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MINI LIGHTPALETTE 90

AGENTS MAINTENANCE

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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.
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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.

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MINI LIGHTPALETTE 90 AGENTS MAINTENANCE

Section 1. Basic fault finding.

When a customer first contacts the service agent with a problem on a Mini Lightpalette 90 there are a number of checks that the customer can make to isolate the fault.

To provide the fastest service to the customer, and the most cost effective service for the agent, the fault should be found over the phone. The agent can then send a replacement board direct to the customer who can be given instructions on how to replace it.

1.1 Obvious faults.

Never over look the obvious faults.

There are many faults which can be traced to very simple mistakes made by the customer. These must be checked tactfully over the phone.

The agent must also have a good understanding of the operation of the desk. There are many faults that can be traced to operator error.

1.2 Common installation faults

	Cure
No outputs on stage	Switch the dimmers on. Is the MUX cable connected to the correct rear DMX output.
No VDU output on one VDU	Swap VDU's and then swap VDU cables to check for faults.
Hand held remote does not work	Are the batteries flat.

1.3 Common operator errors

	Cure
No outputs on stage	Dimmers not assigned to MUX outputs. Incorrect patch. Incorrect dimmer profile. Rear connections.
AND MANY OTHER ERRORS.	

Section 2. Rear connections.

2.1 Mains input and output.

The Mini Lightpalette 90 has a single IEC mains input and fuse assembly. The assembly also contains a filter to provide RFI suppression.

There is a three way IEC mains output connector. This is designed to provide power to the VDUs and to the printer.

2.2 Video outputs.

There are two 9 way D type connectors provided for the VDU's. The VDU's used on the system must be TTL and must be EGA compatible. The multisync monitors which are currently supplied will switch to EGA mode when the video data is detected.

The Remote video output is a 25 way D type which is designed to interface with a remote video card. This card will allow two monitors, with copies of the main video screens, to be positioned away from the main console.

2.3 Printer output.

The printer output is a 9 way D type connector. Details of the printer pin out are given in the copy of the official installation guide in Appendix C.

2.4 Dimmer outputs.

The Mini Lightpalette 90 has two DMX dimmer outputs. These outputs use 5 pin XLR male connectors. The pin-out of this connector can be found in the copy of the installation section - Appendix C.

2.5 Hand Held remote.

There are two 9 way D type connectors. The hand held remotes are powered from rechargeable batteries.

2.6 Unused outputs.

Connectors are fitted for the following functions but these functions are not available in the software.

Remote Submaster port.
Remote console port.

Section 3 Overview and connection details.

3.1 External connections.

All main system cables are described in the "Installation" section of the operation handbook. This handbook describes the cables for the Lightpalette 90 and does not distinguish between the full system and the MINI.

A copy of this installation section is provided as the cable information is correct for the printer and the VDU cables.

3.2 Mini Lightpalette 90 sub-assemblies.

The Mini Lightpalette 90 console contains the following assemblies :-

a. Electronics crate: DEC Processor.
Memory Board (723079-010)
Dimmer Processor Card (723049-010)
Serial Interface Card (723069-010)

b. Control panel processor card. (723070-010)

c. Control panel keyboard card. (723071-010)

d. Control panel fader card. (723072-010)

e. Submaster panel faders. (723073-010)

f. Power supply unit. (1-371052-000)

g. Disc Assembly.

h. Interface Card. (3-723153-010)

i. Peripherals: Printer.
Hand Held Focus Remote.

3.3 Card interconnections.

All connectors on the Mini Lightpalette 90 are labelled "J" followed by a number.

The system interconnections must be the first to be checked when fault finding the Mini Lightpalette.

3.3.1 Control panel processor. (723070-010)

This is the large panel mounted on the base of the Mini Lightpalette 90.

J1 - Video I/O. This connector is not used.

J2 - Video 2. This is a 9 way D type connector that is accessed through the rear panel of the Mini Lightpalette 90.

J3 - Remote Video. This is a 25 way D type connector that is accessed through the rear panel of the Mini Lightpalette 90.

J4 - Video 1. This is a 9 way D type connector that is accessed through the rear panel of the Mini Lightpalette 90.

J5 - Submaster port. This is a 9 way D type connector that is accessed through the rear panel of the Mini Lightpalette 90. This option is not used at this time.

J6 - Console Port. This is a 9 way D type connector that is accessed through the rear panel of the Mini Lightpalette 90. This option is not used at this time.

J8 - Data. This connector is used to transfer data to and from the desk processor to the rear interface panel.

J9 - Power. This is the power input for the panel processor card.

J10 - Fader panel. This ribbon cable connects the panel processor to the fader panel on the lid of the Mini Lightpalette.

J11 - Submaster Panel 1. This ribbon cable connects the panel processor to the submaster panel. Looking at the solder side of the submaster panel when the lid is open. The destination of this ribbon cable is the connector closest to the rear hinge.

J12 - Submaster Panel 2. This ribbon cable connects the panel processor to the submaster panel. Looking at the solder side of the submaster panel when the lid is open. The destination of this ribbon cable is the connector furthest away from the rear hinge.

J13 - Disc drive data. This connector transfers data to and from the disc drive.

J14 - Keyboard panel. This ribbon cable connector links the panel processor card to the keyboard front panel.

3.3.2 Interface card.

This card is mounted on the rear of the Mini Lightpalette 90. It has three Nicad batteries mounted on it to provide memory retention when the system is switched off.

J1 - Dimmer Processor card. This ribbon cable connects the interface card with the DPR card.

J2 - DMX output 1. This is a molex connector which links the DMX data output 1 to the chassis mounted 5 pin XLR on the rear panel. This connector is labelled DMX O/P 2.

J3 - "To console". This is the data connection between the panel processor card and the rear interface panel.

J4 - DMX output 2. This is a molex connector which links the DMX data output 2 to the chassis mounted 5 pin XLR on the rear panel. This connector is labelled DMX O/P 1.

J6 - Serial I/O card. This is the data between the serial I/O card in the electronics crate and the rear interface card.

J7 - Power. This is the connector for the power input.

Four 9 way D type connectors are mounted directly onto the PCB to provide outputs for the two hand held remotes, the printer and the remote console.

Link JP11 must be fitted when using the batteries for memory retention.

JP1 has no link fitted.

3.3.3 Control panel keyboard.

Connector J1 links this card, via a ribbon cable, with the control panel processor.

Connector J2 is the connector to the keyswitch. The keys are not fitted on the Mini Lightpalette 90. The desk processor can not have dual electronics however it must still be told that system **B** is enabled. A link must be fitted between pins 4 and 5 on J2. When viewed from below this connector is the closest to the hinge and pins 4 and 5 are the second and third pins away from the hinge.

After fitting this link always check that link 11 on the panel processor card is not fitted. When this link is removed the panel processor will operate as system B.

Connector J3 is the connector for the channel wheel.

3.3.4 Control panel fader card.

Connector J1 links this card, via a ribbon cable, to the control panel processor.

Connector J2 is the connection to the Rate wheel.

Connector J3 is the connection to the GO button and the STOP/BACK button.

3.3.5 Control panel submaster card.

The Mini Lightpalette 90 can only have one submaster panel fitted.

J1 is the connector to the panel processor card for submasters 1 to 12. This connector is the closest to the rear hinge when looking from below.

J2 is the connector to the panel processor card for submasters 13 to 24. This connector is the furthest from the rear hinge when looking from below.

3.3.6 DEC processor and memory board.

These circuit boards do not have any connectors other than the rear connections to the card crate.

3.3.7 Serial I/O processor.

J1 is the only connection on the front of the card. The ribbon cable from this connector is joined to the rear interface card.

3.3.8 Dimmer processor card.

J1 is the only connection on the front of the card. The ribbon cable from this connector is joined to the rear interface card.

3.4 Card positions in the crate.

The lowest slot in the crate has the memory card in the left hand side and the DEC processor card in the right hand side.

The next slot up is used by the Serial I/O card.

The top two slots are used by the dimmer processor cards.

If the system has only one DPR card then it is put in the top slot. If the system has two DPR cards then the card which is linked for DPR 0 is placed below the card linked for DPR 1.

Section 4. Voltage measurement.

4.1 Power supply.

The power supply voltages should be measured as part of any repair work. The power supply used is a MAP 130-4000.

Pin 1 - (Right hand side) No connection.

Pin 2 - No connection.

Pin 3 - +12V. To left fan.
To crate and right fan.
To interface PCB.

Pin 4 to 6 - 0V.

Pin 7 - +5V To Panel processor.
To interface PCB.

Pin 8 - (Left hand side) +5V to crate.

The +5v and the +12v to the electronics crate are critical. The power cables from the power supply to the crate will drop as much as 130mv.

The other power supply connector J2 us used to provide the power fail detect output. Pin 4 laballed PF is connected to the backplane of the crate.

4.2 Crate voltage measurement.

Measure the voltage on the DPR card in the top slot of the crate. Measure between 0v on IC10/8 and 5v on IC10/16 and adjust R14 on the power supply until the reading is 5.05v.

The power to the crate is connected on the rear right corner of the crate. Great care should be used when measuring voltages on this corner if the crate has not been removed. The power connections are as follows.

Top	+12V	
	+5V	
	+5VB	(+5V Battery Backup)
	GND	
	GND	
Bottom	No connection.	

