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Strand Lighting

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Header page : 1 of 4

MX AGENTS MAINTENANCE

CONTENTS PAGE

MX 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.

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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.

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.

Strand Lighting

MX AGENTS MAINTENANCE

Section 1. Maintenance

The following list details the items which Strand Lighting would expect service agents to be able to repair, and items of maintenance which are not detailed in the Operation Handbook for MX.

1.1 Strip down procedure.

1.1.1 Panels

Each MX panel is held into the MX chassis by three screws (silver M3 x 10 posi, pan head) on the back of the chassis. On removal of these screws the panel must be lifted from the front first in order to allow the moulded hooks on the back to be released.

Fader panels can be removed from the MX by removing the IDC socket connection to the ribbon cable.

The control MX panel is linked to the power supply via a ribbon cable. On all current models this ribbon cable link is soldered into both the power supply board and the control circuit board therefore preventing the removal of the control board without the removal of the power supply.

1.1.2 Circuit Boards

To remove the fader circuit board from the front panel, first remove the fader knobs. Then remove the five screws (silver Self Tapping No.4 x 12) holding the circuit board onto the panel. Now carefully remove the circuit board.

To remove the control circuit board from the front panel, first remove the fader knobs. The remove the eleven screws (silver Self Tapping No.4 x 12) holding the circuit board onto the panel. Now carefully remove the circuit board. **DO NOT** remove the nylon screws from the control circuit board.

To remove the power supply circuit board from the MX chassis, first disconnect the three MOLEX connectors from the three Multiplex output sockets. Next remove the earth input cable connector. Remove the five screws (Silver M3 x 6 posi, pan head) holding the circuit board to the chassis base. Carefully lift out the power supply circuit board.

1.2 Software Upgrading on MX

To upgrade the software in an MX change the two EPROM's on the control circuit board. (IC36 LOW and IC39 HIGH)

All EPROM's must be 100ns or faster.

The latest version of MX software on 18.6.92 is B1.

1.3 Hardware repair

The hardware repair expected by Strand Service Department is of items including the Power Switch, Flash buttons, Faders, LED's and internal cables. Strand Service does not expect any agent to replace or repair surface mounted components.

Faulty items should be easily identified using the self diagnostics built into the MX. If the MX is in a condition where it can not run diagnostics then it is safe to assume that the fault is beyond the level expected of agents.

Faders can be replaced by cutting the pins at each end of the fader then de-soldering the two remaining pins in the centre of the fader. The pins which have been cut can now be de-soldered and a new fader soldered in.

Flash buttons must be replaced by carefully de-soldering all the pins before removal.

Connections within the MX must be checked. Check that the IDC connector on the ribbon cable between fader panels has been crimped down fully.

Check the cables are securely crimped in the molex connectors on the power supply board.

Also check that the plastic feet are not falling off.

1.4 Board replacement

Power supply boards and control boards can be replaced without any adjustments.

Fader boards must have the switch setting changed for the required panel. The switch fitted to these boards has four positions numbered 1 to 4. Set the switch to 1 for fader panel 1 to 12 and 2 for panel 13 to 24 etc.

1.5 Re-assembly of the MX

Replace the circuit boards in the panels with the self tapping screws. Do not over tighten these screws as they can easily strip the thread in the soft plastic panels.

Re-connect the ribbon cable then replace panels by slotting the top hook into the MX chassis first then lower the rest of the panel into place.

Replace the screws on the base of the MX to hold the panels in.

WARNING. ON THE 48 WAY MX THE SCREWS UNDER FADER 26 (ONE OF THE 3 SCREWS HOLDING THE FADER PANEL 25 TO 36 ON). MUST NOT BE FITTED AS THE CABLE FROM THE POWER SUPPLY TO THE CONTROL BOARD GOES ACROSS THIS HOLE.

Section 2. Installation.

When you receive the MX 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 either Strand Lighting UK, or the distributor who supplied the MX and report the damage.
c. Keep all the packaging that MX was shipped in.
d. Do not attempt to repair the MX.

To install the MX plug the supplied power supply into the mains supply then plug the power supply into the MX. Connect the required multiplex cable into the dimmers and into the back of the MX. Now switch on.

Section 3. Commissioning.

3.1 At power up

When the MX is switched on it will perform a series of self tests. The user will observe LED's switching on whilst the MX powers up. The display will show the software version and report that it is running self tests.

If the board reports an error then refer to Appendix B at the back of the operation handbook for a detailed description and a list of possible causes.

