

Strand Lighting

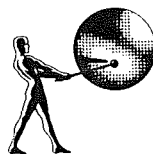
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LIGHTBOARD M AGENTS MAINTENANCE



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Lightboard M Agents Maintenance

Introduction

All Approved Service Centres will be supplied with one copy of this technical training handbook. This copy are supplied for information only. Strand Lighting will not approve the use of information contained within this handbook by persons who have not attended training courses at Strand Lighting.

The front cover, the contents pages and this introduction page form the header document for this handbook. This header document has a unique document number which should always be quoted when referring to the whole handbook.

Each time there is a change or an addition to the handbook a supplement will be written. The supplement will be put at the end of the main text and will have another document number.

Each time a supplement is written the header document is updated. The supplement is added to the contents pages and the issue number of the header document is incremented.

To check that your copy of this handbook is up to date contact Strand Lighting Engineering Service and quote the number and issue of the header document. If your document is not the latest issue you will be sent the latest header document and the missing supplements.

Header document number :- 7Z0023 Issue :- 02

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The information within this handbook is believed to be correct and complete, however if you discover any omission or error, please contact Strand Lighting.

Strand Lighting accepts no responsibility or liability for any errors or omissions which may have occurred during the preparation of this guide.

Strand Lighting accepts no responsibility or liability for any damage, loss or injury, however caused from the use of information contained within this guide.

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Electricity at Work Regulations - 1989.

The Electricity at Work Regulations 1989 require :-

"No person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent **danger** or, where appropriate, **injury**, unless he possesses such knowledge or experience, or is under such a degree of supervision as may be appropriate having regard to the nature of the work." (Guidance on regulations - published by HSE)

"It is for the employer to judge the level of competence required, and to ensure that no person is called on to carry out work for which he does not have the required competence. This is very much a matter of individual judgement, but the employer must always bear in mind the fact that he may be required to justify his decisions before a court of law in the event of an accident." (Guide to Electrical Safety at Work - John Whitfield - Published by E.P.A. Press)

Successful completion of the course and the assessment does not, by itself, necessarily provide the trainee with the knowledge or experience to comply with this requirement.

To satisfy the requirement the following three stages must be completed.

1. Pre-Qualification.

Before attending a course at Strand, the trainee must be able to demonstrate "adequate knowledge of electricity" and "adequate experience of electrical work". This knowledge and experience will probably have been gained from a BTEC, City and Guilds or other vocational qualification.

2. Theory and Identification of Hazards.

The course at Strand Lighting will include understanding of the system to be worked on, understanding of the hazards which may arise during the work and any precautions which need to be taken.

3. Practical Experience.

Finally the trainee must gain practical experience of the class of system which is being worked on. He must also be able to recognise at all times whether it is safe for work to continue. These requirements are not taught at Strand Lighting.

All maintenance courses are assessed. Engineers who pass the assessment will have demonstrated that they have the required theoretical understanding of the system, understanding of hazards and the precautions to be taken. The engineer may now proceed to the next stage which involves gaining practical experience of the type of electrical equipment covered in the course.

Engineers who have attended courses prior to the introduction of the assessments, and have had regular experience of the product, should still have sufficient understanding of the system and understanding of the hazards. Engineers who have not had regular experience should attend a refresher course and take the assessment.



Lightboard M Agents Maintenance

Section 1. Installation.

1.1 Damage in transit.

When you receive the Lightboard M check the equipment for shipping damage. If damage is found :-

- a. Immediately notify the carrier who made the delivery and request inspection of the damage.
- b. Notify Strand Lighting UK and report the damage.
- c. Keep the packaging that Lightboard M was shipped in.
- d. Do not attempt to repair the Lightboard M.

Lightboard M desks are currently sent for pre-delivery inspection to Strand Lighting UK. If a system is to be delivered directly from the USA it is advisable to request the Lightboard M is sent first to the distributor for inspection.

1.2 Visual inspection.

After removing the Lightboard M from the packaging give the desk a visual inspection. Check for :-

- a. Bent or badly fitting metalwork.
- b. Scratches on metalwork.
- c. Broken faders or potentiometer knobs.
- d. Broken connectors.
- e. Correct text on all push buttons.
- f. Correct channel numbering on all fader panels.

Depending on the level of damage the parts may need to be replaced.

1.3 Internal inspection.

Before power is applied to the desk the Lightboard M must be opened and the internal cables should be checked. Check for :-

- a. Connectors which have come loose in transit.
- b. Cable interconnections are not correct.
- c. Cables which are not secure in connectors.

This stage should be checked very carefully if there was evidence on the packaging of the system being dropped.

IMPORTANT

Check the RIM card in the Lightboard M. If the modification detailed in section 3.5.8 is not correct then this must be repaired before the remote macro (Function) switches are tested.

If EC90 dimmers are used with the new style Lightboard M desk then resistors R1 to R4 must be replaced by wire links on the connector backplane. See section 4.5.2.

1.4 Rear connections.

1.4.1 Mains input.

Connect the mains input to the Lightboard M. The old style Lightboard M does not have a mains power switch. The new style has a switch and fuse assembly.

The new style Lightboard M also has two IEC convenience outlets for monitor and peripheral power.