4.3 Panel processor voltage measurement.

The 5V measurement should be taken from capacitors C62 and C63 which are next to the two Zilog processors on the card.

This should be used as a check and not for the voltage adjustment. If there is a significant difference between the 5V on this card and the 5V on the DPR card check the quality of the power connections.

Power connectors should be gold plated and not tin. A poor connection can produce a significant voltage drop on the panel processor card.

Section 5. Detailed circuit board descriptions.

The following information is given to assist with the diagnosis of a fault to a specific circuit board. The description does include details which may assist with repair to component level however agents are not expected to provide full maintenance of this product.

5.1 Control panel processor. (723070-010)

The CPP hardware may be divided into six major sections: The video/disc processor, disc interface, two video interfaces, keyboard processor, analogue interface and keyboard interface. The circuitry for the two video interfaces are identical.

5.1.1 Video/Disc processor.

The video disc processor handles all communications with the "CEE", the floppy disc drive and the keyboard processor.The video/disc processor decompresses video messages from the "CEE" and displays them on the two video monitors.

5.1.2 Disc interface.

The intel 82072 single chip floppy disc controller forms the heart of the disc interface.

5.1.3 Video interface.

The video interface generates an EGA compatible colour display of 25 lines by 80 characters. The Signetics 2674 Advanced Video Display Controller chip AVDC (U16 & U20) generates the vertical and horizontal timing signals necessary for the display.

The Signetics 2675 Colour / Monochrome Attribute Controller CMAC (U15 & U22) contains the high speed shift register that is used to serialise the O/P of the character generator as well as the logic to apply the specified video attribute to the character.

The display memory consists of two 32K x 8 static RAM devices. Ram chip U32 contains the character code for the displayed character, the other U31 contains the character attributes. The character generator U33 contains the character fonts.

5.1.4 Keyboard processor.

The keyboard processor U66 scans all input devices connected to the desk and handles the optional remote submaster processor. The keyboard processor watchdog U54 provides power-on reset and software execution monitoring. Whenever the keyboard processor is executing normally it will toggle the watchdog timer every 50ms. If the processor fails to toggle the watchdog at least once every 1.5 seconds the watchdog will timeout and reset both the keyboard and the video/disc processors.

5.1.5 Analogue interface.

The analogue interface is used to read the positions of all wheels and faders on the desk. The wheels and faders are powered by VRef, a diode isolated +5v source. The other side of the potentiometers are returned to ground. The analogue voltage at the wiper of the potentiometer indicates the physical position of the potentiometer.

5.1.6 Keyboard interface.

All keys and buttons on the desk are viewed by the keyboard processor as a large X-Y array. The X axis of the array is formed by the "drive" lines which select one of the 25 lines. The Y axis of the array is the 8 bit keyboard data bus.

5.2 Control panel keyboard (723071-010)

This PCB contains logically grouped keypads which enable the operator to perform the majority of the systems functions. It also interfaces communication to and from the level wheel via a molex connector J3.

5.3 Control panel faders (723072-010)

This PCB includes 8 playback faders grouped in pairs for split fades or for 8 part cues. Each fader has its own Bump button. The Rate wheel and the STOP/GO switches are connected to molex J2 and J3 respectively.

5.4 Submaster panel faders (723073-010)

This panel contains twenty four submaster faders. Each fader has its own bump button. This panel is read in the same way as the control panel fader panel. The data for the first 12 faders and bump buttons is read via the ribbon cable on J1. The second 12 faders and bump buttons is read via the ribbon cable J2.

5.5 DEC J11 processor.

The computer used in a mini Lightpalette 90 is a DEC KDJ11-A (J11) running at 18MHz. Its main functions include command processing, display generation, and overall system control. Although it does not perform any channel calculations.

The DEC processor has status LEDs on the front of the card. In normal operation only the right hand LED should be lit.

5.6 Q Bus memory card (3-723079-010)

The Q Bus Memory Card contains 256K of battery backed non-volatile RAM and 256K of EPROM. One set of two EPROMS provides 128K of program storage for the J11 and the other set provides the 128K of program for the DPR cards. The DPR program is down-loaded by the J11 into the DPR card at power up.

The RAM is organised as four banks of 32K 16 bit words. Each bank consists of 32K x 8 Static RAM devices. The EPROM is organised as two banks of 64K words. Each bank consists of two 64K x 8 27512 EPROMS.

The remaining control circuitry consists of data bus transceivers, address latches and memory address decoders which provide the J11 processor with access to the EPROM and RAM memory banks.

There are no status LEDs on this card.

5.7 Dimmer processor card (723049-010)

The Dimmer Processor Card performs all real time calculations which are necessary for the 576 channels. Each dimmer card contains 256K of Battery backed CMOS RAM. This RAM is used for program storage and for storage of patch information, cues, groups, submasters, and effects for all 576 channels.

The DPR card contains an 80286 microprocessor (Channel processor U14) which processes commands, fades, submasters, effects and wheel control data. A separate Zilog Super 8 microprocessor (O/P processor U9) converts raw channel levels into dimmer levels by applying the appropriate profile curve. The Super 8 microprocessor then generates signals for three AMX 192 lines and one DMX 512 line.

The DPR card has a status LED on the front. LED D51 should remain lit in normal operation.

5.8 Serial interface card (723069-010)

The serial I/O card provides communications between the electronic crate, the console processor card and peripheral devices.

The SIO card can support three console processors communicating at up to 125K Baud. The Mini Lightpalette 90 only uses one port for the panel processor. Remote consoles are not available.

The SIO can support three hand held remotes operating at 1200 Baud but only two outputs are provided. One remote device operating at 4800 Baud (Not used in Mini Lightpalette 90). One printer operating at 9600 Baud. One full back up operating at 125K Baud (Not used in Mini Lightpalette 90).

Communication to these devices is performed by three zilog super 8 processors (U36,37 & 39). Operational software for the SIO card is contained in the EPROMS (U1, U4 & U8).

The four status LEDs should all remain on during normal operation.

5.9 QBus backplane

The mini LP90 uses a 'Digital H9270' backplane.

'Digital' backplanes are priority structured, ie. signals propagate away from the processor from the highest priority device to successively lower priority devices.

In the MLP90 system the recommended position for each card is as shown below, although each card will operate in any position.

Top	DPR 1
	DPR 0
	SIO
Bottom	MEMORY BOARD J11 PROC.

5.10 Hand held remote

The hand held remote is a compact hand held terminal which has its own command line & liquid crystal display.

It supports most control console functions which do not need manual faders. Each key press sends a single ASCII character to the serial interface card where it is acted upon immediately. Plain text ASCII messages are sent from the serial interface card to the hand held remote for display.

Section 6. Basic fault finding.

6.1 Electronics crate - status LEDs

These LEDs provide a quick diagnostic aid for a large class of hard failures. The DPR, SIO & J11 processor have fault LEDs located at the card edge.

6.1.1 DPR card.

The o/p processor illuminates D51 whenever it is executing the down loaded program in RAM. Since the o/p processor is reset by the cards watchdog timer D51 provides an indication of the health of the channel & o/p processors.

The DPR number is selected using links on the DPR card. See appendix A.

6.1.2 SIO card.

D51, D52, D53 and D54 are watchdog timer and power monitoring LEDS. D51, D52 & D53 indicate the state of the three onboard communications processors. Whenever a communications processor is executing normally it will toggle its watchdog timer every 50 milli seconds. If the processor should fail to toggle the watchdog at least once every 1.5 seconds the watchdog will timeout and reset the processor.
This will cause the appropriate LED to flash.

D54 indicates the state of the Q-Bus watchdog U57. This watchdog drives the reset line which resets all cards connected to the Q-Bus backplane.

The watchdog will activate reset if the 5V rail falls below 4.75V. This feature forms the heart of the non-volatile memory protection circuit. ie. As power fails, the watchdog circuitry holds the processor in reset, causing the Q-Bus memory card to disable writes to RAM.

6.1.3 J11 processor card.

Due to the fact that the J11 processor is not being used with standard "digital" manufactured cards, LED's D1, D2, D3, & D4 provide no useful indication.

6.1.4 General information.

During normal operation the state of the LED's should be as follows.

DPR	-	D51	ON
SIO	-	D51-D54	ON
J11	-	D4	ON
J11	-	D1, D2, D3	OFF

Flashing LEDs indicate the associated circuitry is not working correctly. If the LEDs are completely dark the most likely cause is a failed power supply. If the LEDs are dark and the power supplies are OK, the failure is probably associated with the Q-bus reset logic on the SIO card.

6.2 Connection faults.

In the desk all molex plugs and sockets must be gold plated and not tin plated.

Check that all IDC connectors used in the desk are fitted with the correct thickness of cable. On some old desks the cable thickness used was too large and the IDC connector was not cutting through the insulation. This could lead to poor contact and intermittent faults.

On Mini Lightpalette 90 the Yellow power connector is a poor fit and can cause problems. Make sure the connector is on securely. If the problems continue then this can be replaced with a large molex connector. Future Mini Lightpalette 90 desks will be fitted with a large molex as standard.

Check the quality of all crimp terminated power cables. Also check that the crimp used is correct size for the cable.

