

# CINEMATION 2005

## RELAY BOARD CIRCUITRY

### PART 1 – OPERATION OF THE INTERNAL MODE (INTERVAL SWITCH SW6 TO ON)

The projectionist laces up the film and presses the SHOW START push button. This resets the sequencer to position 1.

Select AUTO or MANUAL position of START SHOW AUTO/MANUAL switch SW1. In AUTO position the show will start after the set time of SHOW START clock TC1 has elapsed. In MANUAL position the show will start immediately the button is pressed.

Pressing the START button PB3 with SW1 in the MANUAL position pulses relay RLA (via NORMAL position of ISOLATE/NORMAL switch SW4 and diode D1) and also triggers the 5 second START BUZZER TIMER TD1 (via diode D5 and relay RLB via SW4).

**Contacts A1** hold on RLA and send PROJECTOR READY (green LED) signal to STATUS PANEL.

**Contacts A2** de-energises relay RLR (see under 5<sup>th</sup> mark).

**Contacts B1** hold on relay RLB.

**Contacts B2** sound the PROJECTOR START warning buzzer.

If the AUTO/MANUAL switch SW1 is set to the AUTO position the START SHOW TIMER TC1 output contacts will initiate the operation of relays RLA and RLB as above after the TIMER set time has elapsed.

After the 5 second time delay has expired the output pulse TD1 O/P energises relays RLX1 and RLX2 contact X1-1 contacts open to de-energise relays RLA, RLB and RLO.

**Contacts X1-2** switches +24V to energise relays RLC and RLD via INTERLOCK switch SW2-B in OFF position. Also switches +24V to INTERLOCK LAST switch SW7 and in the ON position switches +24V to START ON INTERLOCK output (TB4 pin 6) for connection to all other units to allow them all to start together.

Note : INTERLOCK switch SW2-B would be in the ON position for interlock working and relays RLC and RLD would operate with the MASTER unit (LAST ON INTERLOCK) controlling the start of the other units (SLAVES).

**Contacts X2-1** removes the +24V supply from Internal Clock TC2 (pin 11) in AUTO mode (SW10-A).

**Contacts C1** pulse PROJECTOR START.

**Contact C2** pulse the HOUSE LIGHTS DOWN.

**Contact C3** pulse the sound to MUTE. The CD sound fades out slowly as the projector gains speed.

**Contacts C4** pulse side wash lights down.

**Contacts D1** hold on relay RLD.

**Contacts D2** switch on the Xenon rectifier.

When the first mark on the film is detected it is taken to an 8 way sequencer SQ1. Only five of its positions are used as there are only five marks (maximum used for the entire programme).

The principle functions of the sequencer are to 'clean up' the pulse received from the marks on the film and to present them as 5 separate pulses each in turn, and at the end of each pulse advance to the next position in readiness for the next mark on the film. A manual mark pulse can be created by operating the MANUAL PULSE push button PB2.

NB : The sequence position LED's indicate the state prior to the receipt of a film pulse. With the 1<sup>st</sup> position lit we are waiting for the first mark.

**STATUS the 1<sup>st</sup> mark on the film is detected (at the beginning of advertisements and trailers)**

NB : A 10 second timer will operate the sequencer if no foil mark is detected.

The 1<sup>st</sup> film pulse results in an output from the sequencer as output number 1 (M1) and this pulses relays RLE and RLF.

**Contacts E1** pulse the zippa shutter up.

**Contacts E2** pulse relay RLS which opens the curtains and pulses the coloured lights down.

**Contacts E3** pulse the sound to digital.

**Contacts E4** pulse the CD player off.

**Contacts S1** pulse curtains open.

**Contacts S2** pulse coloured lights down.

**Contacts F1** hold on relay RLF, also provides +24V supply to alarm relays RLG1 and RLG2 via ALARM ON/OFF switch SW3-A. When the ALARM switch is in the ON position the equipment is primed to accept an alarm condition via terminal block TB4 pins 4 and 5 when externally shorted. A +24V supply is additionally taken to the front panel tri-colour LED via normally open and normally closed contacts of relay RLF F1 with F1 contacts closed (i.e. RLF de-energised) the LED shows GREEN indicating that the automation is READY (also ALARM switch SW3 must be ON).