1.4.2 RGB monitor.

On the old style Lightboard M the monitor must be connected to the desk in order to provide a Mains Earth to Technical 0v connection in the desk.

The monitor connector is a 9 way D type Female.

The 75Ω BNC connector on the back is for a composite video.

1.4.3 Plot lamps.

The old style Lightboard M has two connectors for goose neck plot lamps. These have been removed from the new design of desk.

1.4.4 Fader panel expansion.

If the Lightboard M is designed to use an expansion fader panel desk the back of each desk will have a group connector.

1.4.5 Remote output.

The remote output is used to connect to the 8 remote submasters and the 8 remote Macro (Function) switches. Do not connect this until you have checked the remote interface card. See section 3.5.8.

1.4.6 Hand Held Remote.

The Hand Held Remote connector on the old style Lightboard M is a 5 pin XLR Male. The connector on the new style Lightboard M is a 9 way Male D type connector.

Note. The new Lightboard M hand held remote uses phantom power from the Lightboard M. The old hand held remote uses a mains adaptor to charge the internal batteries. The old remote can be used on the new Lightboard M with a convertor cable. The new remote can not be used on an old Lightboard M.

1.4.7 Printer output.

The printer connector is a 25 way D type on the old Lightboard M. The printer connector on the new Lightboard M is a 9 way D type.

1.4.8 Overheat input.

The Overtemp connector on the Lightboard M is for use with the American CD80 dimmer rack. A wire from this connector goes to the command module to light the overtemp LED. This connector was found on all very old Lightboard M desks. The later style of old desks had this connector removed. The new desks have this connector back again.

1.5 Dimmer outputs and earth loop tests.

Do not connect the dimmers until the cable has been tested for earth loops.

1.5.1 Dimmer outputs.

On old Lightboard M desks there are 4 dimmer output connectors. The desk is fitted with either 3 pin XLR Female connectors for D54 or 4 pin XLR Male for AMX. Both the D54 and the AMX outputs are 192 dimmers per line.

The new Lightboard M has four AMX dimmer outputs, two D54 dimmer outputs and two DMX dimmer outputs on the back of the desk.

Each AMX connector is a 4 way XLR Male and controls 192 dimmers. Each D54 connector is a 3 way XLR Female and controls 384 dimmers. Each DMX connector is 5 way XLR Female and controls 512 dimmers.

1.5.2 The effects of an earth loop.

The mains earth / Technical earth connection must only be made at the desk end of the installation and at no other place. This connection is made when a monitor is plugged into the Lightboard M.

The effect on stage will be :-

- a. Channels may flicker.
- b. Channel levels may be wrong as the GND voltage changes.
- c. Mains interference will be out of sync with the multiplex signal. This may cause channel level errors which can move from dimmer to dimmer.
- d. The interference may be mistaken by the demultiplex box for a sync pulse. All following dimmer levels may jump one dimmer down the rack.

1.5.3 To test for earth loops.

1. Check that the Mains earth / Tech earth in every dimmer has been removed, if this is possible.
2. Connect an ammeter between the 0v screen pin of the dimmer connector and the 0v screen pin on the multiplex dimmer cable.

The meter should give a reading in microamps.

Note. If the installation uses an F&D multiplex interface and Tempus dimmers (Or and other dimmer where it is impossible to disconnect mains earth from technical earth), it will not be possible to reduce the earth current to zero. With an earth isolation circuit fitted to the F&D box the current will be about 8mA per F&D box.

1.5.4 Pin connections of dimmer lines.

D54.	Pin 1 -	Signal Ground.
	Pin 2 -	Fader Mux input.
	Pin 3 -	Dimmer Mux output.
AMX 192	Pin 1 -	Signal Ground.
	Pin 2 -	Sync +
	Pin 3 -	Analogue Level.
	Pin 4 -	Sync -
DMX 512	Pin 1 -	Signal Ground.
	Pin 2 -	Data -
	Pin 3 -	Data +
	Pin 4,5 -	No Connection.

1.5.5 Common causes of earth loops.

- a. The earth is linked in one of the dimmers.
- b. The earth is linked in one of the demultiplex boxes (Check that earth isolation cards are fitted in all boxes.)
- c. The screen on one of the multiplex leads is touching the XLR plug or socket and shorting to the metalwork on one of the dimmers.
- d. The multiplex cable is worn and an exposed screen is touching something that is earthed.

1.6 Rear switches.

1.6.1 The reset switch.

The reset switch is under a cover on the back of the Lightboard M. On the old Lightboard M this switch is connected to the reset connector on the CCU (J6). If the desk has a full backup then this switch is connected to both CCU cards.

The reset switch on the new Lightboard M is connected to the same point on the CCU and also to a 2 pin molex reset connector on the new Multi-protocol driver board. The new Lightboard M does not have the option of a backup.

1.6.2 The dimmer number switch.

The dimmer number switch was only found on old Lightboard M desks. It should either be removed and a blank panel fitted over the hole in the back or the connector on the CCU (J3) should be disconnected and the cable tied back.

If this switch is fitted and is set to 96 dimmers then the user can assign CD80 12K dimmer allocation. If a dimmer is assigned to 12K then the dimmer appear in red on the patch screen and the output of the dimmer level is duplicated on the next dimmer. All following dimmer outputs will be shifted by one dimmer. To clear this assignment enter the patch screen and press * * on the desk.