Any poor quality cable termination or connector contact may cause a voltage drop which will be detected by the watchdog chip. This can result in the desk intermittently going into reset.

Serial communication from the panel processor to the SIO card is made via the rear interface card. All data concerning button pushes, fader movements and disc drive data is sent to the SIO down this cable. The video data is sent up to the panel processor card through the same cable.

A faulty cable from the SIO to the interface card or from the interface card to the panel processor will result in the message "Trying to establish communications with the tower." on the desk VDU. The crate is called the "Tower" because the desk processor is the same for the full system and the Mini system.

Section 7. Basic maintenance.

7.1 Control desk.

The Mini Lightpalette 90 may be serviced by releasing the ¼ turn fasteners on the bottom of the console. Lift the lid of the console to expose the system electronics and assemblies. There is a bar which can be used to hold the lid open.

Before switching on the console physically inspect all wiring, cable routing and connections within the system.

With no monitors, dimmers or peripheral devices connected switch on the console. The fans will start up and the disc drive LED will momentarily flash on brightly and then remain dim. A failure of one or both of these is almost certainly due to a lack of incoming supply or an internal PSU failure. See Section 4.

7.2 Power up routine for communication link.

With the two monitors connected to VIDEO outputs 1 and 2, the following message will be displayed on power up.

"Attempting to establish communications with the tower."

This is followed by the message

"The communication line is up."

These messages will only appear on VIDEO 1. The message will not move to VIDEO 2 screen when the SWAP button is pressed. When the screen is first updated by the tower the message line of the CRT should be overwritten by one of the following messages :-

DPR d: HOT START	-	All data correct at power up.
DPR d: WARM START	-	Some data corruption detected.
DPR d: COLD START	-	Fatal data corruption. Lightpalette 90 has cleared all of the memory.
DPR d: SUPER 8 COLD START	-	The DPR program stored in RAM is corrupt or missing. All memory has been cleared and the DPR program has been re-loaded.

Removing the DPR card, the batteries on the interface or the battery link on the interface, will cause a Super 8 Cold Start.

Please refer to Appendix B for the full list of power up messages and the description.

The message "Trying to establish communication with the tower" will appear if the communication between the control panel and the card crate is lost. If this message appears a good percentage of the control panel electronics is functioning correctly. The message "The communication link is up" is also generated by the control panel and indicates that the majority of the SIO card in the card crate is working correctly,

When the J11 processor in the card crate is able to communicate with the SIO it will update the video displays after it sees that communication has been established between the electronics crate and the control panel processor card. Some screens are generated locally by the J11, other screens are generated by DPR cards. DPR START messages are generated in the card crate.

7.3 Video problems.

If one of the video monitors is dark make sure it is plugged in to the appropriate console port and is switched on. Check the brightness and contrast of the monitor. If the monitor proves to be faulty and a replacement is not readily available use the SWAP key to swap over the displays when necessary.

When using only one monitor make sure that it is connected to video output 1 because error messages are only displayed on this video.

For a non functioning remote monitor first make sure it is plugged into the appropriate console port and switched on. Check contrast and brightness. Plug the monitor directly into the console to check the monitor.

If a remote video problem is traced to the video distribution system make sure that the video repeater system is getting power.

7.4 Submaster problems.

Problems with submaster faders may be diagnosed by swapping the ribbon cables between the first and second section of faders. If the problem follows the fader then the fader is defective. If the problem remains in the same logical submaster then the console panel processor has a fault.

7.5 Individual key problems.

If a row or a column of keys on the keyboard fails the chances are good that the problem is caused by the console panel processor card. The failure of a single key is likely to be the actual keyswitch.

7.6 Hand held remote problems

When the terminal is switched on a block cursor should be displayed in the LCD window.
If the cursor is not displayed check the phantom power received at the hand held remote. This should be approx. 12v.

Ensure that the hand held remote is enabled in the console definition and status menu.

7.7 Disk problems

Most disk drive problems are actually diskette problems. You should always have a back up diskette for every show or setup.

If you are having difficulty initializing a diskette check the right protection tab is set correctly.

If you still cannot initialize the diskette try another one.

Use the same procedure as above if you have difficulty recording onto a diskette.

If the system will not read a diskette or halts on a read use "Load partial show" to load each data item (ie. cues, groups, etc.) separately. If you successfully load all items, re-record the show from memory and try to read the newly recorded diskette.

7.8 Dimmer problems

Always check the system setup first in any dimmer malfunction or addressing problem.

Check the configuration menu to ensure the correct number of dimmers are assigned to the dimmer o/p port being used.

Make sure that all patches are correct.

If dimmer control is shifted by a fixed amount check that 6kw to 12kw assignments are not allocated.

Make sure that the faulty dimmers in question are not being modified by a profile or being held on or off by a submaster.

Section 8. Modifications.

There have been two significant modifications since the launch of the Mini Lightpalette 90. Please check every Lightpalette 90 that comes in for repair has been modified.

8.1 Memory corruption during power down.

During the AC power down transition the reset line disables the RAM. The corruption was found to be due to the reset line momentarily bouncing back and enabling the RAM.

A modification must be made to the memory card and to the dimmer processor card.

8.1.1 Memory card modification for REV E to REV F.

Materials. 1 x 74HCT132.

Procedure.

a. Replace the 7438 in U10 with a 74HCT132 (Strand P/N 3-723079-010)

b. Cut the track between the via hole and C10 on the component side of the PCB. This track comes from U10 pin 14.

c. On the solder side of the PCB add the following jumper wires to U10 :-
link pins 3, 4 and 5.
link pins 9, 10 and 11.

d. Link between C10 and the via hole of Vmem (See diagram)

8.1.2 Memory card modification for REV F to REV G.

Materials required.

VN10LE MOSFET
100KΩ ¼W resistor.
0.1 μF Ceramic capacitor.
32 AWG single core PTFE coated wire.
Shrink tubing.

a. Remove old software and install latest version. Oldest version which can be used after this modification is 1.8.4. (U11, U12, U14 and U15)

b. On the solder side cut the track between pins 8 and 9 of U26.

c. On the component side connect a 0.1μF capacitor between U10 pin 1 and C10 (as shown on the diagram)

d. On the component side also connect a 100KΩ resistor to U10 pin 1. Using single core PTFE insulated wire connect the other leg of this resistor to the rear gold finger labelled BPOK on the diagram. Ensure both resistor legs are insulated.

e. Connect the Drain of the MOSFET VN10LE to the via hole from the gold finger labelled BDCOK.

f. Connect the source of the MOSFET to the via hole in the GND track as shown.

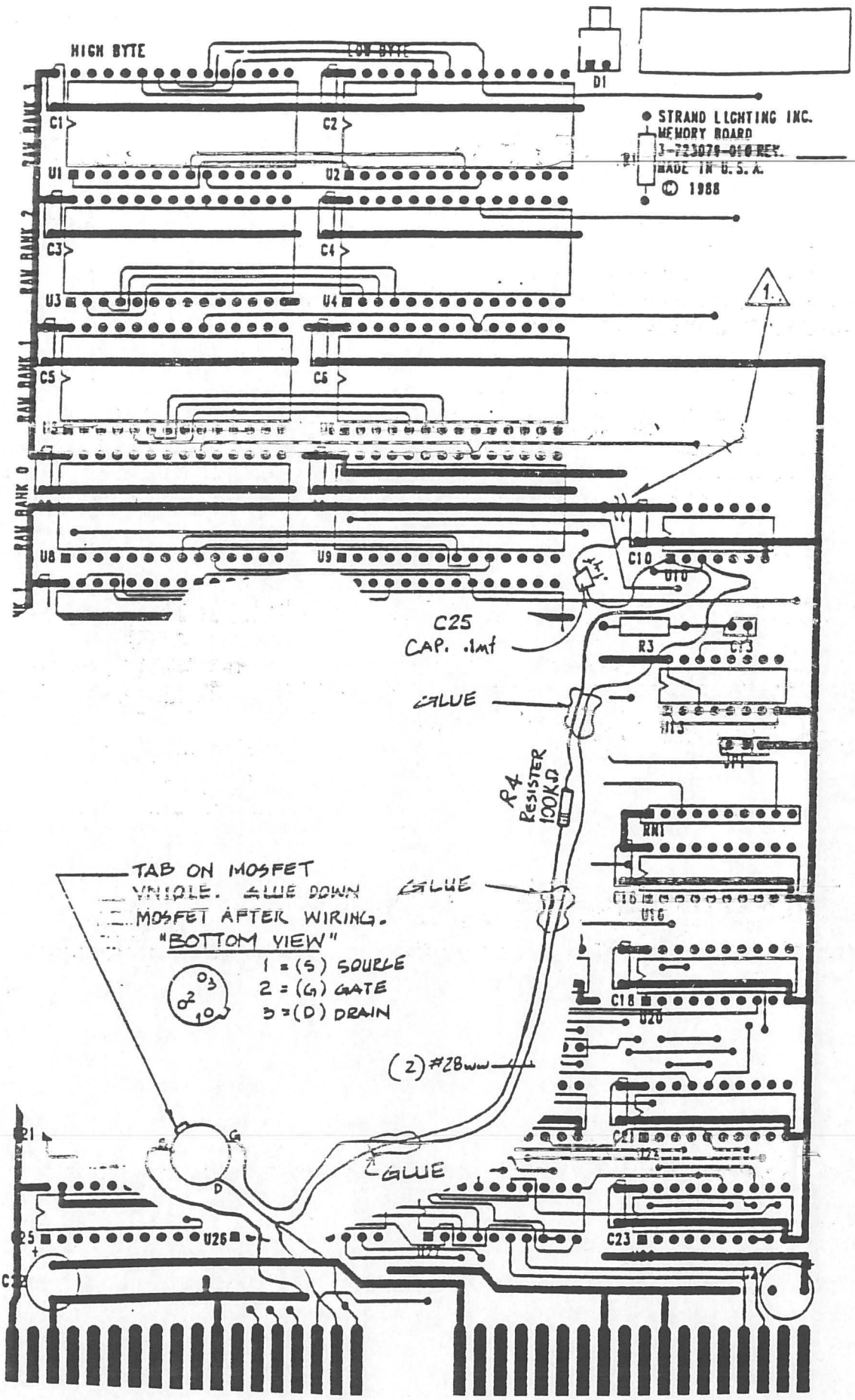
g. Connect the gate of the MOSFET using single core PTFE insulated wire to U10 pin 3.

h. Glue the wires down in the places shown.

i. Ensure that the J11 DEC processor card has the correct link positions. (These links are given in Appendix A).