When RLF energises both red and green LED's are switched ON giving an AMBER indication and the automation is now primed ready to accept an alarm via terminal block TB4 pins 4 and 5.

When an alarm occurs the green section of the tri-state LED is switched off as RLG1-2 normally closed contacts break the +24V supply to it. RLG1-2 normally open contacts supply +24V to give a RED condition.

**Contacts F2** energise the SHUTTER UP solenoid on Philips FP 20 projectors.

**The advertisements and trailers are now on the screen.**

## **STATUS the 2<sup>nd</sup> mark on the film is detected (end of advertisements and trailers)**

The film pulse is taken to the sequencer which is now at the second position. An internal pulse triggers the triple timer TD2. The timer delivers three separate outputs designated TD2-1, TD2-2 and TD2-3 which occur one after the other (in series). TD2-1 and TD2-2 are variable timers (1 to 30 seconds) controlled by potentiometers VR1 and VR2 respectively. VR1 and VR2 are mounted on the sequencer board and the time settings for differing curtains close times are described in the operating instruction information. The third timer output TD2-3 is not adjustable and occurs 3 seconds after TD2-2 has expired. The first output pulse TD2-1 operates relay RLH.

**Contacts H1** pulse the curtains close.

**Contacts H2** pulse the coloured lights up.

After the curtains have closed and after the second delay period an output pulse TD2-2 occurs which energise relay RLK and creates a MASKING & LENS change to 'Scope if switch SW5-A LENS/MASKING is the ON position.

**Contacts K1** pulse the masking to 'Scope.

**Contacts K2** pulse lens to 'Scope.

In addition, output pulse TD2-2 is routed through the INTERVAL switch SW6 (in ON position for interval) and operates relays RLL, RLM, RLN and RLO.

### **Relay RLL pulses :**

**Contacts L1** pulse side wash lights up.

**Contacts L2** pulse house lights up.

**Contacts L3** used internally to de-latch relays RLD and RLF.

**Contacts L4** used internally to operate relay RLM and supply high current (1A) for external use via terminal block TB4-8 (STOP ON INTERLOCK).

### **Relay RLM pulses :**

**Contacts M1** pulse CD player ON.

**Contacts M2** CD sound ON (non sync).

### **Relay RLN pulses :**

**Contacts N1** pulse projector to STOP.

**Contacts N2** pulse shutter down.

**Relay RLO:** pulses via relay R2-1 contacts (normally closed) and diode D20.

**Contacts O1** hold on relay RLO via alarm relay contacts RLG1-2 (normally open), +24V is taken via relay contacts X2-1 and INTERVAL switch SW6-A in the AUTO position to start the interval clock TC2.

**Note** that relays RLN and RLO are only allowed to pulse under non-interlock conditions (INTERLOCK SWITCH SW2-A in OFF position).

When running in INTERLOCK, relays RLN and RLO only operate within the last unit of the interlock chain which has its LAST switch SW7-A in the ON position. The last unit sends a +24V pulse to terminal block TB4-8 called STOP ON INTERLOCK which is connected to TB4-8 on all other interlocked units. These units receive the +24V pulse as an input which via interlock switch SW2-A in the ON position energises their relays RLN and RLO. This means that all interlock units will stop at the same time.

### **STATUS an interval is now in progress**

The INTERVAL CLOCK TC2 runs down and when the pre-set time is reached it delivers its output pulse. The sequence now is identical to that carried out on the initial START SHOW routine where relay RLB is energised by TC2 output contacts rather than TC1 output contacts.

Therefore :

**Relays** RLX1 and RLX2 pulse on TD1 O/P (after 5 seconds).

**Relay** RLC pulses giving PROJECTOR START etc.

**Relay** RLD latches to switch on the Xenon rectifier etc.

The equipment now awaits the 3<sup>rd</sup> mark on the film.

