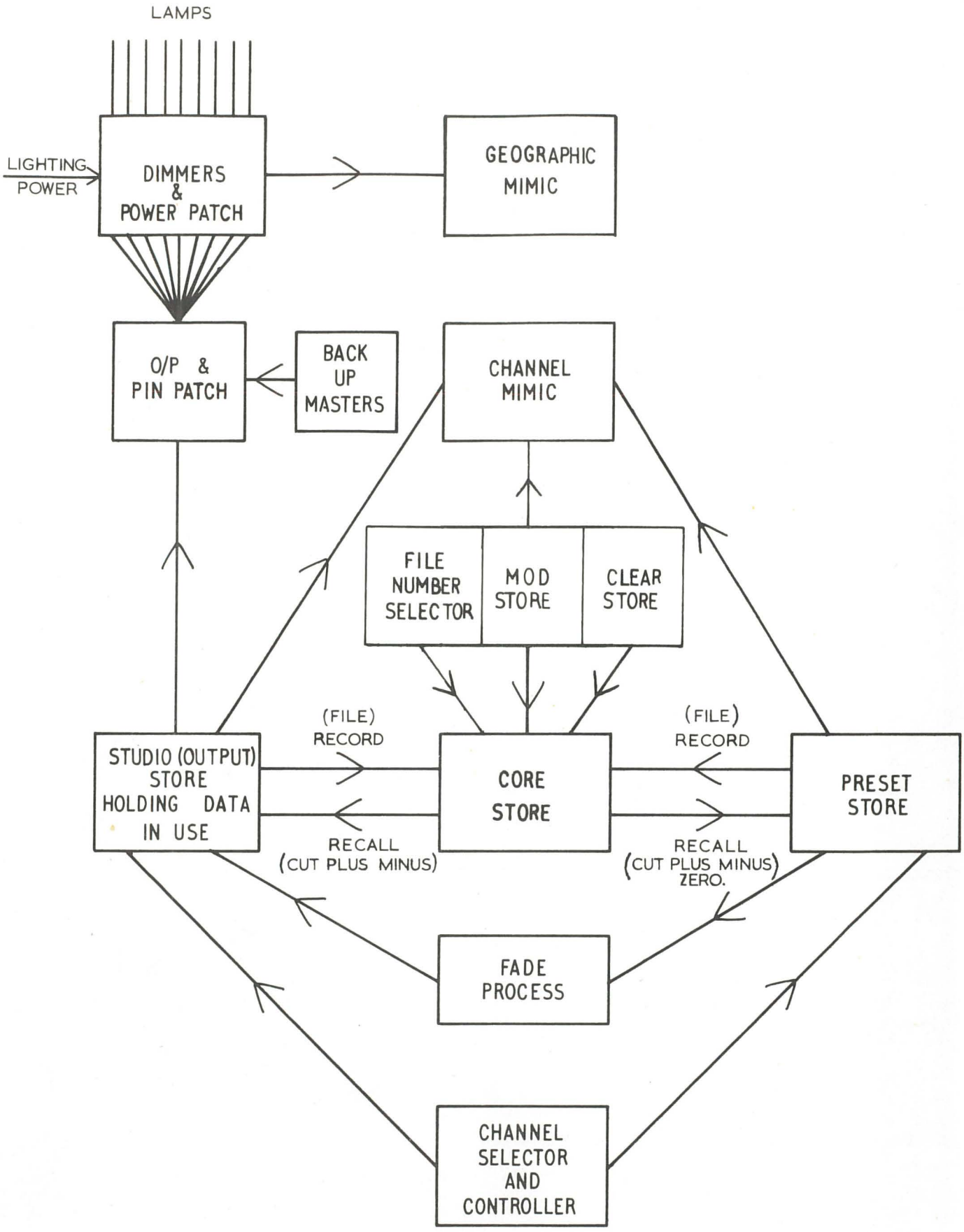


FIG.5. MMS CONTROL PATH DIAGRAM

RATE PLAYBACK (TC 5)

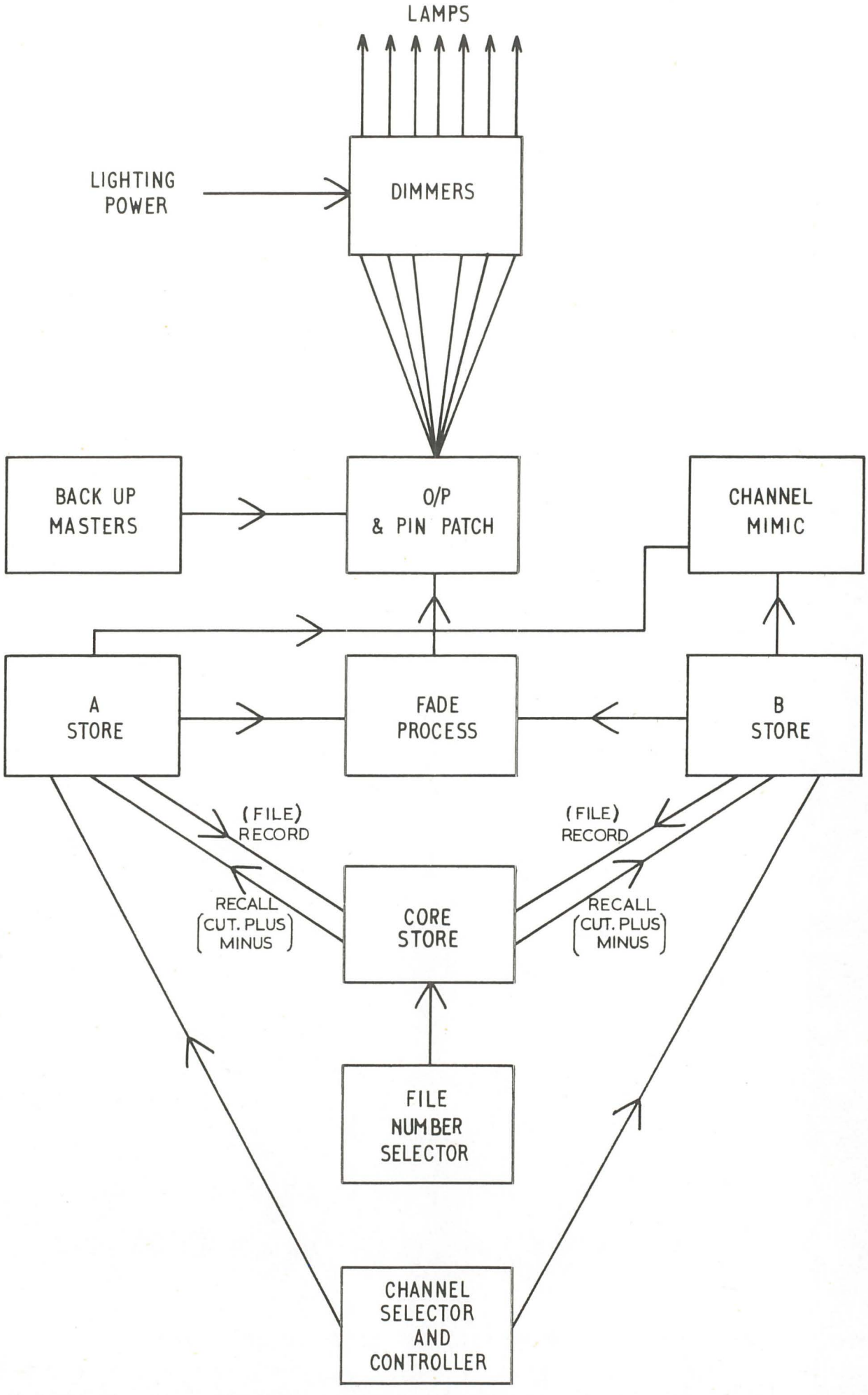
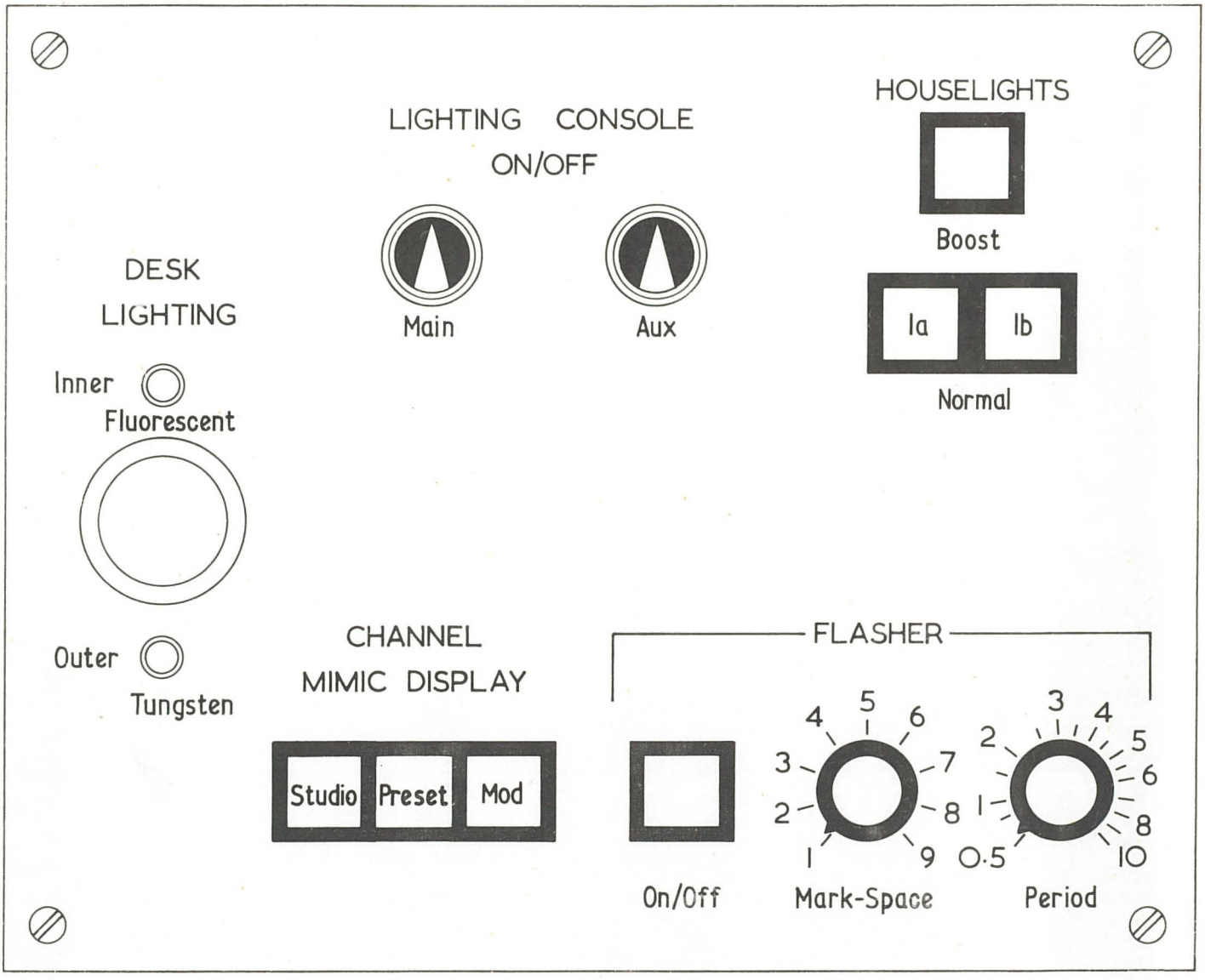