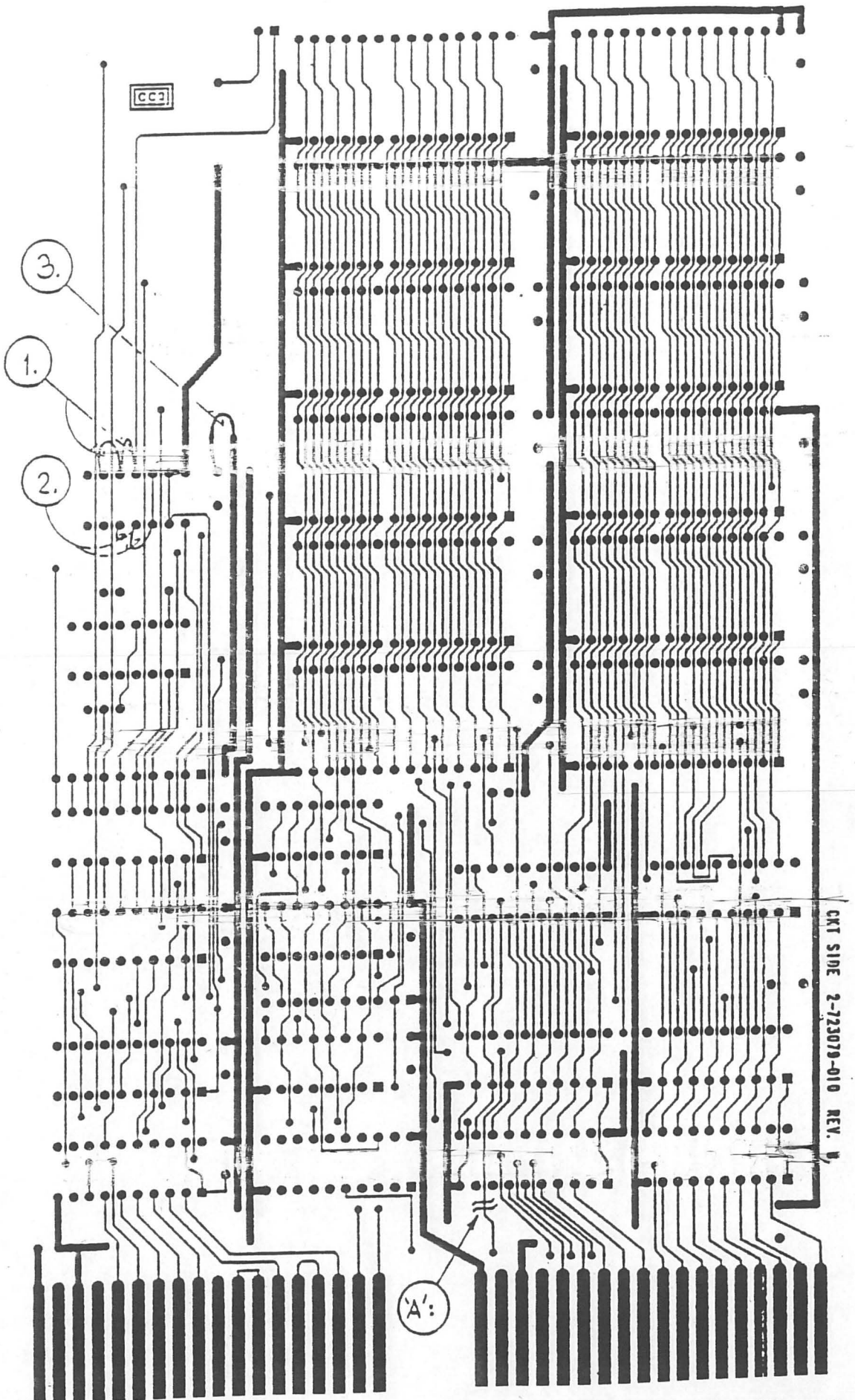
Details of the modification in section 8.1.1 and 8.1.2

FIGURE NO.1 "COMPONENT SIDE"



Details of the modification in section 8.1.1 and 8.1.2

FIGURE NO.2 "SOLDER SIDE"



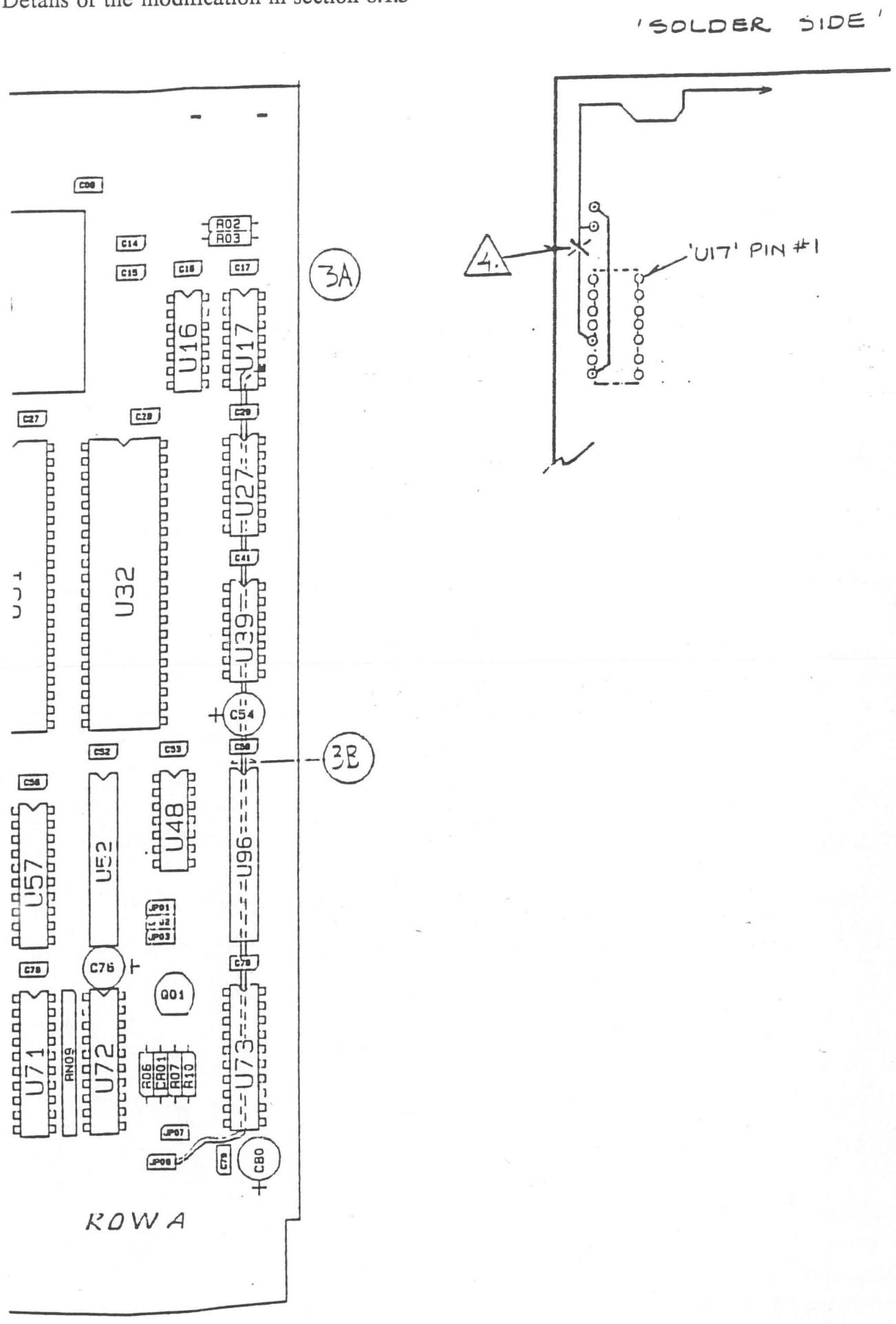
8.1.3 Modification to Dimmer Processor card.

a. Remove the old software and fit version 1.8. (U49 and U50)

b. Cut the track on the solder side close to U17. (See diagram)

c. Attach wire link from U17 pin 9 to the through hole of JP8. The wire should be threaded under U17, U27 U39, U96, U73 and any capacitors. (See diagram)

Details of the modification in section 8.1.3



8.2 Frame error on DMX output.

LIL DMXTER will report 513 frames instead of 512 and non Strand equipment using DMX will report DMX frame errors.