1.6.3 The 50/60 Hz switch.

This switch selects the mains frequency for the VDU. This switch is only found on the new Lightboard M desks. The wire is attached to J2 on the CCU card.

1.6.4 The Backup switch.

This switch is only found on the old Lightboard M desks as the new Lightboard M does not have any form of backup. On an old lightboard M with an intermediate backup the switch is connected to J2 on the backup card. On an old Lightboard M with a full backup the switch is connected to J4 on the relay card.

Section 2. Commissioning.

2.1 Operation check.

The operation of the Lightboard M can be fully tested without the need to connect the system to the dimmers. Every button must be pressed and checked for correct operation. Every fader and potentiometer must be checked for correct operation. Every LED must be checked for correct operation.

The engineer does not have to perform all operations on the desk. The aim of the operation check is to test the mechanical and electrical operation of all parts of the desk. For example the engineer can assume that a button which correctly performs one function will perform all the other functions that it is expected to do.

2.2 Multiplex output tests.

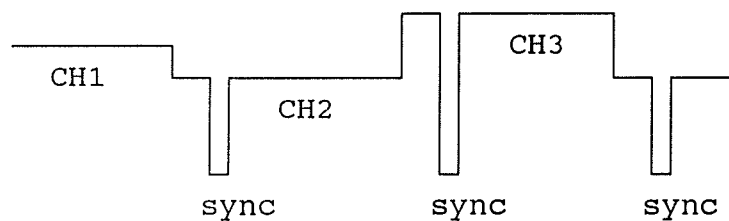
Having tested the operation of the desk and checked the installation for earth loops the dimmer outputs can be tested. There are no adjustment for the dimmer outputs therefore any mux failure could require the replacement of the faulty multi-protocol driver card or the CCU card.

2.2.1 D54 testing.

To test the D54 use an oscilloscope to examine the dimmer mux output line. With a channel at Full the output level of that channel should be 5v. The sync pulses and the end of frame should be -5v.

The D54 multiplex output of the old and new Lightboard M has a known fault. The sync pulses which separate the analogue levels come too late.

The signal looks like this :-



If the demultiplex box reads the level a long time after the sync pulse then it could read the wrong channel level. If this problem occurs then the demultiplex boxes must be modified according to the service bulletin 020889.
(See Appendix A)

2.2.2 AMX testing.

To test the AMX lines use an oscilloscope to examine the analogue output. The signal will look like the D54 signal but without the sync pulses or End of Frame.

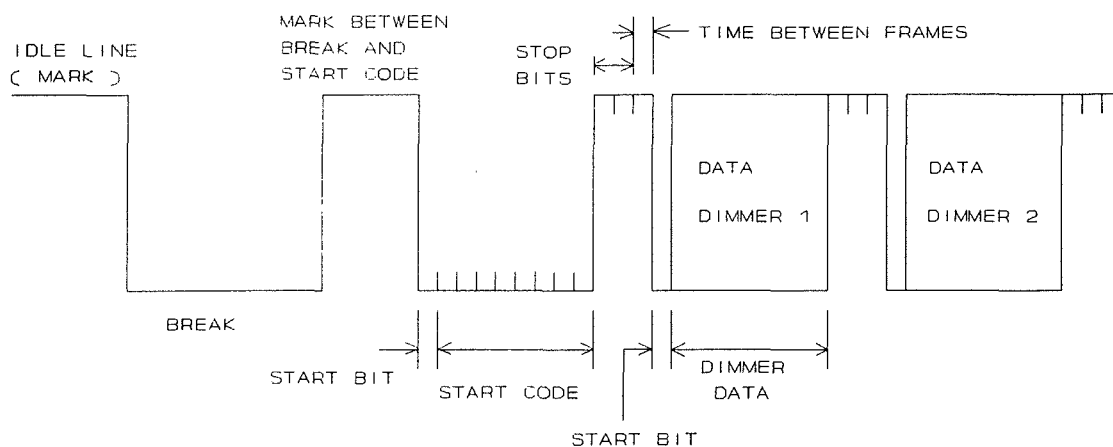
The Sync + output line will look like the D54 sync pulses and End of Frame pulses on the D54. This signal is from 0v to +5v.

The sync - signal is identical to sync + except that the signal is inverted.

2.2.3 DMX testing.

To test for DMX the best method is to use a "Lil Dmxter" or other DMX testing device.

The DMX can be tested using an oscilloscope if the number of dimmers on the mux line is reduced to 2. The digital output of the desk can then be easily read.



IMPORTANT.

If the new Lightboard M is going to be used with EC90 and DMX protocol then a modification must be made to the output card.

On the rear connector card remove resistors R1, R2, R3 and R4 (all 100Ω) and replace them with a wire link. An official change note detailing this modification will follow soon.

2.2.4 Connection to the dimmers.

The final test of the multiplex output from the Lightboard M is to check that the dimmers can be controlled correctly from the desk.

2.3 Hand over.

Before the commissioning is complete the desk must be handed over to the customer. This may involve an acceptance test.

Demonstrate that the Lightboard M operates correctly. This may take the form of a short operation course.