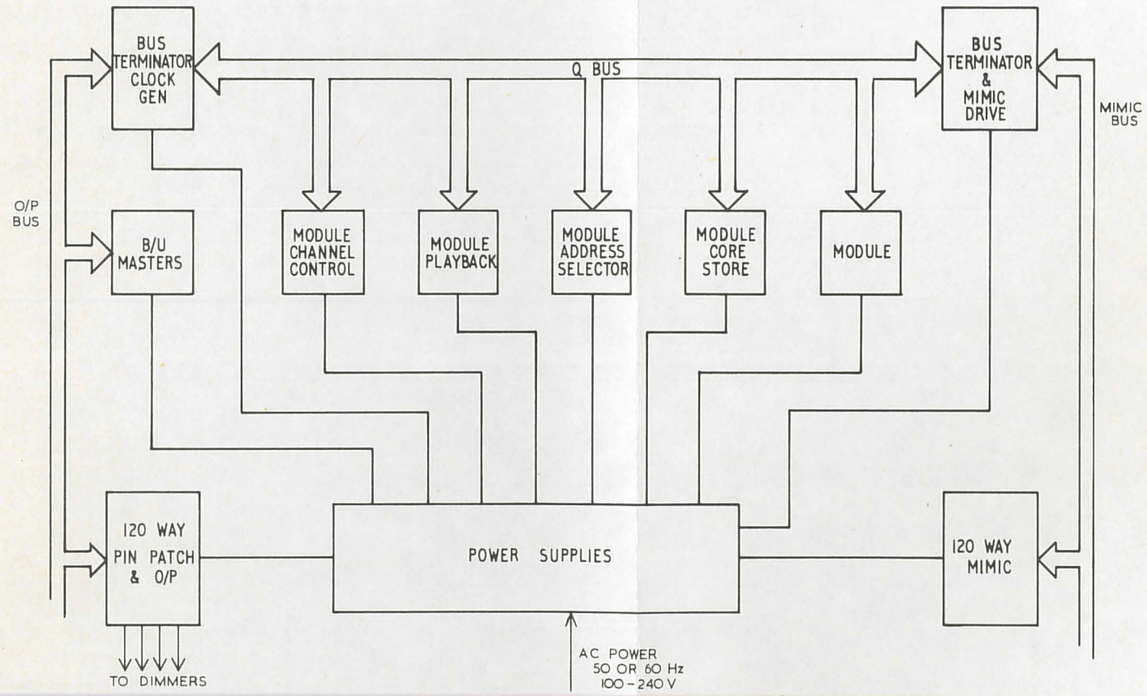
FIG.6. MMS. CONTROL PATH DIAGRAM

MANUAL PLAYBACK (CARDIFF)