### **STATUS the 3<sup>rd</sup> mark on the film is detected (start of feature)**

Under interval conditions the 3<sup>rd</sup> mark on the film re-activates the same functions as did output pulse no. 1 (M1) from sequencer – namely pulse relays RLE and RLF (latched).

Note also that a 10 second timer will operate the sequencer if no film mark is detected.

The censor of the feature film is now on the screen.

### **STATUS the 4<sup>th</sup> mark on the film is detected**

The sequencer now delivers an output pulse (M4) to operate relay RLP if switch SW8-A CREDIT LIGHTING is in the ON position.

**Contacts P1** pulse the HOUSE LIGHTS UP before the CURTAINS CLOSE when a film has lengthy credits on the end. The house lights enable patrons to leave the auditorium without waiting until the end of the credits.

**Contact P2** are spare.

## **STATUS the 5<sup>th</sup> mark on the film is detected (end of feature film)**

The sequencer delivers output pulse number 5 (M5) which activates a repeat of output pulse number 2 which initiates the triple timer TD2 (note that output pulse number 2 does not drive any of the relays and the triple timer TD2 is triggered inside the sequencer board).

An "End of Show" routine is initiated which is similar to an interval function except that the INTERVAL CLOCK TC2 is not allowed to function.

**Relays** RLR1, RLR2 and triple timer TD2 are pulsed.

- Contact R1-1** opens and prevents RLO and the TIME CLOCK TC2 from working.
- Contact R1-2** holds on RLR1, RLR2 and supplies +24V to the status panel to signal END SEQUENCE (orange LED).
- Contact R2-1** changes over to enable the 2<sup>nd</sup> output pulse (TD2-2) to by pass the INTERVAL ON/OFF switch SW6-A and so pulse relays RLL, RLM, RLN directly.
- Contact R2-2** changes over and prevents RLS from working. The normally open contact routes the TD2-3 pulse to the LENS/MASKING switch SW5-B and to relay RLV (when SW5-B is in the ON position).
- Contacts V1** resets MASKING to wide screen.
- Contacts V2** resets LENS to wide screen.

The function of contacts for relays RLL, RLM and RLN are the same as for the 2<sup>nd</sup> mark condition.

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### PART 2 – OPERATION WITHOUT INTERVAL

The INTERVAL switch SW6 is set to the OFF position. The START operation is identical to that of the INTERVAL mode and is summarised as follows:

- Operate RESET push button.
- Select AUTO or MANUAL position of the SHOW START AUTO/MANUAL switch.
- Set TIMER TC1 if AUTO position is required.
- On TIMER TC1 time out or an operation of START button relays RLA, RLB and TIMER TD1 operate. Projector ready LED shows GREEN and buzzer sounds for 5 seconds.
- At the end of 5 seconds TIMER TD1 output pulses relays RLX1 and RLX2 causing RLC (projector start etc) to pulse and RLD (rectifier on etc.) to latch.

#### **STATUS the 1<sup>st</sup> film mark is detected (or after 10 seconds)**

The 1<sup>st</sup> sequencer output pulse (M1) operates relays RLE and RLF which latches on. The functions of relay RLE and RLF are identical to those described under INTERVAL mode.

The advertisements and trailers are now on the screen.

#### **STATUS the 2<sup>nd</sup> film mark is detected**

Triple timer TD2 is triggered within the sequencer board and delivers three output pulses TD2-1, TD2-2 and TD2-3 as for the INTERVAL MODE.

**TD2-1** pulses relay RLH (curtains close and coloured lights up) after set time (VR1 adjustable).

**TD2-2** pulses RLK (Masking to 'Scope and Lens to 'Scope) after set time (VR2 adjustable).

**TD2-3** after three seconds pulses relay RLS via relay RLR normally closed contacts (R2-2) and INTERVAL switch SW6-B in the OFF position.

Relay RLS pulses curtains open and coloured lights down.