When the customer is happy with the system he may be asked to sign an acceptance document. The acceptance may be delayed until the whole site is finished and all other Strand Lighting equipment is installed and commissioned.

Before training the customer the following rules must be observed. The commissioning must have been fully completed. The training session must be arranged to be free of interruptions. The instructor must have a thorough knowledge of the subject that is being taught.

Section 3. Hardware overview of the old style Lightboard M.

3.1 Safety.

3.1.1 High Voltages can be found in the following places.

- a. The toroidal transformer has 240v input (UK versions). The centre tap of the primary coil is used to create two 120v supplies.
- b. The power supply board contains simple regulated voltage supplies. All fuses which are soldered onto the board are either 240v or 120v.
- c. The two large capacitors can store charge for a significant length of time and great care must be taken not to touch the ends.
- d. Thick Black and White cables going to the Disc drive module and to the relay card (Full Backup only) carry 120v AC.

3.1.2 Heat dangers.

- a. All heat sinks get very hot.

3.1.3 Connector faults.

- a. White connectors are currently used on the LAN cable and the CCU AUX cables. Old versions of LBM used small sockets which were prone to falling off. If the LBM has loose connectors tie-wrap the connector to the plug.

3.2 Power Supply Unit.

There are two types of power supply board made for the Lightboard M. However there are very few of the old type still around.

3.2.1 Power on the LAN cable.

There are no voltage adjustment on the power supply. The working voltage for the Lightboard M is 10v which is sent to every circuit board via the LAN cable. (Pin 1 = System Gnd, Pin 4 = 10v unregulated). Each SAD contains a 7805 voltage regulator which provides the 5v needed for it's IC's. The CCU contains a LM323K voltage regulator on a heat sink to provide the 5v needed for it's IC's.

3.2.2 Power on the CCU AUX cable.

The power supply also provides -12v unregulated. This is used by the AMX driver card, and the intermediate backup card if fitted, to generate the -5v sync pulses which are used on the D54 mux output. This voltage is sent via the CCU AUX connector on pins 1 and 2.

Pin 3 is a power fail detect signal. During normal operation the signal is 5v but the voltage drops to 0v when the power starts to fail. This voltage is only required by the intermediate backup card.

Pin 4 is not used. There is no 0v pin on the CCU AUX connector.

Note. Pins 3 and 4 on the CCU AUX cable must be swapped on the connector for the intermediate backup.

3.2.3 Power to the disc drive.

120V AC is supplied to the disc drive power supply.

3.2.4 Power to the relay card.

120V AC is supplied to the Full Backup relay card.

3.2.5 Power to the RIM.

The remote interface module (RIM) receives two regulated 5v supplies. 5v RIM is used to power the logic and the processor. 5v ANA is used as the reference voltage for the analogue to digital convertors.

+V opto is a +12v unregulated source. This provides the power to the remote submaster faders and the remote function switches.

3.2.6 Earthing.

On the old Lightboard M there is no mains earth to technical earth connection on the power supply. The only connection to earth is via a colour monitor when it is fitted. Because the power supply is not a switch mode the technical earth will not always float to 1/2 mains voltage. However it could float to any other voltage.

3.3 Lightboard M peripherals.

3.3.1 Lightboard M Remote (Oyster terminal)

The Lightboard M will look for all it's panels and for the remote when it powers up. If the cable from the Lightboard M to the remote is very long then the signal from the remote will be too weak. If the Lightboard M does not see the remote at power up then the Lightboard M will never talk to the remote even when the remote option is switched on. To cure this the remote must be switched on before the Lightboard M is switched on.

3.3.2 The VDU

The VDU recommended for the Lightboard M is a PHILIPS.

- a. If the VDU screen rolls, sometimes only when the VDU warms up, then the vertical hold inside the VDU must be adjusted. This is found on the circuit board at the bottom of the VDU behind the tube and on the right hand side (looking from the front).
- b. If the screen tears at the top or the characters loose their definition then a capacitor must be added to the rear connection of the VDU. Cut off the ribbon cable to 9 way D type connector and fit a new connector onto the ribbon cable. Leave 10mm of ribbon sticking out after the connector. Strip wires 2 and 8 and connect a 0.01 μ F capacitor across these wires. This will suppress the interference that is causing this problem.

3.4 Memory corruption

If the corruption is small then use the clear options on the set up screen to clear the memory. This will clear only the cue area of memory but not the processor working memory ie, the page 0 stack.

If you get severe corruption then the stack can become corrupt and memory 0, which should be a blackout, can contain channel levels. These channel levels can never be removed.

To clear down the system from this sort of failure, switch off the Lightboard M. Open the Lightboard M and unplug the memory capacitors from the CCU. (Both CCU if you have a full backup).

Either wait for 15 minutes for the information in the RAM to be lost or short out the 5v and 0v lines (Pins 7 and 14 of U76) on the CCU or CCU's.

When powered up the system will be totally corrupt, however when you clear the system using the set up screen options the memory 0 page is also cleared and the Lightboard M will now work correctly.

3.5 Card level repairs.

3.5.1 Power supply circuit board.

The Power supply card and associated electronics is very simple and agents should have no trouble fixing broken regulators or bridge rectifiers. The circuit diagrams are provided as part of the course notes.