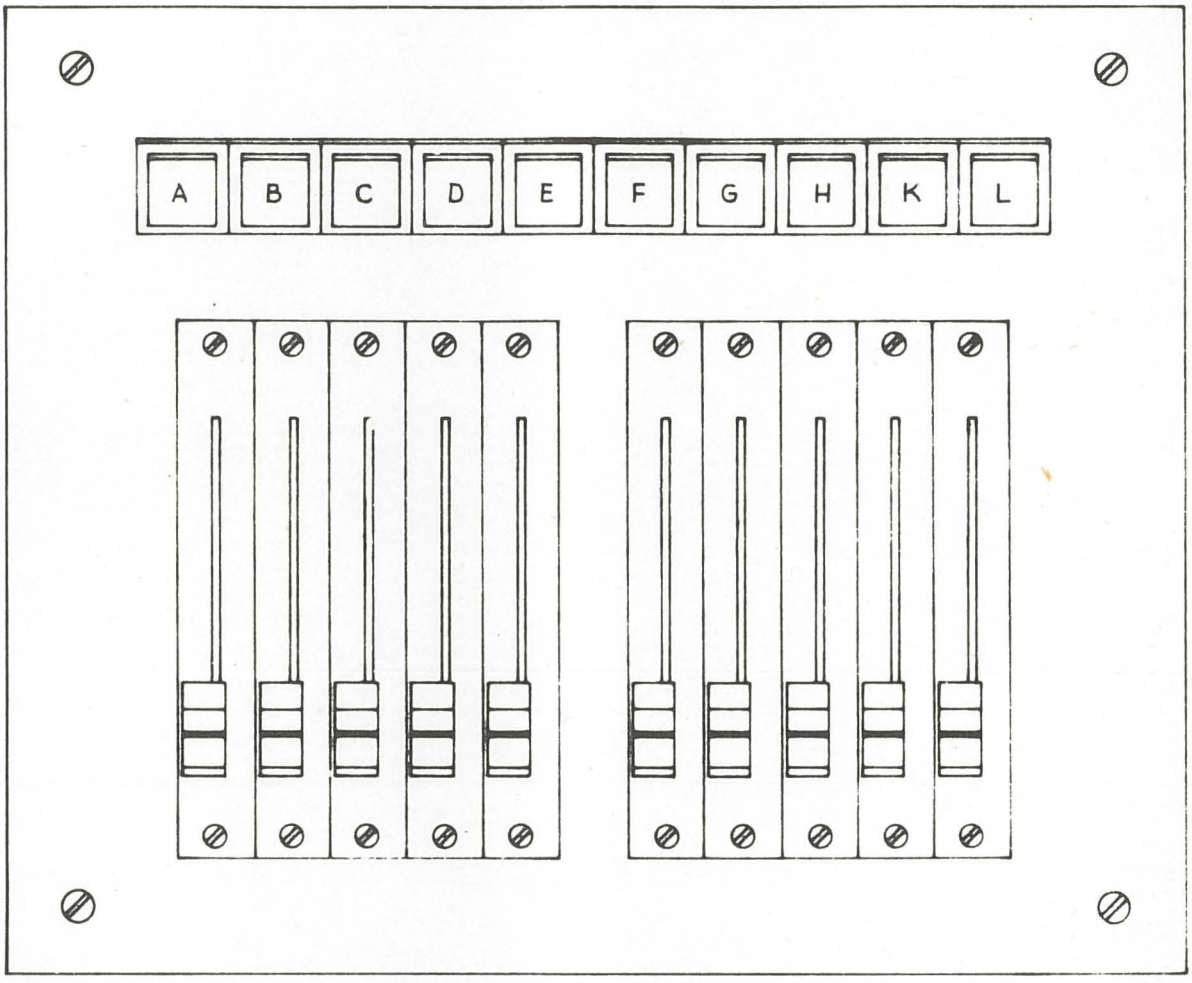
AUXILARY CONTROL
PANEL TC 5
FIG 7

AUXILARY CONTROL PANEL
CARDIFF STUDIO C2
FIG 8



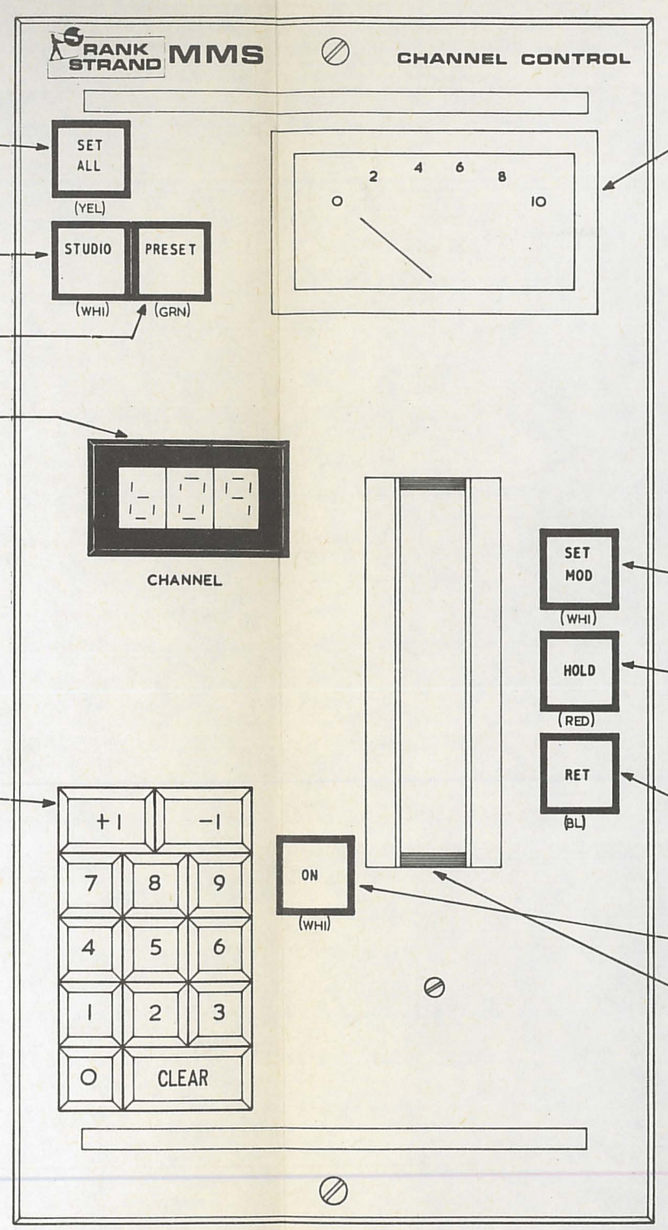
MMS MODULE INTERCONNECTION DIAGRAM

FIG. 9



AUXILIARY FADER UNIT
BBC - TC5

FIG.10



SET ALL (Not illuminated)

Sets all Last Store levels to the Meter level (see table opposite)

Store Selector Buttons:

These buttons determine which of the two Playback Stores are controlled by this Channel Control Module.

STUDIO (Called 'A' for Cardiff)

Selects control of the Studio (A) Store.
Cancelled by the PRESET push. STUDIO is selected automatically on switch-on.

PRESET (Called 'B' for Cardiff)

Selects control of the Preset (B) Store.
Cancelled by the STUDIO push.

CHANNEL Number Window

Shows the Number of the Channel being controlled by this Module. New digits are entered at the right, existing digits are shifted left. Leading zeros are suppressed.

Channel Selector Keyboard

Digit keys 0 - 9 enter into the CHANNEL number window.
CLEAR key always clears the Channel Number Window.
+1 key increases the Channel Number by one.
-1 key decreases the Channel Number by one.

Channel Level Meter

Shows the level of the Selected Channel in the Store being controlled.

Last Store

Each Channel Control Module contains a hidden Store able to remember one level for each channel. This level will be the most recent from the following table:

Latest Action	Last Store Level
System switched On.	Zero for all Channels.
Channel switched Off using the ON button on this Control Module.	Level for the Selected Channel reset to that shown on the Meter at switch off. All other channels unchanged.
Either FILE button used. (Core Store Keyswitch On)	All Channels reset to the level being Filed.
SET ALL on this Control Module operated.	All channel levels reset to the level shown on the Meter.

Note: Since each Channel Control Module contains its own Last Store their ON buttons may occasionally give different results due to their different history of use.

SET MOD (TC 5 only)

Illuminates with ON push.
When pressed sets the Selected Channel into the Mod Store. Sets the Mod Store Active if the push is alight; inactive if the push is not alight.

HOLD

Alternate Action. Illuminates when On and Holds the Channel Level in the Store being controlled under the exclusive control of this Module and independent of all Playback Store Controls.

If two Channel Control Modules are accessed to the same Channel, the first HOLD action excludes the other. HOLD cannot prevent the Channel being Faded on Manual Playback.

RETurn

The indicator lights whenever the selected Channel is not at the level present when its Channel number was last selected. Pressing RETurn resets the channel in the store being controlled to this level. This level is held for one Channel only in the Return Store.