Set up the display then pull out the power lead without switching the MX off. when you put the power lead back in the MX should return to the same display without running the self tests.
Check that the Power Supply is producing at least 15v.

3.2 Operation checks.

Operate every function of the MX to make sure that the MX is working correctly.

Check that the MX will drive the dimmers correctly. If there are problems first check that the MX contains a patch, then check that the configuration of the output is set to the correct protocol, ie D54, AMX192, DMX512 or SMX.

If the MX powers up with some flash LED's lit when there is no output from the C/D playback and the faders are at 0. Move the fader up and down again to extinguish the LED. (The MX is very sensitive at the 0 position and may sometimes detect 1% from a fader at 0.)

If the MX appears to work correctly then go through the diagnostic checks.

3.3 The diagnostics in the MX.

3.3.1 The Error Log.

This lists every error found in the MX since the Log was last cleared. It lists faults found during power up, faults found whilst running diagnostics and faults found during normal operation.

After running the diagnostics, if no faults are found then clear the fault log from the Clear options.

3.3.2 User Diagnostics.

The list of diagnostic programmes can be selected using the cursor up and down. Every test can be run once only or cycled. (If you select cycle then you must select abort to end the test.) Every test will ask you to confirm that you wish to run the test.

The diagnostic tests will not report that the test has passed successfully. If the test returns you to the menu without an error message then the test has passed.

a. LC DISPLAY

All the character segments of the display light in order form the top left of the screen.

b. A/D CONVERTER

There is a slight pause during the test then the MX returns to the menu.

c. DATA CHECKSUM

There is a slight pause during the test then the MX returns to the menu.

d. DIMMER OUTPUT

There is a slight pause during the test then the MX returns to the menu.

e. FADER MODULES

All faders must be at 0 before this test is run. The test will switch on all LED's in turn then ask you to press every flash button in turn. Then move every A preset fader to full then back to 0 then every B preset fader to full and back to 0.

f. CONTROL MODULE

All faders must be at 0 before this test is run. Please note that not all faders are at 0 when they are at the bottom position. The test will light each LED in turn then ask you to press each button then move each fader to full then back to 0.

g. MEMORY CARD

If you have a memory card fitted this test will initialise the memory card and clear it's contents.

h. D/A CONVERTER

There is a slight pause during the test then the MX returns to the menu.

i. ALL TESTS

This will run through all of the above tests.

3.3.3 Service Diagnostics.

a. RS232

This test requires a wrap around plug from pin 2 to pin 3 on the RS232 port (25 way D connector). There is a slight pause during the test then the MX returns to the menu.

b. MIDI

This test requires a MIDI cable to connect MIDI OUT to MIDI IN. There is a slight pause during the test then the MX returns to the menu.

c. AUDIO

Set the AUDIO fader to full before this test is run. There is a slight pause during the test then the MX returns to the menu.

d. ALL TESTS

This will run through all the above tests.

3.4. Multiplex output of the MX.

Using a scope check the multiplex outputs of the MX. To test these outputs go to the CONFIG I/O menu and select each output protocol in turn.

On the SMX and DMX512 output (See Figure 1):-

Pin 1 = Signal Ground
Pin 2 = Data -
Pin 3 = Data +

On the D54 output (See Figure 2):-

Pin 1 = Signal Ground and
Pin 3 = Multiplexed output signal

On the AMX192 output (See Figure 2):-

Pin 1 = Signal Ground,
Pin 2 = Sync pulse +
Pin 3 = Analogue channel levels
Pin 4 = Sync pulse -

Note. SMX with 9600 or 2400 baud can not easily be seen on a scope because the refresh time of the data is too long.

SMX data - is the same as SMX data + except inverted.

Section 4. Modifications.

There is only one modification to the MX at the time this document is published.

Description of fault.

Output levels (particularly those controlled directly by channel faders) may fluctuate by up to 1% from their actual level. This fluctuation is not visible on controlled lighting, but it is visible on a terminal if connected.

This fluctuation is more noticable on channels 13 to 24.