3.5.2 The Central Computing Unit (CCU)

The CCU is the board which controls all the main functions of the Lightboard M. Agents are not expected to work on the CCU card other than changing software on EPROM.

JP2 must be fitted for 50Hz signal to the VDU. 60Hz if not fitted.
JP3 must not be fitted. Only fit for CD80 dimmer racks.

On the top of the CCU is fitted the AMX driver. It is possible to fit this card one pin out on either side. Before powering up the Lightboard M it is vital that the screws are fitted which hold this board in position. This is to make sure that the board is fitted correctly. If it is not fitted correctly then a huge number of IC's will blow up and several tracks will burn away on the CCU and AMX card.

3.5.3 The AMX driver board.

JP 1,2,3 and 4 must all be fitted for the card to output D54 MUX.

The connection from the AMX to the four output mux connectors depends on the type of backup. Details of these connections can be found in section 3.6.

Agents are not expected to repair this card to component level.

3.5.4 The Command Module.

This panel contains two circuit boards. The top circuit has faders, switches, buttons and display LED's. The lower circuit board contains a processor, RAM, EPROM and all the drive and scanning circuitry for the front panel.

Agents are only expected to replace mechanical switches or faders on the front panel or Software on EPROM on the rear panel.

3.5.5 The Submaster Panel.

This panel contains two circuit boards. The top circuit board has faders and push buttons and the lower contains a processor and software on EPROM.

The lower circuit board is the "Smart Analogue to Digital convertor" or SAD.

In a 96 channel Lightboard M two Submaster Panels may be fitted. When two are fitted the numbering changes to read from 1 to 24 across the top faders of both panels then from 25 to 48 across the bottom faders of both panels.

Important. A panel is identified as a Submaster by setting the 4 way switch on the back of the panel. Please note that the switch settings for the 96 channel Lightboard M and the 144 channel are different.

This panel is connected to the LAN unless the Lightboard M has an Intermediate Backup. Connect the Submaster to the Intermediate backup using a short LAN cable. Plug J12 on the Backup.

Agents are only expected to replace flash buttons or faders on the front panel or Software on EPROM on the rear panel.

3.5.6 The Fader Panel.

The Fader panel is identical to the Submaster panel except that there is only one row of flash buttons, and the switch setting on the back is different.

The Fader panel is not as important as the Submaster panel because the command module can be used to control channels if the fader panel is missing. Therefore if the Submasters panel becomes faulty it is best to take a fader panel, change the switch settings and turn it into a Submaster panel, until a replacement submasters panel can be fitted.

Each Fader panel has it's own number set on the rear switches. Agents are only expected to replace flash buttons or faders on the front panel or Software on EPROM on the rear panel.

3.5.7 The Library Module (Disc Drive).

This module has it's own 120v power supply built onto the front panel. Lightboard M desks have the disk interface card fitted next to the power supply on the rear of the panel. A Lightboard M desk with a full backup will have this card fitted into the base of the Lightboard M.

The Disk drive can be difficult to remove and replace. The whole library module is usually sent as a service exchange.

Important. DO NOT CONNECT THE LAN ONTO THE SPARE WHITE FOUR WAY MOLEX ON THE POWER SUPPLY CARD.

3.5.8 The Remote Interface Module (RIM)

This card is connected to the eight remote submaster faders and the eight remote function buttons. When a function key is pressed a circuit is completed and the Lightboard M performs the commands recorded into the selected function. The remote submaster should behave like normal submasters on the submaster panel. If the faders are not taking the contents of the submaster to full then adjust the potentiometer on the RIM until the faders work correctly.

The card sits on the RIM and has it's own switch setting as if it was a front panel.

It is connected to the remote output connector on the back of the Lightboard M. If the Lightboard M has a full backup then the connection is made via the relay card.

The EPROM on the RIM must be correct for the number of channels available in the Lightboard M.

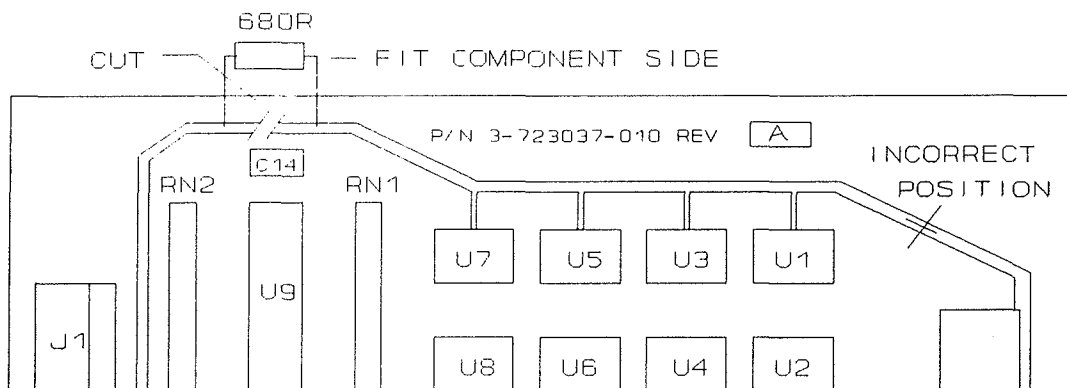
The RIM has it's own power connection from the Power Supply in order to drive the remote submasters.