ON

Alternate action. Switches the selected channel between Off and the Last Store level (see above). Lit when the channel level is above 7%.

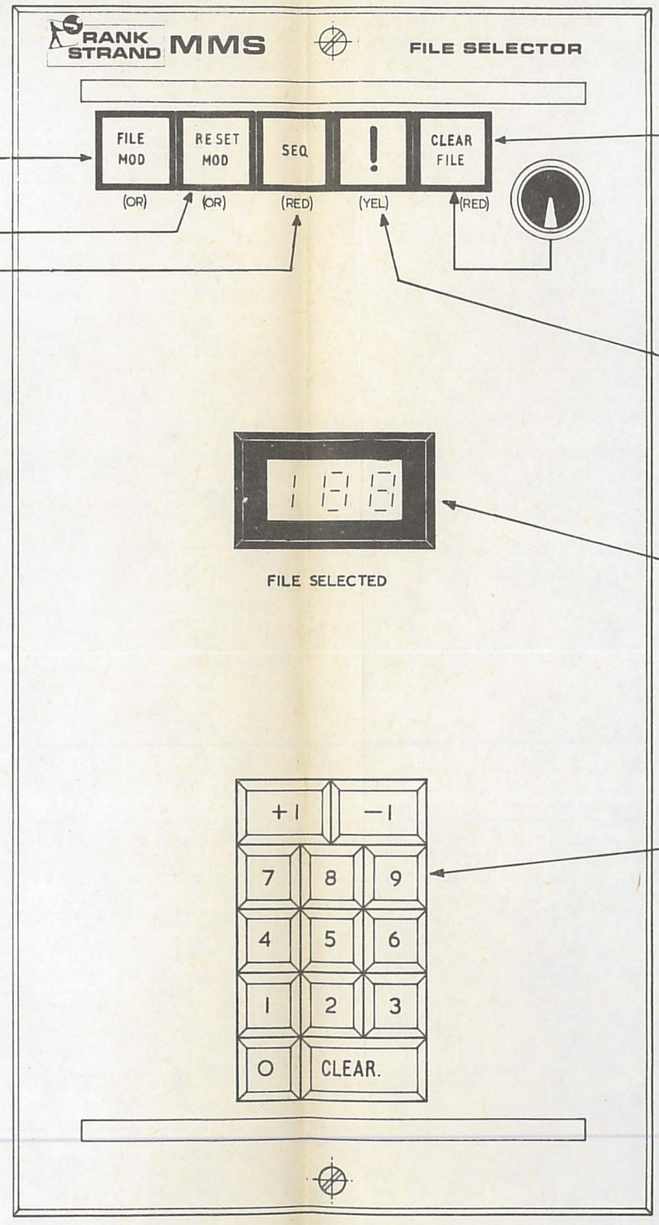
Fader Wheel

Provides direct manual level control of the selected Channel. No matching is needed. The full range of dimmer level is available on the exposed movement of the wheel.

Note: Two Control Channel Modules can be used simultaneously to control the same Store and Channel without restriction. The last action will always be obeyed (unless HOLD is On on the other Controller). The angular movement of the wheels add for the same direction of rotation.

MMS CHANNEL CONTROL MODULE LAYOUT AND CONTROL FUNCTIONS BBC TC5 AND CARDIFF

FIG.11



FILE MOD (TC 5 only)

Copies the Mod Store into the selected file for long term storage.

RESET MOD (TC 5 only)

Resets the Mod Store from the selected file.

SEQuence Push

Alternate Action - Lights when On.

When On, the preselected File Number is increased by one after any CUT, PLUS, MINUS or ZERO action on the Playback Module.

If the Manual Playback Module is in use, the AB Faders can also sequence the selected file if FADE SEQuence is also on.

CLEAR FILE (TC 5 only)

When the keyswitch (TOK 1) is held turned against a spring, and the 'CLEAR FILE' push is pressed, the core store module will be completely cleared. This action takes 4 seconds and is complete when the (!) indicator lights. Illuminates when clearing store.

Overflow Indicator

Lights to indicate when a file number selected is larger than the system can deal with or during switch-on routine. When lit the system interlocks to stop all file transfer operations.

FILE SELECTED Window

Shows the number of the file that will be used by any store action push.

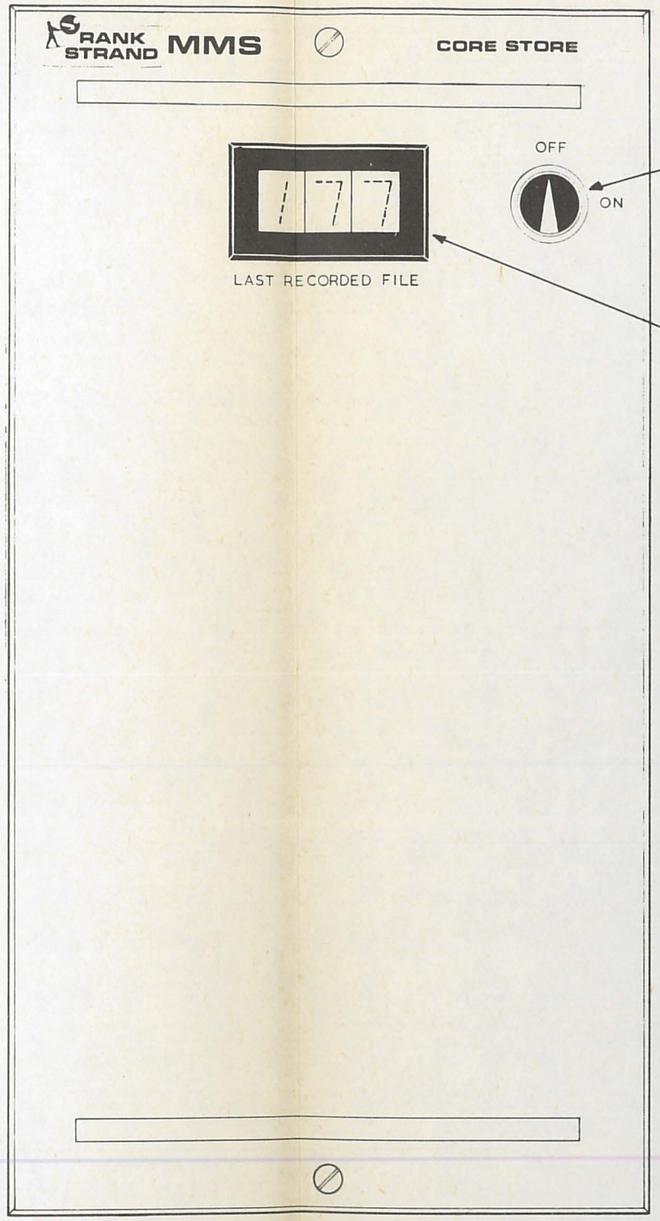
Leading zeros are suppressed.

New digits are entered at the right. Existing digits are shifted left.

File Selector Keyboard

Digit keys 0 through 9 enter into the file number window.
Clear key always clears the file number.
+1 push increases the file number by one.
−1 push decreases the file number by one.

MMS FILE SELECTOR MODULE
LAYOUT AND CONTROL FUNCTIONS
BBC TC5 AND CARDIFF FIG.12



Core Record Keyswitch (TOK.1)

Inhibits transfer of new information into the core when off. Enables such transfer when on.

LAST RECORDED FILE Window

Shows the file number to which information was last transferred into the core. Leading zeros blanked. Blank when record lock is off.

MMS CORE STORE MODULE
LAYOUT AND CONTROL FUNCTIONS
BBC TC5 AND CARDIFF FIG.13

A Store FILE Push

Lights when pressed and records all channel levels in the A Store into the selected file, if the core store module key switch is on.

A Store Identification Push

As B Store.

D.B.O. (Dead Blackout) Switch

Top Position Flash D.B.O.