The modification is to the rear interface card and will upgrade from REV A to REV B.

Materials. 1 x 74HCT32 (P/N 1-295090-032)

Procedure.

a. Remove U5 (74HCT00) and replace it with a 74HCT32.

b. Swap TX DMX+ and TX DMX (Pins 2 and 3) in the two molex connectors attached to J4 and J2 on the interface PCB.

c. Swap the DMX 1 and DMX 2 output connectors so that the rear 5 pin XLR connector for DMX 1 is attached to J4 and the rear 5 pin XLR connector for DMX2 is attached to J2.

Note. Future issues of this PCB will have the artwork updated.

APPENDIX A.

Lightpalette 90 switch setting and link options.

A1 Console control processor jumpers.

Jumper	Key	Jumper	Key
JP1	1-2	JP9	1-2
JP2	2-3	JP10	2-3
JP3	1-2	JP11	sys A/B (Default = OFF for B)
JP4	2-3	JP12	1-2
JP5	1-2	JP13	1-2
JP6	1-2	JP14	OFF
JP7	2-3	JP15	OFF
JP8	1-2	JP16	2-3

Links JP1 to JP13 have pin 1 towards the rear of the desk.
Links JP14 to JP16 have pin 1 towards the front of the desk.

The panel processor must be set to system B. Check that the link on the keyboard processor is correct. Link pins 4 and 5 on connector J2 (See section 3.3.3)

A2 Dimmer processor card jumpers.

DPR Card	JP1	JP2	JP3
0	IN	IN	IN
1	OUT	IN	IN

JP4 must also be fitted for maximum timeout of watchdog.

A3 Serial I/O card jumpers.

Settings are for reference only.

EPROM TYPE	JP1	JP2	JP9	JP3	JP4	JP13	JP5	JP6	JP12
27256 (Default)	1-2	2-3	1-2	1-2	2-3	1-2	1-2	2-3	1-2
27512	2-3	2-3	1-2	2-3	2-3	1-2	2-3	2-3	1-2

EPROM Speed	JP10	JP11	JP13
0 Wait States 1 Wait State	ON OFF	ON OFF	ON OFF

The Default for the EPROM speed is 1 wait state.

JP7 - I/O Address								
Pins	1-16	2-15	3-14	4-13	5-12	6-11	7-10	8-9
Link	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

JP14 - Memory Address				
Pins	1-8	2-7	3-6	4-5
Link	OFF	OFF	OFF	ON

JP16 - Interrupt Vector (not used)						
Pins	1-12	2-11	3-10	4-9	5-8	6-7
Link	OFF	OFF	OFF	OFF	OFF	OFF

Unlabelled jumper between U63 and U64 at edge connector.	
1-2 2-3	RAM connected to +5v (Default) RAM connected to battery backed +5v

All links have Pin 1 towards the front of the serial interface card.

A4 Qbus memory card jumpers.

Settings are for reference only.

JP1 - EPROM Speed	
1-2 2-3	Slow EPROMS (Default) 100ns EPROMS

JP2 - EPROM Type	
1-2 2-3	27512 EPROMS (Default) 27256 EPROMS

Link JP1 has pin 1 on the right hand side.
Link JP2 has pin 2 on the left hand side.

SW1 - RAM address from 1000000 through 2000000 (Octal)	
1 Closed	RAM Address Line 21
2 Closed	RAM Address Line 22
3 Closed	RAM Address Line 23
4 Open	RAM Address Line 24

SW1 - EPROM address from 0000000 through 1000000 (Octal)	
5 Closed	EPROM Address Line 21
6 Closed	EPROM Address Line 20
7 Closed	EPROM Address Line 19
8 Closed	EPROM Address Line 18

A5 KD J11-A CPU module.

Settings are for reference only. These settings must be set after completing the modification in section 8.1.

Jumper	Fitted	Function
W1	ON	BOOTSTRAP Address bit 15 Jumper closest to the rear of the PCB
W2	OFF	BOOTSTRAP Address bit 14
W3	OFF	Power up option selection bit 2
W4	OFF	BOOTSTRAP Address bit 13
W5	ON	HALT TRAP options bit 3
W6	OFF	BOOTSTRAP Address bit 12
W7	OFF	Power up option selection bit 1
W8	OFF	Wake-up Disable
W9	OFF	BEV NT Recognition Jumper closest to the front of the PCB

APPENDIX B

Lightpalette 90 Error Messages.

This is a comprehensive list of error messages that may appear on the screen of the Lightpalette 90. The list was correct for software version 1.5 and it is unlikely that this list will change for future releases of version 1 software.

Not all error messages are classed as faults. Some error messages are for information only and refer to incorrect key pushes or options which are not available.

In the following error messages the letter "d" refers to :-

a. The DPR card number (0 to 6) for DPR errors.
b. The SIO port number (0 to 9) for SIO errors.

B1 Information messages.

ONLY ENABLE AND DISABLE ARE VALID FOR THIS DEVICE
REMOTE Q OUTPUT PORT IS DISABLED
PRINTER IS DISABLED
MAIN CONSOLE CANNOT BE RESTRICTED
ONLY MAIN CONSOLE CAN GET STATUS
RECORD LOCKED
DISPLAYS ONLY
DISABLED
MAX DIMMERS TRIMMED DUE TO EXISTING 6/12K's

B2 Reserve system messages/errors.

RESERVE SYS NOT RESPONDING TO HEALTH CHECK
RESERVE SYS PORT LINK DOWN
RESERVE SYS COMM OVERLOAD
RESERVE FAILED TO ASSUME CONTROL
SYSTEM CONTROL SWITCHED TO RESERVE
RESERVE SYSTEM NOW OK

B3 Power up messages.

Message	Notes
DPR d: COLD START	All data is reset to default.
DPR d: WARM START	Warning - Data may be damaged.
DPR d: HOT START	Successful recovery from power up. Data OK.
DPR d: SUPER 8: COLD START	All data is reset to default if battery backed RAM is badly corrupted.
DPR d: SUPER 8: WARM START	Warning - Data in battery backed RAM is corrupt.

B4 Operation errors.

Message	Notes
S12: d: NO CMT	Illegal comment update received.
S13: d: QP EXISTS	Cue/Part already exists.
S14: d: BAD PART	Trying to create part 0 when no part exists.
S17: d: BAD PROF	Bad profile number in cue or profile update.
S18: d: BAD STEP	Bad effect step received.
DPR d: REQUEST CONFLICT	Two wheels are requesting control of the same channel.
DPR d: MUST BE FADE Q FOR WHEEL OR RECORD	The cue must contain channel moves before it can be used in a record command or with the wheel.
DPR d: BAD RANGE	Channel being modified on the channel track screen must have a starting level in the selected cues.
DPR d: BAD LEVEL	A channel must be given a level or be left blank when making modifications using channel track.

DPR d: NO SUBS	There are no submasters available for running the effect test.
DPR d: NO FADERS	All 128 playback faders are already in use.
DPR d: CANNOT RECORD EFFECTS INTO CUE/PART WITH ACTIVE CHANNELS	To load an effect onto a cue the cue must not contain channels which are moving level.
DPR d: DELETE EXISTING ATTRIBUTE	Remove the existing attribute before recording another.
DPR d: DISK ACTIVE	Disc read/write request when read/write is already active.
DPR d: BAD RENUMBER	Cue number plus renumber value give a number over 999.
DPR d: SUB DOES NOT EXIST	Can not find selected submaster.

B5 Other Errors.

Message	Notes
S01: d: BAD VID	Bad video identity code in display register.
S02: d: BAD DTYPE	Bad display type in display register.
S03: d: DD NDEF	Message DD not defined or not implemented.
S04: d: EL MISSING	Item should exist but cannot be found when :- a. Updating displayed cue/group or b. Placing cue/group on the wheel.
S05: d: NOT IMP	Function not implemented.
S06: d: EXP EFX	Trying to expand an effect in preset heap.
S07: d: BAD PSTYPE	Bad preset type found in preset heap.
S08: d: BAD CMD	Generic bad command. System has received an unknown command, data type, sub attribute or key/analogue identity code.

S09: d: BAD WHL	Wheel number not in range 1 to 6.
S10: d: BAD TARG	Bad target or source specified.
S11: d: BAD CLIST	Bad control list. Illegal number of parameters, control type or content.
S15: d: MSG ROOM	No space in output buffer for message.
S16: d: BAD SUBID	Submaster level received with bad scan id (Console 0-31, Pod 0-63). Or scan id not found in initial console and pod sweep.
S19: d: BAD CLEAR	Bad clear type.
S20: d: BAD BFR	Buffer passed to output buffer with trashed size.
S21: d: DISK SYSTEM ERROR	Software inconsistency.
S22: d: DISK INACTIVE	Disc data message received while disc is inactive.
S23: d: BAD ELEMENT DATA	Disc data received with illegal element.
DPR d: NO ELEMENT STORAGE	Out of space in preset heap.
DPR d: NO SUCH ELEMENT	No such element in preset heap.
DPR d: ELEMENT DELETED	Element apparently deleted when updating display for just deleted item.
DPR d: RETURN ERROR	Current display not the same as saved data. Or an error when restoring into an effect submaster.
DPR d: INTERRUPT i/j	Software / Hardware CPU interrupt type i at location j.
DPR d: RESET S-8 & 286	
DPR d: OUT OF BUFFER SPACE	No working buffer space.
DPR d: BAD DISK DIRECTORY	Bad directory.
DPR d: BAD DISK DATA	Bad data received.
DPR d: DATA LOST IN XMIT.	Bad data transmit.