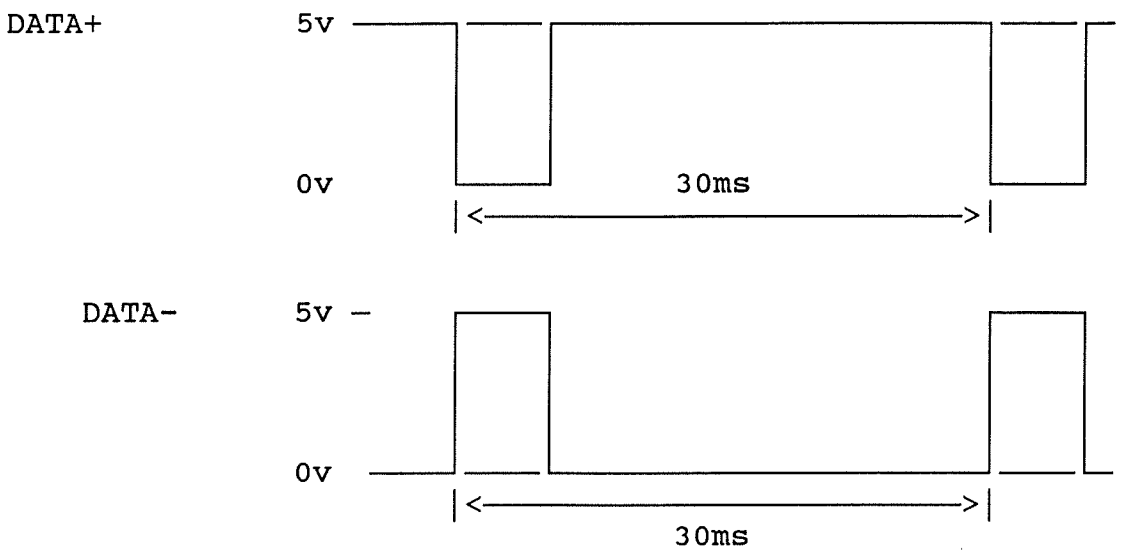
The magnitude of the fluctuation may be reduced by a PCB modification.

The details of the modification will not be included in this manual. The modification is only documented in the full maintenance training document. The information is omitted from this document because it involves the replacement of a surface mount component on the power supply card.

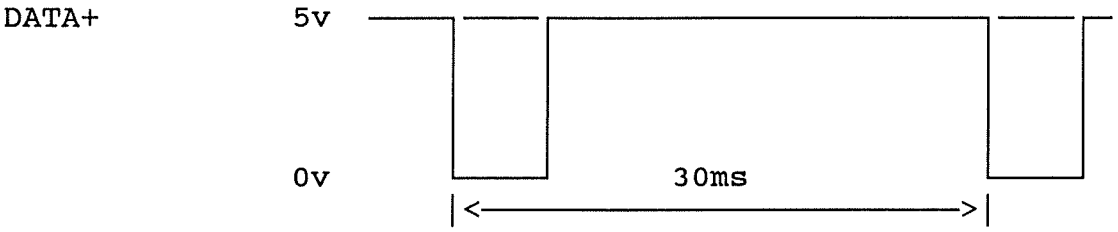
If a customer complains of this fault then the system should either be returned to Strand Lighting Service or sent to a service agent who has attended the full maintenance training course.

Figure 1.