RIM Modification.

On circuit board P/N 3-723037-010 REV A a resistor must be added to the GND rail which supplies the LED side of the 8 opto couplers.

The resistor is 680Ω and is shown as R15 on the latest circuit diagrams. The position of this resistor is shown in the diagram below.

One batch of RIM cards from the factory has the resistor fitted in the wrong place. If the RIM is tested with this fault the 12v from the function switch will blow the LED in the opto coupler.



Before testing the function switches always check the revision of the PCB. IF the revision is A then check this modification. Correct the fault if one is found before testing the switches. If the switches still do not work then use a multimeter on diode test setting between pin 1 (LED Anode) and pin 2 (LED Cathode).

Replace any broken opto isolator with a 4N35. The 4N25 is a suitable alternative if the 4N35 is not available.

The latest RIM circuit board is revision F. This board does not require any modification.

3.5.9 Intermediate backup.

The intermediate backup contains it's own processor and software on EPROM. The memory of the intermediate backup is a lithium battery backed RAM chip.

The Backup only has two MUX outputs therefore it can only output to 384 dimmers. The Submaster is connected directly to the intermediate backup via a LAN spur.

The CCU AUX cable which provides the -12v for the Sync pulse has pins 3 and 4 reversed on the white connector. (This is compared to the CCU AUX connector on the CCU).

Plug J1 is the connection to the Backup Switch on the Lightboard M. The Plug J2 is the link to the CCU plug J2. When you select the option to transfer the backup the submaster information is sent via this link.

Agents are not expected to repair this circuit board to component level.

3.5.10 Full Backup Relay card.

Every signal sent to the rear connectors of the Lightboard M is sent instead to the Relay card. When the relays are switched to main system the rear connectors are linked to the signals from the main system. When the system is switched to backup then the relays link the rear connectors to the backup system. The LAN is also connected to the Relay card.

Agents can replace faults relays on this card. Replace one relay at a time until the faulty relay is found.

3.6 Internal connections with no Backup.

Always use the system wiring diagrams to check all system interconnections.

3.6.1 The LAN

The LAN cable starts at the power supply and is connected to the CCU, the RIM, the command module, all the front fader panels and the submaster panels.

Never plug the LAN onto a card backwards. If you do then the 7805 voltage regulator fails instantly. If the power is left on then C1 (220 μ F electrolytic capacitor) goes bang.

Pin 1 = System Ground

Pin 2 = Data +

Pin 3 = Data -

Pin 4 = +10v Unreg.

3.6.2 CCU AUX

CCU AUX is connected from the power supply to the CCU on J5.

Pin 1 and 2 = -12v

Pin 3 = 5v power fail.

Pin 4 = No connection.

3.6.3 Capacitor cable.

This cable is from the capacitor board to the CCU on J1. The capacitors keep the data stored in RAM when the system is switched off.

3.6.4 Reset cable.

The reset cable is from the reset switch to the CCU on J6.

3.6.5 The Hand Held Remote.

This cable is from the rear connector on the desk to the CCU on J11.

3.6.6 The printer.

This cable is from the rear connector on the desk to the CCU on J10

3.6.7 The RGB Video.

This cable is from the rear connector on the desk to J12 on the CCU.

3.6.8 The Composite Video.

This cable is from the rear BNC connector to J13 on the CCU.

3.6.9 The Disc drive data.

The cable for the data to and from the disc drive starts on the CCU at J4. It is connected into half of the connector J2 on the disc processor card. The other half of J2 is the power from the 120v power supply built into the library module.

3.6.10 The group output.

This output connector is only fitted if a fader outrigger desk is used. The connector from the back splits and half is connected to J9 on the CCU and half is connected to J7 on the AMX driver card.

3.6.11 The Dimmer outputs.

There are four dimmer data lines which start on the four 4 pin molex plugs on the AMX driver card. From the molex they are joined to the four rear XLR connectors.

3.6.12 The disc drive.

The disc drive takes it's power from J3 on the disc processor card. The drive data comes from J1 on the disc processor.

3.6.13 The Remote output.

The remote output is a ribbon cable from J3 on the RIM card.

3.6.14 The RIM power.

The power for the RIM is taken directly from the power supply. The power is input on J2.

3.6.15 Overtemp.

The over temp connector is taken to J3 on the command module.

3.7 Internal connections with Intermediate Backup.

Always use the system wiring diagrams to check all system interconnections. The system interconnections are identical to 3.6 with the following exceptions.

3.7.1 The Dimmer outputs.

The Multiplex output of the AMX card is sent to the Intermediate backup via a ribbon cable. The multiplex outputs are then sent from two molex connectors on the intermediate backup to the first two output connectors. (Please note that a system with intermediate backup will only control 384 dimmers not 768 dimmers which are available on the AMX card system)

The output for dimmers 1 to 192 is on J4. The output for dimmers 193 to 384 is on J5.

Dimmers 385 to 768 which are not controlled by the backup are sent directly from the 4 pin molex on the AMX card to the rear XLR connectors.

3.7.2 The LAN cable.

The LAN is also connected to the intermediate backup on J11.