Centre Position No D.B.O. Action

Bottom Position Sustained D.B.O.

A Store File Number Display Window

Shows last file number from the File Selector Module after any FILE, CUT, PLUS or MINUS action. Blanked by the OFF action. Set from the B Store window when COPY operated and by Fade Sequence Copy.

FADE SEQuence Push

Lights when active (SEQuence must also be On on the File Selector Module). Causes automatic cutting of the channel levels from next file set by the file selector module into the dead store (either A or B) on the completion of a crossfade (A to B, or B to A).

COPY

When pushed cuts the contents of B Store into A Store (used to allow routine with A Store as Studio and B Store as Preset). (Illuminated after Action; cancelled by other A Store action pushes).

If used when FADE SEQuence is On, the A Store will automatically copy the B Store whenever the AB Faders reach the B end so that they can be returned to the A end with no further change. The B Store cuts to the next file in the sequence when the faders reach the A end.

A Store MINUS Push

Turns off those channels in the A Store for which corresponding channels in the selected file are non-zero. (Illuminated after action - cancelled by other A Store action pushes).

A Store OFF Push

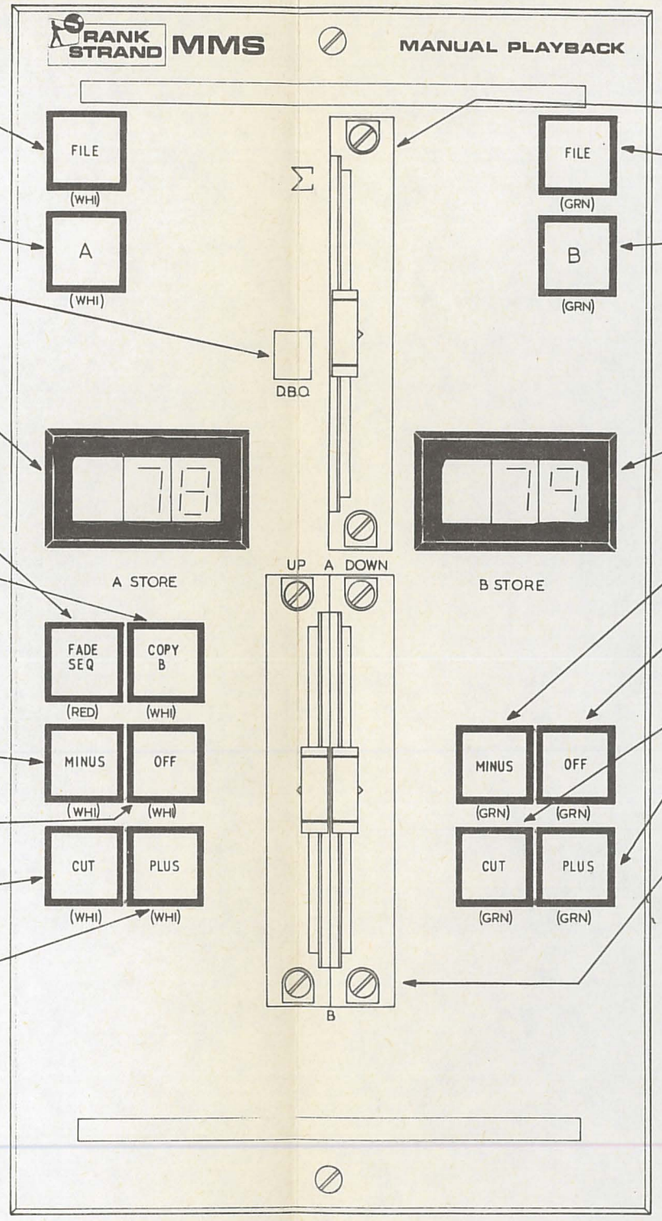
Turns off all channels in the A Store.

A Store CUT Push

Replaces all channel levels in the A Store by new channel levels from the file selected on the file selector module. (Illuminated after action; cancelled by other A Store action pushes).

A Store PLUS Push

Replaces channel levels in the A Store by new channel levels from the selected file provided the latter are non-zero. (Illuminated after action; cancelled by other A Store action pushes).



Grand Master Fader

Provides a proportional reduction on all channel outputs from this module.

B Store FILE Push

As A Store.

B Store Identification Push

Alternate action. When lit identifies this as the B Store. Available for control by a channel control module and for display on the Channel Mimic. When off, no external control or mimic display is possible but still gives outputs to the dimmers. Normally turned on automatically at switch-on. Only used when two playback modules are connected, to determine which playback is to receive control and give mimic display.

B Store File Number Display Window

As A Store.

B Store MINUS Push

As A Store.

B Store OFF Push

As A Store.

B Store PLUS Push

As A Store.

B Store CUT Push

As A Store.

AB Faders

Transfer control for all channels between the A Store and the B Store. Separate levers are provided for the up and down parts of the crossfade. Channels at same level in both the A & B Stores are not affected by the AB Faders. When both are at the A end, the A Store can control the dimmers. When both are at the B end, only the B Store can control the dimmers.

DOWN Fader

Proportionally controls those channels whose levels are to be decreased by the fade.

UP Fader

Proportionally controls those channels whose levels are to be increased by the fade.

MMS MANUAL PLAYBACK MODULE
LAYOUT AND CONTROL FUNCTIONS
BBC TC5 AND CARDIFF FIG.14

STUDIO STORE CONTROLS

OFF

Turns off all Channels in the Studio Store.

STUDIO Store Identification Push

When Lit, identifies this as the Studio Store available for control by a Channel Control Module and for display on the Channel Mimic. When Off, no external control or display is possible but the Store still gives outputs to the dimmers. Normally turned on automatically at switch-on. Only of use when two Playback Modules are connected to determine which Playback is to receive control and give mimic display. (Alternate Action).

Studio File Number Display Window

Shows the last File number taken from the File Selector Module by any Studio FILE, CUT, PLUS or MINUS action, or the File Number from the Preset Store following a complete Crossfade. Set blank by the OFF action.

FILE

Records all the Studio Store Channel levels into the File Selected in the Core Store. The button is only lit and operative if the Core Store Module keyswitch is On.

TAKE MOD

When On, those channel levels being transferred from a File into the Studio Store as a result of a CUT or PLUS action, and which have non-zero levels in both the File and the Mod Store, take the Mod Store level instead of the File level. (Alternate Action).

MIX STORE

When On, the highest level from the combined outputs of the Studio and the Preset Stores are fed to the dimmers. The contributions of the two Stores remain separately recordable. (Alternate action).

SEQ ON

A slave pilot from the SEQuence push on the File Selector Module.

MINUS

Turns Off those channels in the Studio Store for which the corresponding channels in the File Selected are non-zero. (Illuminates after action; cancelled by Studio CUT, PLUS and OFF pushes).

PLUS

Replaces channel levels in the Studio Store by new levels from the File Selected provided the latter are non-zero. (Illuminates after action; cancelled by Studio CUT, MINUS and OFF pushes).

CUT

Replaces all Channel levels in the Studio Store by new levels from the File Selected. (Illuminates after action; cancelled by Studio PLUS, MINUS, and OFF pushes).

NOT FILED

A pilot light to warn that a channel level may have been altered in the Studio Store and has not been Filed.

FADE CONTROLS

UPFADE

Initiates a fade change of Channel levels in the Studio Store to match the Preset Store levels, but only for channels with higher levels in the Preset Store than in the Studio Store. (Alternate Action; Illuminates when active).

When GROUP is On, all channels that are non-zero in both the Studio and the Preset Stores are proportionally increased in the Studio Store while UPFADE is held depressed, (i.e. the starting level in the Studio Store is doubled in the time shown on the Up Time lever). The increase cannot be continued after any channel reaches 100%. The increase can be reversed at any time using the DOWNFADE push.