APPENDIX C

Copy of the section "INSTALLATION" from the Operation handbook.

5

Installation

Environment

To maximize equipment life, and minimize the chance of failures, the following environmental requirements should be met:

- **Temperature** -- 20 ±5°C (68 ±9°F).
- **Humidity** -- 5%-80% relative humidity maximum, no condensation.
- **Dust** -- Good office environment.

Caution

If the processor tower is mounted on the floor or table top, care must be taken to assure an unobstructed air path for the cooling fans. Without airflow, interior temperatures can exceed the maximum operating temperature of 40°C, and result in damage to the equipment.

Power

A single-point conditioned power source (120VAC @ 10A 50/60Hz for 120VAC units or 220VAC @ 5A 50/60Hz for 220VAC units) must be provided for the processor tower and all consoles (except for the Hand Held Remote, which receives its power through the control cable).

Primary power should be exclusively for the console and not used for other devices such as power hand tools, motors, transformers, and dimmers.

Warning

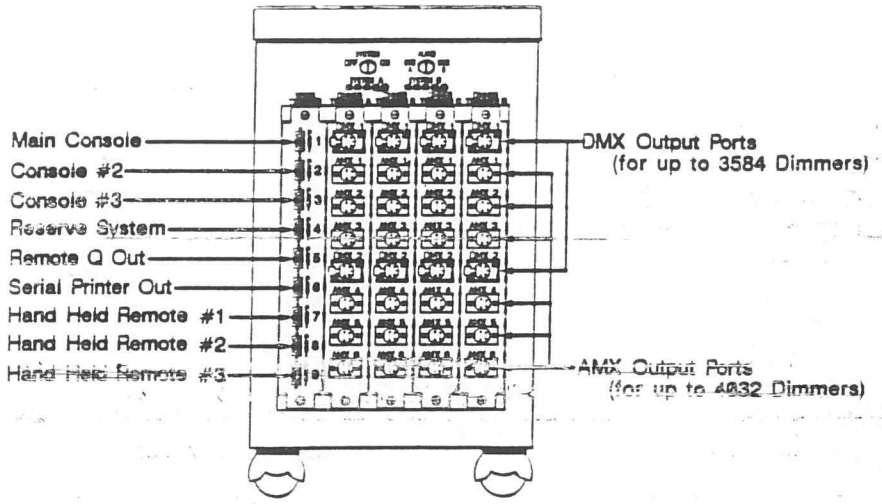
Do not plug a 120VAC unit into 220VAC power, or a 220VAC unit into 120VAC power, as damage may result. Conversion between the two voltages requires modification of the power supplies.

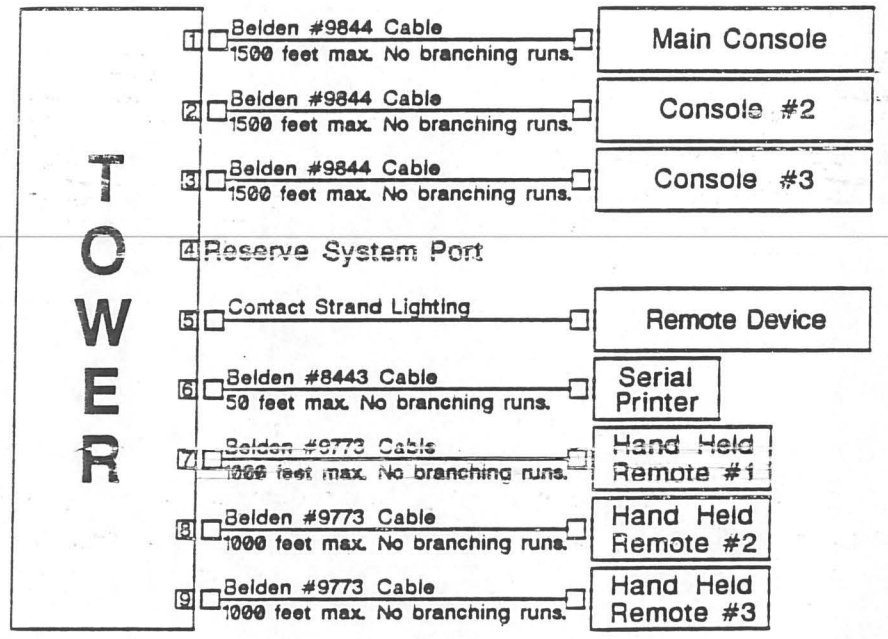
Note

Leave the equipment connected to its primary power source (120VAC, 60Hz, 15A, or 220VAC service for 220VAC consoles) unless maintenance is being done or the console is not in use for extended periods of time.

Processor Tower Hookup

The Light Palette 90 Processor Tower has 9 serial connections for the main system components, and acts as the hub of a star network. It also contains connections for dimmer output. Connections to the tower may be made directly or through wall mounted junction boxes with appropriate connectors linked by **metallic** conduit. Long runs may require serial cable termination.





Notes:

Consoles can all be single or double tier.
Single tier consoles may or may not have a submaster outrigger.
Long cable runs may require serial cable termination.

Figure 17. Tower Connectors and Cabling

Control Console Ports

Control consoles are tied directly to processor tower ports #1, #2, or #3 with a data cable. As far as the tower is concerned, there is no difference between the three allowed consoles.

Table 1. Tower Outputs to Consoles

Cable:	Belden 9844
Max Length:	1500 feet - one console per run (all EIA RS422 restrictions also apply)
Port:	High speed ports #1, #2, & #3
Connector:	Subminiature "D" 9 pin male (on Serial Transfer card)

Pin #	Signal	Comments
1	GND	Ground
2	KSYSON	System Keyswitch ON
3		
4	TXD-	Transmit Complement
5	RXD-	Receive Complement
6	KSYSOFF	System Keyswitch OFF
7	KSYSCOM	System Keyswitch Common
8	TXD+	Transmit True
9	RXD+	Receive True

Note

Pins 4 and 8 on the tower end (pins 1 and 6 on the console end) and pins 5 and 9 on the tower end (pins 2 and 7 on the console end) are twisted pairs.

Table 2. Console Inputs From Tower

Cable:	9844
Max Length:	1500 feet - one console per run (all EIA RS22 restrictions also apply)
Connector:	Subminiature "D" 9 pin female (on rear of console)

Pin #	Signal	Comments
1	TXD-	Transmit Complement
2	RXD-	Receive Complement
3		
4	KSYSON	System Keyswitch ON
5	GND	Ground
6	TXD+	Transmit True
7	RXD+	Receive True
8	KSYSCOM	System Keyswitch Common
9	KSYSOFF	System Keyswitch OFF

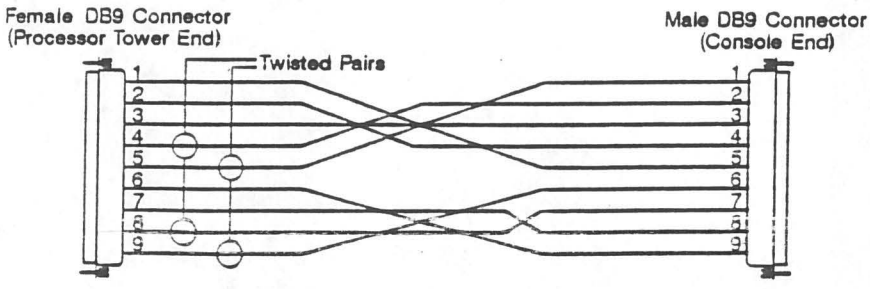


Figure 18. Tower to Console Cable

Hand Held Remote Ports

Hand Held Remotes are tied to Processor Tower ports #7, #8, or #9 with a data cable which also carries phantom power for the remote.