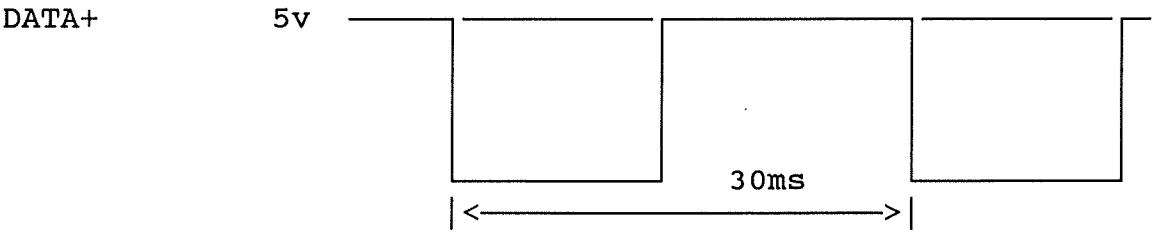
DMX 512



SMX at 250K Baud



SMX at 62.5K Baud



SMX at 19.2K Baud

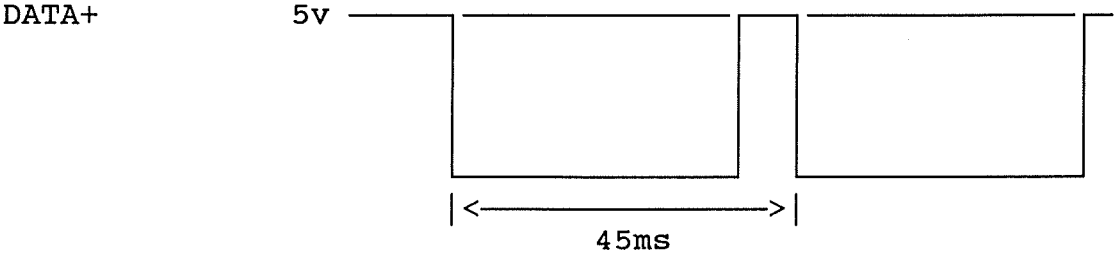
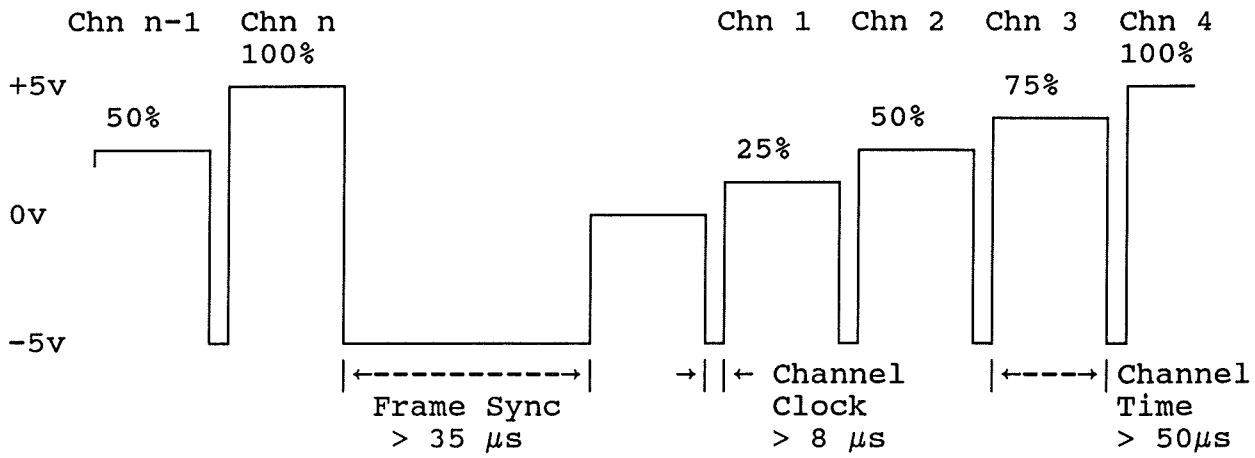
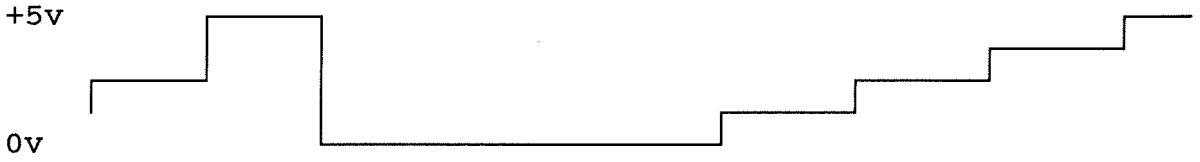


Figure 2.

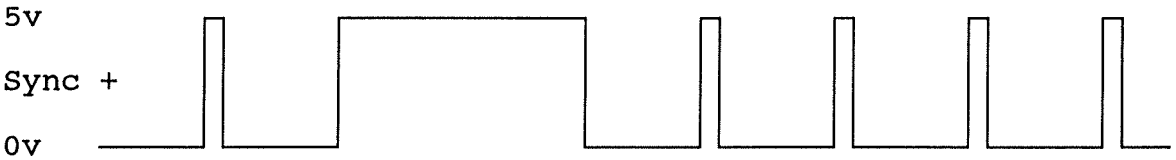
D54 - 2 Wire Multiplex

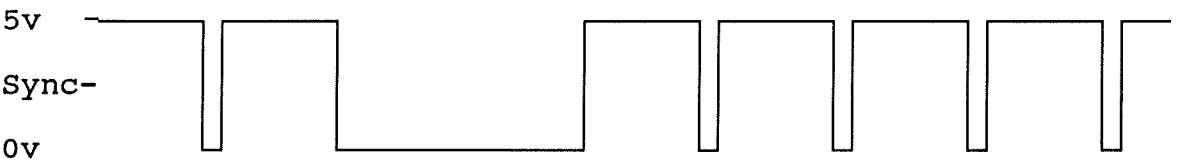


AMX 192 - 4 Wire Multiplex.



Analogue output waveform - Waveform also applies to Mux fader input line.





Channel levels are given for example only.