DOWNFADE

Initiates a fade change of Channel levels in the Studio Store to match the Preset Store levels, but only for channels with lower, but non-zero, levels in the Preset Store than in the Studio Store. (Alternate Action; Illuminates when active).

When GROUP is On, all Channels that are non-zero in both the Studio and Preset Stores are proportionally decreased in the Studio Store while DOWNFADE is held depressed, (i.e. the starting level in the Studio Store is reduced to zero in the time shown on the DOWN Time Lever). The decrease can be reversed at any time by using the UPFADE push.

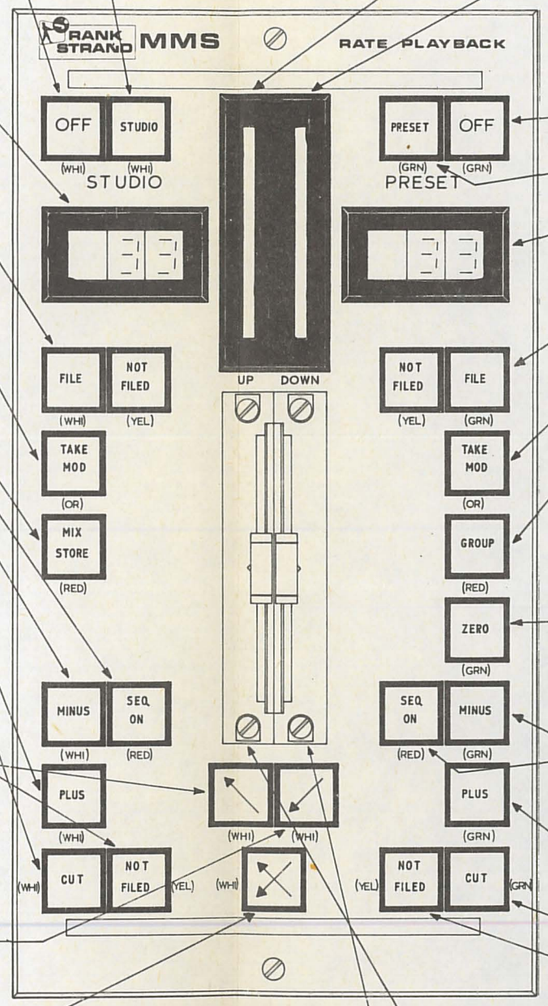
CROSSFADE

Initiates a fade change of all Channels in the Studio Store to match levels, including zero levels, in the Preset Store.

While CROSSFADE is On:

Channels turned Off in the Preset Store by Preset MINUS or OFF or by a Channel Control Module will stop fading. Channels turned Off by Preset CUT will fade out. Channels altered in the Studio Store by Studio PLUS or MINUS will turn Off in the Preset Store and stop fading.

Action inhibited by GROUP.
(Alternate action; Illuminates when active. Studio CUT will cancel).



Upfade Progress Indicator

Lights come on from the bottom as an Up Fade progresses. All lights On shows that the Up change is complete. Reset to all-off at the start of any new major change.

When GROUP is On the lights show how much the Studio Store has been increased from the starting levels.

Downfade Progress Indicator

Lights come on from the bottom as a Down Fade progresses. All lights On shows that the Down change is complete. Reset to all-off at the start of any new major change.
When GROUP is On the lights show how much the Studio Store has been decreased from the starting levels.

PRESET STORE CONTROLS

OFF

As Studio Store.

PRESET

As Studio Store.

Preset File Number Display Window

Shows the last File number taken from the File Selector Module by any Preset FILE, CUT, PLUS, MINUS or ZERO action. Set blank by the OFF action.

FILE

As Studio Store.

TAKE MOD

As Studio Store.

GROUP

Changes the mode of Fade operation.

When pressed:

a. GROUP button illuminates.
b. The File Selected is Cut into the Preset Store.
c. The action of CROSSFADE is inhibited.
d. The mode of operation of the UPFADE and DOWNFADE pushes is changed to give proportional increase or decrease of Studio Store levels for the Group of channels Cut into the Preset Store while these buttons are held depressed.
Channels set non-zero in the Preset Store from a Channel Control Module while GROUP is On will also give proportional changes in the Studio Store.

This mode of operation is cancelled and the Fade controls returned to normal by Preset CUT, PLUS, MINUS, ZERO, OFF and FILE.

ZERO

Turns Off those Channels in the Preset Store for which the corresponding channels in the File Selected are non-zero.

When used with UPFADE, DOWNFADE or CROSSFADE, Channels that are non-zero in the File Selected are set to fade to zero.

(Illuminates after Action; cancelled by Preset CUT, PLUS, MINUS and OFF pushes).

SEQ ON

As Studio Store.

MINUS

Turns Off those channels in the Preset Store for which the corresponding channels in the File Selected are non-zero. When used with UPFADE or DOWNFADE, or with CROSSFADE On, Channels that are non-zero in the File Selected stop fading and remain at their present level until new levels are set into the Preset Store.

(Illuminates after action; cancelled by Preset CUT, PLUS, ZERO and OFF pushes).

PLUS

As Studio Store.

CUT

As Studio Store.

NOT FILED

As Studio Store.

UP Time Lever

Determines the time taken to complete any UP fade. Calibrated in Seconds. The fade is stopped in the ⊚ position.

DOWN Time Lever

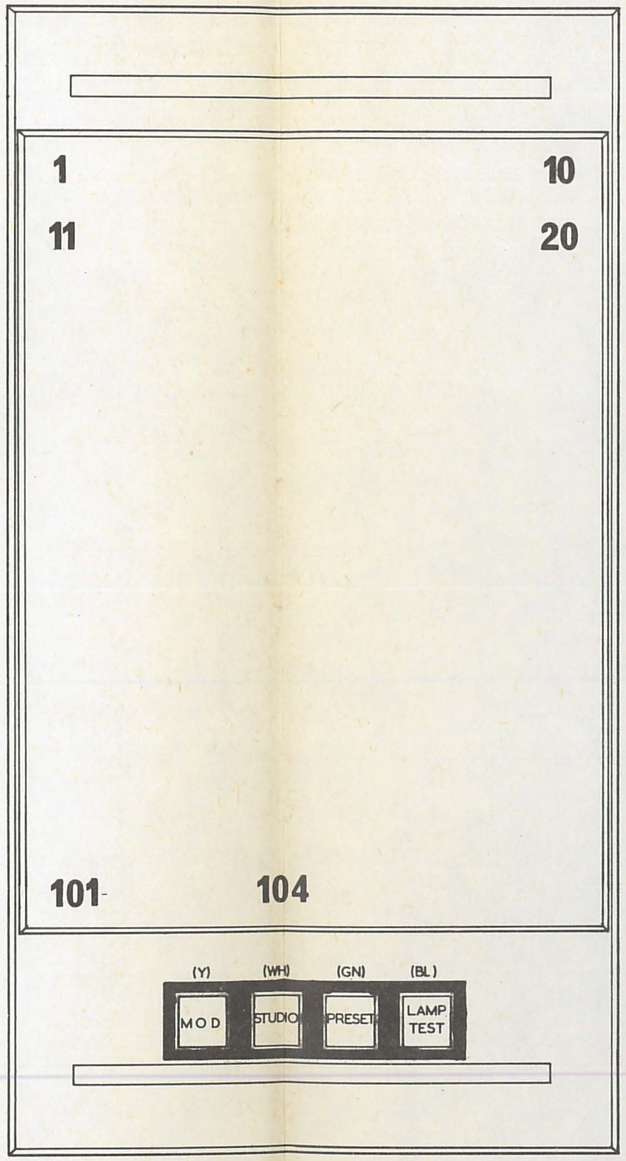
Determines the time taken to complete any Down fade. Calibrated in seconds. The fade is stopped in the ⊚ position.