The LAN is removed from the Submaster panel and a LAN spur is fitted from J12 on the backup to the Submaster panel.

3.7.3 The CCU AUX cable.

This cable is also connected to the Backup on J9. Pins 3 and 4 must be swapped on this connector.

3.7.4 The group output.

The group connector cable, if fitted, is split between J9 in the CCU and J7 on the intermediate output. J7 is a through link for the dimmer data from the AMX card.

3.7.5 The Backup switch.

The backup switch on the rear of the desk is connected to J2 on the backup.

3.7.6 The Data transfer cable.

The data to program the backup comes from J2 on the CCU and goes to J1 on the Backup.

3.8 Internal connections with Full Backup.

Always use the system wiring diagrams to check all system interconnections. The system interconnections are identical to 3.6 with the following exceptions.

3.8.1 The dimmer outputs.

The Multiplex output of the system A AMX card is sent to the relay card J21 via a ribbon cable on J7 on the AMX card. The Multiplex output of the system B AMX card is sent to J22 of the relay card. The multiplex outputs from the relay card are sent from the four molex connectors (J26, J27, J28 and J29) to the four output connectors on the back of the Lightboard M.

3.8.2 The LAN cable.

The LAN cable starts on system A CCU and is linked to all panels, the power supply and the RIM. The other end of the LAN cable is fitted to the system B CCU.

The ribbon cable to pins 2 and 3 (DATA + and DATA -) must be cut on the connectors at each CCU.

Data + and Data - is supplied to the correct CCU via the group connector.

3.8.3 The Group connector.

The connector on the rear of the desk is connected to J7 on the relay card.

The group connector from system A CCU on J9 is connected to J6 on the relay card. The group connector from system B CCU is connected to J8 on the relay card.

3.8.4 The Printer output.

The printer output on the back of the desk is to J2 on the relay card. The printer data is received via the group inputs to the relay card.

3.8.5 The Hand Held Remote output.

The Hand Held Remote output on the back of the desk is to J2 on the relay card. The printer data is received via the group inputs to the relay card.

3.8.6 The CCU AUX cable.

This cable is connected between the power supply and J23 on the relay card. The output on J24 takes CCU AUX to J5 on system A CCU. The output on J25 takes CCU AUX to J5 on system B CCU.

3.8.7 RGB Video cable.

System A RGB output J12 goes to J16 on the relay card. System B output goes to J17 on the relay card. The relay card output on J15 goes to the RGB output on the back of the desk.

3.8.8 Composite Video.

System A Composite output J13 goes to J11 on the relay card. System B output goes to J10 on the relay card. The relay card output on J9 goes to the Composite output on the back of the desk.

3.8.9 The RESET switch.

The RESET switch is connected to J5 on the relay card. The reset output to system A and B is via the group connector.

3.8.10 The Disc data.

The disc data comes from J4 on each CCU. System A data is connected to J20 on the relay card. System B data is connected to J19 on the relay card. The output to the disc is from J18 on the relay card.

3.8.11 The Backup switch.

The Backup switch is connected to J4 on the relay card.

3.8.12 Backup data.

The data to allow tracking between each CCU is from a link between J2 on system A CCU and J2 on system B CCU.

3.8.13 Backup power.

The power supply supplies 120v AC to the backup relay card. This is connected to J1.

Section 4. Hardware overview of the new style Lightboard M.

4.1 Safety.

All voltages inside the new Lightboard M are low with the exception of the two convenience outlets and the inputs to the power supplies.

4.2 Power supply.

The old power supply has been replaced with two new switch mode supplies.

The power supply also provides convenience outlets for a monitor and other peripherals.

On both power supplies the main input is as follows :-

- Pin 1 = Earth (Green/Yellow)
- Pin 2 = Live (White)
- Pin 3 = Neutral (Black)

Some connections to the power supply output are via IDC plugs. Some are via ring crimps.

4.2.1 Power Supply 1.

This is power supply which is adjusted to approximately 11v. The power supply provides power to the LAN and also power for the two 12v fans. The voltage can be adjusted using V1 ADJ pot inside the power supply.

The power supply is 110v / 240v auto switching.

The LAN cable is identical to the old Lightboard M. Pin 1 = 0v and Pin 4 = 11v. Both ends of the LAN cable are connected to the power supply.

The LAN cable provides power to all the front panels on the Lightboard M but not to the CCU. The LAN is still connected to the CCU to allow data to be sent and received.

There is a connection between mains Earth and technical 0v inside the power supply.

The power supply pins are :-

- Pins 1,2 and 3 = Not used.
- Pin 4 and 5 = 0v.
- Pin 6 and 7 = +12v.

There is a 0v link from pin 5 to Power supply 2.

4.2.2 Power Supply 2.

This power supply is adjusted to output +5v, +12v and -12v.

The 5v output sent via individual cables to power the IC's on the RIM, to power the IC's on the disc interface card, the disc drive and the CCU.

The +12v is used to power the remote Submasters and the remote Macro switches on the RIM card.

The -12v is used to provide power for the CCU AUX cable. Because the new Lightboard M does not have a backup the 5v power fail signal is no longer required.

The pin out of CCU AUX is :- Pins 1 and 2 = -12v
 Pins 3 and 4 = No Connection.