**STATUS the 3<sup>rd</sup> film mark is detected**

The sequencer output pulse number 3 (M3) does nothing as INTERVAL switch SW6-C is in the OFF position and those functions previously executed for an INTERVAL are not now required.

**STATUS the 4<sup>th</sup> film mark is detected**

The sequencer output pulse number 4 (M4) is routed via the CREDIT LIGHTS ON/OFF switch SW8-A to relay RLP to effect early raising of the house lights where lengthy end credits are experienced.

**STATUS the 5<sup>th</sup> mark on the film is detected**

The sequencer output pulse number 5 (M5) operates relays RLR1, RLR2 and triple timer TD2. The operation is identical to that for the INTERVAL MODE.

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### PART 3 – ALARM SYSTEM OPERATION

On the 1<sup>st</sup> film mark relays RLE and RLF operate and RLF holds in. Contact F1 provides a +24V supply to alarm relays RLG1 and RLG2 via the ALARM ON/OFF switch SW3-A. When the ALARM switch is in the ON position the equipment is primed to accept an alarm condition via terminal block TB4 pins 4 and 5 when externally shorted by any pair of volt free contacts e.g. film scan alarm contacts or EPAS contacts. A +24V supply is additionally taken to the front panel tri-colour LED via normally open and normally closed contacts of RLF-F1.

With F1 contacts closed (ie RLF de-energised) the LED shows GREEN indicating that the automation is READY (ALARM SWITCH SW3 must be ON).

When RLF energises both red and green LED's are switched ON giving an AMBER indication and the automation is now primed ready to accept an alarm. When an alarm occurs the green section of the tri-state LED is switched off as RLG1-2 normally closed contacts break the +24V supply to it. RLG1-2 normally open contacts supply +24V to give a RED condition.

#### **Contacts G1-1**

holds relays RLG1 and RLG2 ON (replaces the short across TB4 pins 4 and 5 which caused the alarm).

#### **Contacts G1-2**

normally open contacts supply +24V to give alarm information to status panel and via D11 and ALARM switch SW3-A (in the ON position) to keep RLG1 and RLG2 energised as priming +24V from RLF is removed as relay RLL pulses (see contact G2-2 below). G1-2 normally closed contact breaks +24V to relay RLO to stop the INTERVAL CLOCK TC2 starting on shut down (see contacts G2-2 below).

#### **Contacts G2-1**

send the sound to digital.

#### **Contacts G2-2**

pulses the charged capacitor C1 to energise relay RLL which pulses RLM and RLN causing a complete shut down.

#### **Action To Be Taken After An Alarm**

When an alarm occurs the tri-colour LED will show **RED**, the alarm buzzer sounds (intermittent sound) and the Alarm LED on the status panel shows red on the screen which caused the alarm. The show will shut down as described above (RLG1 and RLG2 energised).

Once the fault is fixed (for example broken film repaired) the show must be started without the aid of the automation. Local projector and rectifier buttons must be used to start the projector, turn on the rectifier and alter the house lights etc. Once the show is running again to the projectionist's satisfaction, the alarm switch SW3 can be switched ON which makes the tri-colour LED turn GREEN. To prime the alarm operate the Alarm Reset button PB5 (below ALARM switch SW3). This pulses relays RLD and RLF which both latch.

RLF contacts supply +24V to prime alarm relays RLG1 and RLG2 and change the tri-colour LED to AMBER.

The Sequencer should be in exactly the right position to continue as only the Alarm Switch and Reset button have been altered.

## **PART 4 – INTERLOCK**

The interlock feature allows a reel of film to be consecutively run through a line of projectors so that in each auditorium the film is viewed in sequence.

The last machine to show the film is known as the 'Master' unit. The master unit must have INTERLOCK switch SW2 ON and LAST (on Interlock) switch SW7 ON. The master unit controls the start and stop sequences. The first machine to show the film and any others except the master are known as 'Slave' units and must have just the interlock switch SW7 ON.