MMS RATE PLAYBACK MODULE LAYOUT AND CONTROL FUNCTIONS

BBC TC5 FIG.15

This Mimic may be selected to monitor the following information:

Mimic Display Indicator On	When Available	Displayed Information
STUDIO (White)	TC 5 only Rate Playback in use	Channels On (non-zero) in the Studio Store and therefore normally alight in the Studio.
	Manual Playback in use.	Channels On (non-zero) in the A Store.
	Both Playbacks fitted	Channels On in the Studio Store or the A Store on the Playback accepting control.
PRESET (Green)	TC 5 only Rate Playback in use	Channels On in the Move Store. The Move Store is identical to the Preset Store except when a Fade is happening or has recently been completed. It then shows all channels that may have to move, including those set to change to zero by CROSSFADE or ZERO, and does not show those not able to move as a result of MINUS in the Preset Store or CUT or PLUS in the Studio Store.
	Manual Playback in use	Channels On (non-zero) in the B Store.
	Both Playbacks fitted	Channels On in the Move Store or the A Store on the Playback accepting control.
MOD (yellow)	TC 5 only	Channels On (non-zero) in the MOD Store.
'A' (white)	Cardiff only	Channels On (non-zero) in the A Store, usually those channels alight in the studio.
'B' (green)	Cardiff only	Chanels On (non-zero) in the B Store.
STUDIO (yellow)	Cardiff only	Channels On (non-zero) at the output of the AB and Grand Master Faders; so normally alight in the studio.
LAMP TEST (blue)	TC 5 and Cardiff	All lamps should light for checking.



The front panel forms a matrix of 120 rear illuminable channel numbers. For TC5: 104 numbers are revealed. For Cardiff C2: 80 numbers are revealed.

A window is lit when that channel number is on in the store selected for display. See opposite.

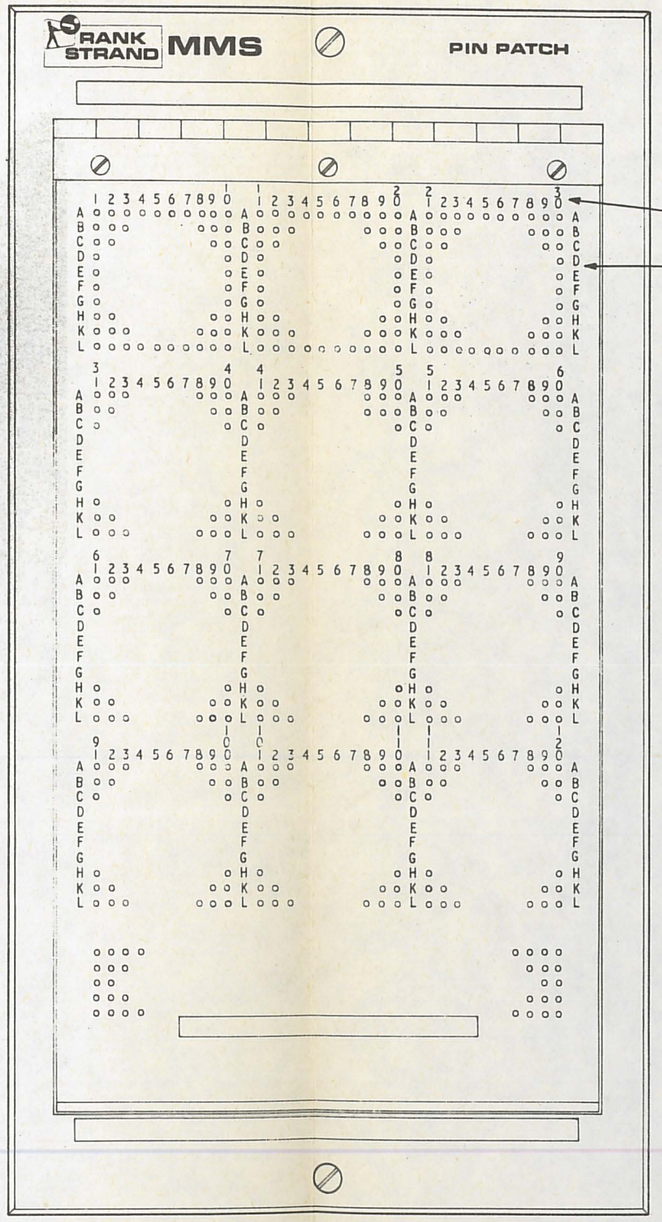
Mimic Display Indicators

Show which store is being monitored by the mimic lamps.

MOD, STUDIO or PRESET are selected on the Auxiliary Control Panel. Lamp test is switched by operating the indicator button (alternate action).

MMS CHANNEL MIMIC MODULE LAYOUT AND CONTROL FUNCTIONS BBC TC5 AND CARDIFF

FIG. 16



CHANNELS

AUXILIARY FADERS A - L

L can be switched on the Auxiliary Control Panel to become the output of an effects flasher.

Control Pins can be inserted at any intersection hole to give the (row) fader control of the (column) channel.

The outputs of the MMS proper and the control faders combine as follows:

Yellow Pins	- highest level takes precedence
Red Pins	- lowest level takes precedence

WARNING: Red and Yellow pins must not be used simultaneously on the same channel or interaction may result (e.g. do not use a Red Pin in A1 and a Yellow Pin in B1).

MMS PIN PATCH MODULE
LAYOUT AND CONTROL FUNCTIONS
BBC TC5 AND CARDIFF FIG.17

REGIONAL OFFICES & ASSOCIATE COMPANIES

HEAD OFFICE, SOUTHERN REGION & MAINTENANCE DEPT:

RANK STRAND ELECTRIC LTD.
P.O. Box 70, Great West Road,
Brentford, Middx., TW8 9HR.
Tel: 01-568-9222 Telex: 24408 Cables: Rankaudio Brentford

NORTHERN REGION:

Church Lane, Lowton,
Nr. Warrington, Lancs., WA3 2PN
Tel: Ashton-in-Makerfield (0942-) 73811

SCOTLAND:

128 St. Vincent Lane, Glasgow, G2 7LA.
Tel: 041-248-5735

ASSOCIATE COMPANIES:

Asia:

Rank Strand Asia Ltd.,
1618 Star House, 3 Salisbury Road,
Tsim Sha Tsui, Kowloon, Hong Kong.
Tel: K-677589
Telex: HX 4953 Ranksa Cables: Spotlite Hong Kong

Australia:

Rank Industries (Australia) Pty. Ltd.,
Strand Electric Division,
19 Trent Street, Burwood, Victoria, 3125.
Tel: 29-3724
Telex: 31904 Sigray Cables: Spotlite Melbourne

Canada:

Strand Century Ltd.,
6334 Viscount Road, Malton, Ontario.
Tel: (416) 677-7130
Telex: 06 22204 Cables: Spotlite Toronto

Germany:

Rank Strand Electric,
3301 Salzdahlum, Salzbergstrasse 2, W. Germany.
Tel: 05331-7951
Telex: 95641 Cables: Cinemoid Salzdahlum.