The power supply is 110v / 240v auto switching.

The pin out of the power supply is :-

Pin 1 = -12v
Pin 2 = No Connection
Pin 3 = +12v
Pin 4 = 0v
Pin 5 = =5v

4.3 Lightboard M peripherals.

4.3.1 Lightboard M remote.

Follow the same instructions as the old Lightboard M. See section 3.3.1.

4.3.2 The VDU.

The VDU will still suffer with a scrolling picture if the vertical hold is not adjusted correctly.

So far no Lightboard M VDU has shown signs of tearing. Do not carry out the capacitor modification to a new Lightboard M until Strand Lighting Service Department have been consulted.

All details can be found in section 3.3.2.

4.4 Memory corruption.

Follow the procedure detailed in section 3.4.

4.5 Card level repairs.

The only new cards in the Lightboard M are the Multi-protocol driver card and the LBM connector backplane.

4.5.1 The Multi Protocol Driver Card.

This card replaces the AMX driver card. It is fitted in the same position as the AMX driver but is much larger.

The dimmer output of this card is via a ribbon cable to the connector backplane.

The card contains a 6809 processor and therefore has a reset input. The Reset switch is connected to J6 on the CCU and also to the 2 pin molex on this card.

There are no parts of this card that can be repaired by the agent.

4.5.2 The connector backplane.

To remove this card the metal panel which holds the connectors onto the back of the system must be removed.

The data to this card is via the ribbon cable from the multi protocol driver card.

IMPORTANT.

Modification for using DMX to an EC90.

Remove R1, R2, R3 and R4 and replace them with wire links.

Reason.

These 100Ω resistors are in series with the output of the Data + and Data = from the two DMX outputs. With an EC90 this will result in termination of the dimmer line before the data has left the back of the Lightboard M.

These resistors do not have to be removed to other dimmers.

4.5.3 Backup cards.

The new Lightboard M does not have any form of backup.

The new Lightboard M also provides 5v to the library module therefore the 120v power supply for the module is not longer fitted.

4.6 Internal connections.

The internal connections to the Lightboard M are almost identical to the old Lightboard M with no backup. Only the following changes have been made to the information in section 3.6

4.6.1 The LAN.

Power is now 11v from the power supply and the cable forms a ring from and back to the power supply.

4.6.2 The CCU AUX.

Power is still -12v. The power fail detect on pin 3 is no longer used.

4.6.3 The Reset cable.

This now goes to the CCU and to the multi protocol driver card.

4.6.4 The Dimmer output.

This is now a ribbon cable from the Multi protocol driver card to the connector backplane.

4.6.5 Disc drive data.

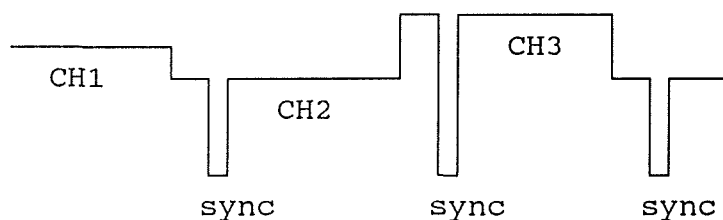
The cable to the CCU has not changed. The second half of J2 on the disc processor card now goes to the 5v power supply instead of the power supply on the library module.

Appendix A.

Service Bulletin 020889 Modifications to Strand demultiplex units.

Fault.

The analogue protocol output of the Lightboard M has a sync pulse after the start of the new channel level. The demultiplex unit will sample a specific time after the start of the sync pulse. If the sample delay is too long the demultiplex unit may sample the wrong channel.



Cure.

The delay time between the sync pulse and the channel level sample must be reduced. One resistor change is required.

Details.

Ref 1828 F&D interface.	-	R43 becomes 47K
Ref 1866 Permux interface	-	R19 becomes 47K
Ref 1867 24 Channel demux	-	R15 becomes 47K

All resistors are SFR 25 ¼W 5%

Appendix B.

Lightboard M Switch settings.

PANEL	Switch 1	Switch 2	Switch 3	Switch 4
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96 Channel Software

Submaster 1	on	off	on	on
Submaster 2	off	off	on	on
Faders 1 - 12	on	on	off	on
Faders 13 - 24	off	on	off	on
Faders 25 - 36	on	off	off	on
Faders 37 - 48	off	off	off	on
Faders 49 - 60	on	on	on	off
Faders 61 - 72	off	on	on	off
Faders 73 - 84	on	off	on	off
Faders 85 - 96	off	off	on	off
R.I.M.	on	on	off	off

144 Channel Software

Submaster 1	on	off	on	on
Fader 1 - 12	off	off	on	on
Fader 13 - 24	on	on	off	on
Fader 25 - 36	off	on	off	on
Fader 37 - 48	on	off	off	on
Fader 49 - 60	off	off	off	on
Fader 61 - 72	on	on	on	off
Fader 73 - 84	off	on	on	off
Fader 85 - 96	on	off	on	off
Fader 97-108	off	off	on	off
Fader 109-120	on	on	off	off
Fader 121-132	off	on	off	off
Fader 133-144	on	off	off	off
R.I.M.	on	on	on	on