Table 3. Tower Outputs to Hand Held Remote

Cable:	Belden 9773
Max Length:	1000 feet - one remote per run (all EIA RS422 restrictions also apply)
Port:	Low speed ports #7, #8, & #9
Connector:	Subminiature "D" 9 pin male (on Serial Transfer card)

Pin #	Signal	Comments
1	GND	Ground
2	RS232 TX	RS232 Transmit to Remote
3	RS232 RX	RS232 Receive from Remote
6	+12V	+12VDC Phantom Power for Remote

Table 4. Hand Held Remote Input Pins

Cable:	Belden 9773
Max Length:	1000 feet, one remote per run
Connector:	5 pin "XLR" (on Hand Held Remote)

Pin #	Signal	Comments
1	GND	Ground
2	RS232 TX	RS232 Transmit to Tower
3	RS232 RX	RS232 Receive from Tower
6	+12V	+12VDC Phantom Power for Remote

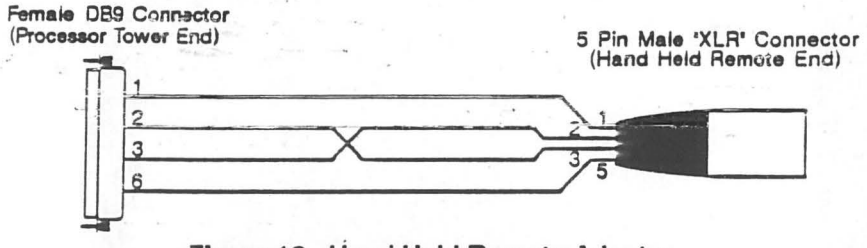


Figure 19. Hand Held Remote Adaptor

Caution

The adaptor shown above should only be used once in each remote run. It crosses the RS232 Receive and RS232 Transmit pins so that the RS232 Transmit signal from one device ends up on the RS232 RECEIVE pin of the other device. All additional control cable extensions should be 5 pin "XLR" connector extension cables (a male connector on one end and a female connector on the other end) with pins wired 1-to-1.

Note

If you wish to have outlets at more than 3 locations, each of the control cables may have multiple outlets along its length. Only one Hand Held Remote at a time can be connected to each control cable loop.

Each control cable loop must be a single run with no branches.

Remote Device Control

Light Palette 90 allows you to hook up to a remote device to help synchronize various stage events.

Table 5. Tower Output to Remote Device

Cable:	Please contact Strand Lighting
Max Length:	Please contact Strand Lighting - one console per run (all EIA RS422 restrictions also apply)
Port:	Low speed Port #5
Connector:	Subminiature "D" 9 pin male (on Serial Transfer card)
Signal Type:	EIA RS485, 4800 baud, 8 bit with 1 stop bit, no parity

Pin #	Signal	Comments
1	GND	Ground
2	RS232 TX	RS232 Transmit
3	RS232 RX	RS232 Receive
4	LSPD TXD-	Low Speed Transmit Complement
5	LSPD RXD-	Low Speed Receive Complement
6		
7	GND	Ground
8	LSPD TXD+	Low Speed Transmit True
9	LSPD RXD+	Low Speed Receive True

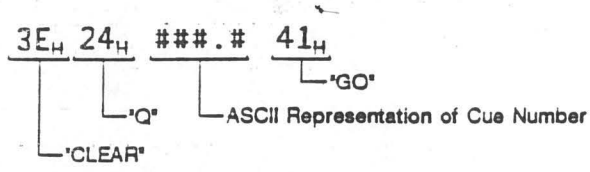


Figure 20. Remote Device Control Output String

Warning

This connection allows you to control devices which are not manufactured by Strand Lighting.

Strand Lighting assumes no liability for problems caused by external devices connected to the Light Palette 90 console, or by software residing in the external devices, unless they were provided by Strand Lighting.

Dimmers

Light Palette 90 is designed to drive dimmers which conform to the USITT AMX192 or DMX512 Dimmer Signal Specifications. You can have both types of dimmers in a system, as long as you have correctly defined the output port parameters in the *Dimmer Output Configuration* menu.

AMX192 Control Wiring

The three types of connections provided in Strand Lighting equipment for the AMX192 signal are the XLR style connector, the TA4/TY4 Series Mini-SwitchCraft connector, and terminal blocks (see table 6 for pin assignments). Unless otherwise specified, CD80 Racks use terminal block connections.

Table 6. AMX192 Dimmer Outputs

Cable:	Belden 9156 or equal (may use Belden 8723 for adapters under 100 feet long)
Max Length:	1000 feet (daisy chaining allowed - no branching runs)
Connector:	Terminal block in dimmer rack. "XLR" style connector, or SwitchCraft TA4/TY4 series connector in control equipment.

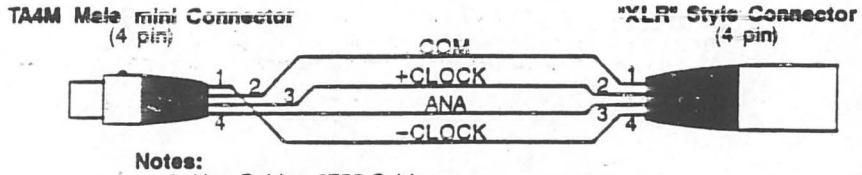
XLR Pin	TA4/TY4 Pin #	Terminal Pin #	Signal	Comments	Belden 8723	Belden 9156
4	4	DMX-	CLOCK -	Clock Complement	Green	Black
2	3	DMX+	CLOCK +	Clock True	White	White
1	2	CMN	COMMON	Analog Common	Black	Black
3	4	AMX	ANALOG	Multiplexed Analog	Red	Red

Note

CLOCK+ and CLOCK- are one twisted pair. Analog and Common are one twisted pair.

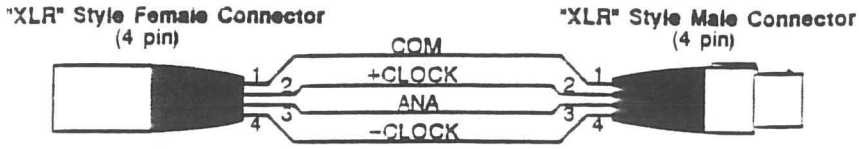
Interconnection between equipment with different plug types requires an adapter cable. The plugs on this adapter are not connected pin to pin. See figure 21 for proper adapter wiring.

Short extensions of the multiplex signal, where TA4/TY4 connectors are used, are made with Belden cable #8723 (2 pairs of shielded 24 gauge wire). **Do not use this cable for runs greater than 100 feet.** All other runs (in or out of conduit) are made with Belden #9156 (2 pairs of unshielded 18 gauge wire). The maximum allowable distance from the control console to the last dimmer cabinet is 1000 feet.



Notes:
1. Use Belden 8723 Cable.
2. Sex of "XLR style connector depends on application.
3. Maximum adapter length = 100 feet.

Figure 21. XLR to TA4 Series Adapter



Notes:
1. Use Belden 9156 Cable
2. Maximum extension length = 1000 feet (including all adapters).

Figure 22. AMX192 Extension Cable

DMX512 and SMX Control Wiring

The two types of connections provided in Strand Lighting equipment for the DMX512 and SMX signals are the XLR style connector and terminal blocks (see table 7 for connector pin assignments). Unless otherwise specified, CD80 Racks (analog or Advanced Electronics) use terminal block connections.

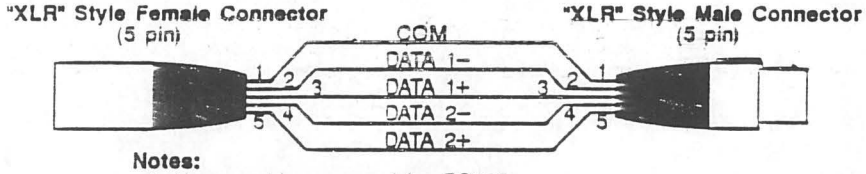
Table 7. DMX512 Dimmer Outputs

Cable:	Belden 9841 or 9842 or equal (any cable approved for RS422/RS485 use)
Max Length:	Standard RS485 electrical characteristics apply, including line driver and receiver characteristics, line loading, and multi-drop configurations.
Connector:	Terminal block in dimmer rack. "XLR" style connector in control equipment.

XLR Pin	Terminal Pin #	Signal	Comments
1	CMN	COMMON	Dimmer Common (shield)
2	DMX-	DATA 1-	Dimmer Drive Complement
3	DMX+	DATA 1+	Dimmer Drive True
4	Not used	DATA 2-	Optional Second Data Link Complement
5	Not used	DATA 2+	Optional Second Data Link True

Note

DATA 1- and DATA 1+ are one twisted pair. Common is tied to the cable shield.



Notes:
1. Use a cable approved for RS485.
2. For electrical characteristics, including driver and receiver selection, line loading, and multi-drop configurations, see RS485 specification.

Figure 23. DMX512 Extension Cable

Printer

The printer supplied by Strand Lighting for Light Palette 90 is an Okidata ML182 with the super high speed serial interface installed. This interface is necessary for the on-board buffer, and not for its extra speed.

Printer Cable

The printer cable uses a standard 9-pin DB25 connector at the printer end and a DB9 connector at the console end (see table 8 for pinouts, cable, and connector types).

Table 8. Tower Output to Serial Printer

Cable:	Multi-conductor jacketed (no shield)
Max Length:	50 feet
Connector:	Subminiature "D" 9 pin male (on Serial Transfer card)
Signal Type:	EIA RS232, 9600 baud, 8 bit with 1 stop bit, no parity, busy indicated by XON/XOFF.

Pin #	Signal	Comments
1	COM	Serial Common
2	RS232 TX	RS232 Transmit
3	RS232 RX	RS232 Receive

Table 9. Printer Serial Input

Cable:	Multi-conductor jacketed (no shield)
Max Length:	50 feet
Connector:	Subminiature "D"25 pin female (on printer)
Signal Type:	EIA RS232, 1200 baud, 8 bit with 1 stop bit, no parity, busy indicated by MARK level on SSD.