### **Note 1 :**

Automation units to be interlocked require a modified logic board (Sequencer) and an additional relay that must be requested.

The modified logic board prevents the 10 second timer first mark, therefore a first foil mark for shutter up MUST be used.

As described later under Interlock stop, the additional relay RLY allows a slave projector to drop its shutter without the actual projector motor shutting down (RLN).

### **Note 2 :**

The platter on the slave units must have their arms tied back to prevent shut down if they are fitted with an arm rapture alarm.

### **Note 3 :**

When changing direction the LAST (on Interlock) switch must be set so that the original slave unit becomes the master and vice versa.

### **Note 4 :**

A set of three wires ( also a common 0V) must be run between each machine in the interlock chain.

These are :-

Terminal Block TB4 (relay board)	pin 6	START ON INTERLOCK
Terminal Block TB4 (relay board)	pin 8	STOP ON INTERLOCK
Terminal Block TB4 (relay board)	pin 7	ALARM ON INTERLOCK
Terminal Block TB4 (relay board)	pin 5	COMMON OV

## **INTERLOCK START**

The last unit in the interlock chain has both its INTERLOCK switches set to the ON position (Master unit). All other units have their INTERLOCK switch set to ON, but their LAST switch is set to OFF (Slave unit).

To start, press SHOW RESET button and then MANUAL START button on the MASTER unit. This will start all projectors and rectifiers etc. in the interlock chain. Clock starting is not available in INTERLOCK mode.

On the MASTER unit relays RLC and RLD (after 5 second start buzzer) will operate when RLX1-2 routes a +24V pulse through LAST switch SW7-B and INTERLOCK switch SW2-B both in the ON position. This same +24V pulse is taken to the START on INTERLOCK output on terminal block TB4 pin 6. As all TB4 pin 6 lines of the other projectors are joined together all Slave units will receive the +24V pulse which when routed via their INTERLOCK switches SW2-B in the ON position energises their relays RLC and RLD. All projectors and rectifiers etc. then start together and the film passes consecutively through the line of projectors.

## **INTERLOCK STOP.**

For interlock situations an additional relay RLY is fitted, which is driven in parallel with RLM (CD Player ON). This allows a slave projector to drop its shutter without the actual projector motor shutting down (RLN). The Shutter Down pair of wires are removed from RLN terminals 5 and 6 and are connected to the normally open (NO) contacts of the added relay RLY.

When an end sequence is detected by the slave units they shut down but the projector motors are kept running. The master unit then receives its end sequence when a +24V pulse is routed through relay RLL and Interlock LAST switch SW7-A to the terminal STOP ON INTERLOCK TB4 pin 8 which is connected to similar terminals TB4 pin 8 on all slave units. This same +24V pulse is taken via INTERLOCK switch SW2-A in the ON position to pulse relay RLN which shuts down the master unit's projector, and because of the external connection described, all slave projectors have their relays RLN pulsed so that all projectors stop together.

## **ALARM ON INTERLOCK (Alarm switch SW3-A switched ON)**

In every unit there is a connection from alarm relays RG1 and RLG2 coils (pin 16) which is taken to terminal block TB4 pin 4 designated ALARM (with TB4 pin 5 0V). When TB4 pins 4 and 5 are shorted together relays RLG1 and RLG2 energise causing an ALARM condition. Relay RLG1 contacts close to maintain the short after the original short has disappeared.

The connection to terminal block TB4 pin 4 is also routed through the INTERLOCK switch SW2-C (which will be in the ON position for interlock working) and returns to terminal block TB4 pin 7 which is designated ALARM ON INTERLOCK. As all terminals TB4 pin 7 are joined together on all of the units in the interlock chain, an alarm on any unit will cause an alarm on all other units and all units will shut down.

To recover from an alarm, the same procedure as for single projector running is carried out. Namely, switch off alarms, fix, fault, re-start manually. As more than one machine is being manually started the projector manual start buttons must be pressed simultaneously, unless manual interlock key switches have been fitted.

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