U.S.A:

Strand Century Inc.,
20 Bushes Lane,
East Paterson, New Jersey 07407.
Tel: (201) 791-7000 Telex: 130 322

RANK STRAND ELECTRIC LIMITED

Head Office:

P.O. Box 70, Great West Road,
Brentford, Middlesex, TW8 9HR

Tel: 01-568 9222 Telex: 24408

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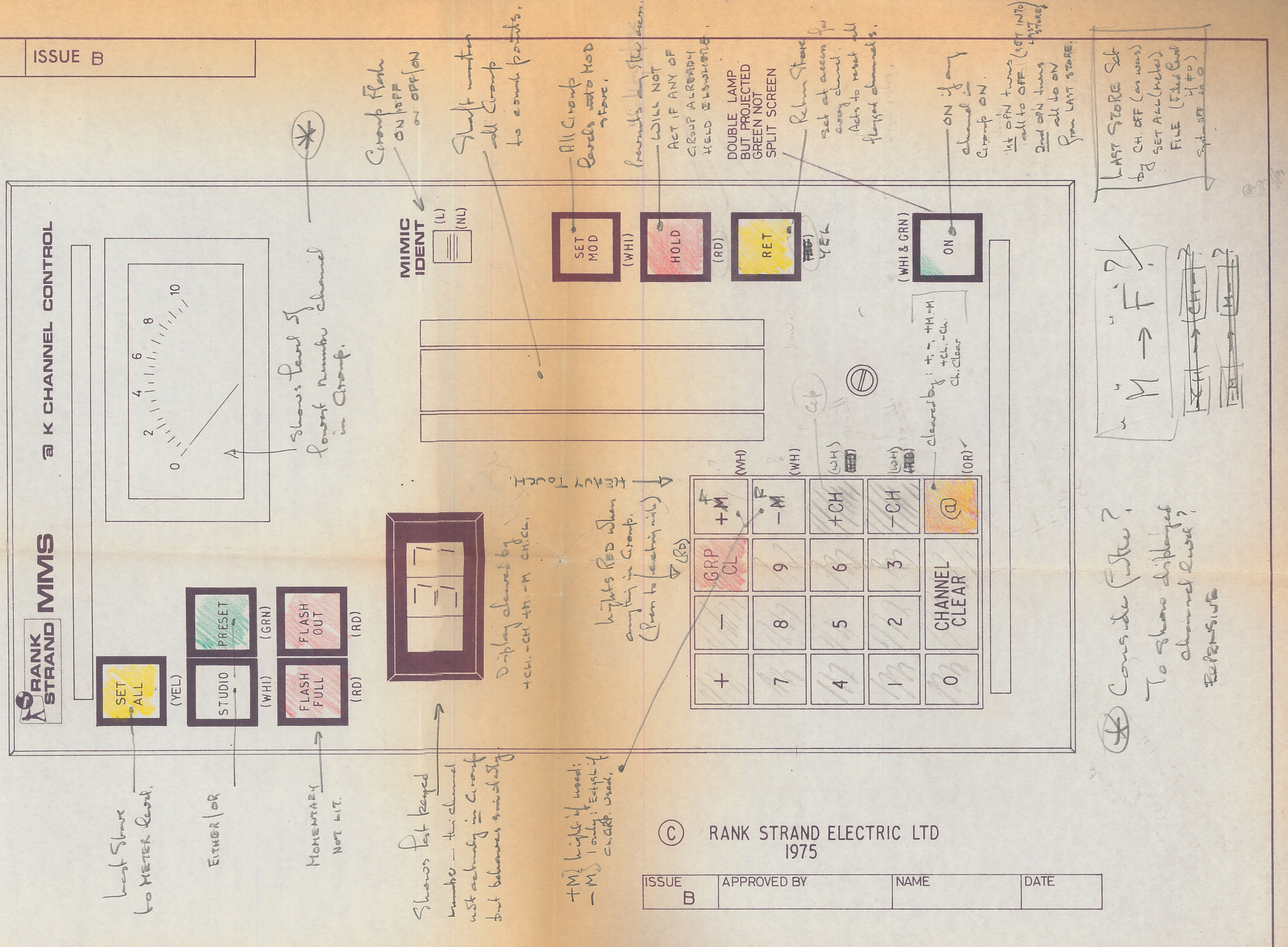

ISSUE	APPROVED BY	NAME	DATE
B			

RANK STRAND ELECTRIC
PO Box 70 Great West Road Brentford Middlesex TW8 9HR
Telephone 01-568 9222 Telex 24408
A DIVISION OF
RANK AUDIO VISUAL LIMITED

DIMENSIONS IN INCHES/MILLIMETRES
THIRD ANGLE PROJECTION

TOLERANCES	
IMPERIAL	METRIC
FRACTION ± 1/64"	1 DEC PLACE ± 0·4 mm
DECIMAL ± ·005"	2 DEC PLACE ± 0·1 mm
ANGULAR ± 0·25°	
UNLESS OTHERWISE STATED	
USED ON :-	

		DATE
SCALE	1:1	
DRAWN		14.10.75
CHECKED		
APPROVED		
MATERIAL :-		

FINISH :- BS4800 -1972 COLOUR 00-A-09 WARWICK SEMI GLOSS

TITLE :- MMS BBC -TC6 @ K CHANNEL CONTROL MODULE PANEL LAYOUT

ISSUE B

DWG. Nº 1C15921

REV. 1. C. Nº

TC 6: Channel Controllers

Do we want:

✗ a). GRP CL to light to show Group Mode?
COLOUR: RED.
RELABEL: CL GRP.?

✓ b). +M, −M, +CH, −CH, @ — Heavy Touch.
✓ COLOUR: +CH. −CH. (Non illuminating - why) — WHITE. (NOT RED).

✓ c) RETURN YELLOW (or WHITE) (NOT RED).

~~d) −CH to be CH− (cf: +CH)~~

✓ e). +M. −M to be +F. −F [FILE!]

✓ f) Should +CH −CH light.

g). RESET MOD. instead of Recall MOD. (Also TC5)
As Handbook.

Note importance of handbook.

Filter Ref Mod on P/S.
SEQ Separate on SS + PS.
(!) only on SS.
Chan/Ide only on PS.

INTERCHANGE OFF/STUDIO
FILE/NOT FILED

How does [GRET] put up steps in level from the controller.

Group can give: Flag in Group Store.
Selected Channel in Gp Store.

+M. Set Channel flags from Selected Memory

−M Clear Channel flags from Selected Memory.

+CH ~~&~~ Set Channel flag from Selected Channel. if ON ?

−CH ~~&~~ Clear channel flag from Selected Channel.

(How clear all group?)

Wheel up / down: all flagged channels count up / down

NB Crunch at [illegible] or while

at ON 1st — All flagged channels set to last store levels if off

at ~~OFF~~ ON 2nd — All flagged channels set to 0 if > 0.06. and last store is reset. ? (Last store also set from SET ALL or FILE ?)

at RET — All flagged channels set to levels in Return Store (Return Store set when flag put ON for that channel

ON if flag > 0.06 ? then lowest channel selected NOT 2

METER — Shows level of lowest number flag channel. NB Not channel selected !

WINDOW — SHOWS KEYED NUMBER

After CL GP. only Keyed No ~~[illegible]~~ flagged.

After +CH exiting flag retained & new keyed no flagged

+F ?

~~At~~ At +M exiting flags retained & new flags set from Memory > 0.05 (Display cleared)

~~At~~ −CH flag ~~removed from window group~~ from ~~number~~ ~~here~~ present in window

Does this mean +Ch37 but ~~[illegible]~~ 37 CH− .

At −M flags removed from channels with M > .05.

At CL GP. All flags removed.

At Cl. CH. Keyed number from window.

SET MOD. Puts present level into MOD store for all flagged channels (if OFF & flag takes out of ~~[illegible]~~ MOD Store)

HOLD prevents access to flagged channels

by other controller: What if some already

Held elsewhere?

MOD ROUTINE. "98"

FILE SELECT Group

Last Store: Dev.

[Read Mod. } Labels
[Read Mod. } Number

Set Mod in Group

Retain in Group.

Recognition of Group State.

		ON	OFF
	+M ←	Channels in F Sheet Specified.	-M. Ch.GP
	-M ←	– – – – –	+M. Ch.GP.
	+Ch ←	Flag in Gp.	No Flag in Gp
Red:	-Ch ←	W.No in Gp.	W.No ~~...~~ in Gp.

---

1. IN GP MODE

2. ~~...~~ History of Use.