Pin #	Signal	Comments
2	TRANS DATA	Outgoing RS232 Data
3	RCV DATA	Incoming RS232 Data
7	GND	Signal Ground

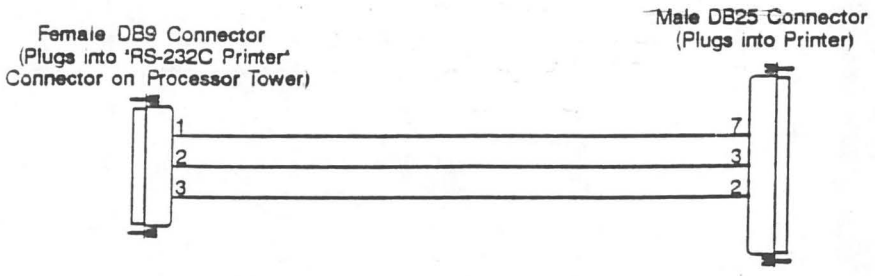


Figure 24. Printer Control Cable

Printer Setup

Set up an Okidata 182 with super high speed serial interface for use with Light Palette 90 by removing the switch access cover on the upper rear of the printer and setting the circuit board and serial interface switches appropriately (see figure 25).

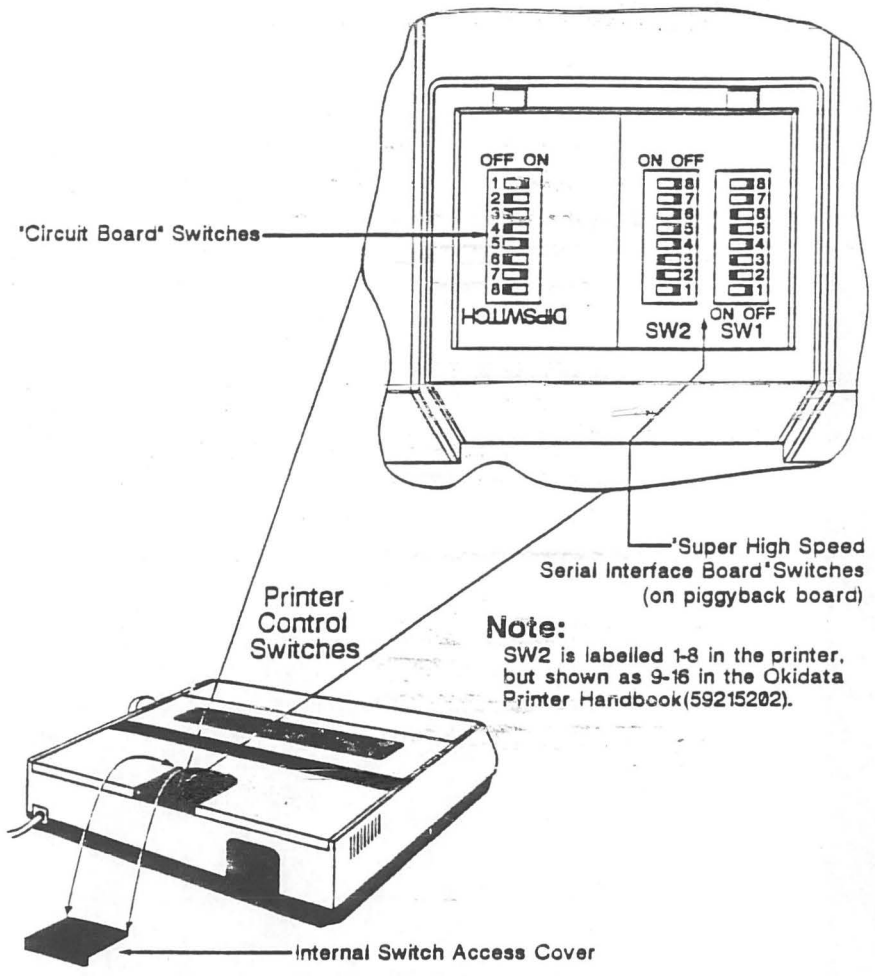
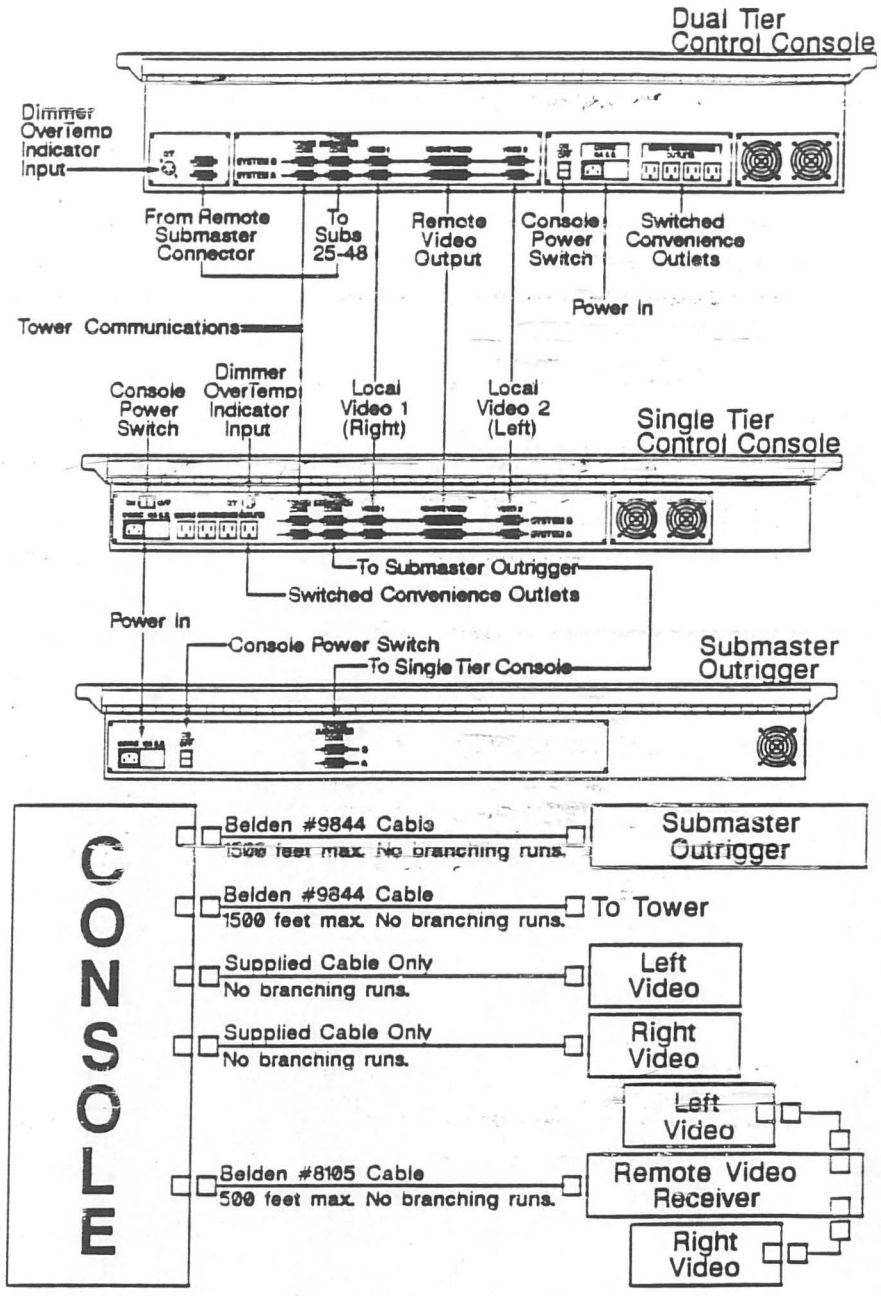


Figure 25. Okidata 182 Switch Configuration

Control Console Connections

Connections from a control console to its peripheral components may be made directly or through wall mounted junction boxes with appropriate connectors linked by **metallic** conduit.



Notes:

Dual tier consoles do not have a usable submaster outrigger receptacle.
Long cable runs may require serial cable termination.

Figure 26. Console Cabling

Note

In dual electronics consoles, if you plug your cables into the SYSTEM A connectors it is not necessary to replug cables when switching to System B (unless there is physical damage to the System A connectors).

Console Video

Light Palette 90 generates RGB TTL video signals compatible with IBM EGA video from the Main Console or Remote Consoles for its two local monitors (see table 10 for connector pinouts, Strand Lighting color codes, and allowed cable lengths). Consult Strand Lighting Field Service for additional details.

Warning

Connecting a monitor which is not set up for TTL inputs may damage the Light Palette 90, the monitor, or both.

Table 10. Video Cable Specifications

Cable: Supplied cable only
Max Length: Supplied cable only
Connector: Subminiature "D" 9 pin female (on console)

Pin #	Signal	Comments
1	GND (pair 1)	Signal Ground
2	GND (pairs 2 & 5)	Signal Ground
3	RED (pair 1)	TTL red signal
4	GREEN (pair 2)	TTL green signal
5	BLUE (pair 3)	TTL blue signal
6	GND (pairs 3 & 4)	Intensity (grounded)
7		
8	HSYNC (pair 4)	Horizontal sync
9	VSYNC (pair 5	Vertical sync

Note

Ground wires for pairs 2 and 5 are both tied to pin 2, and ground wires for pairs 3 and 4 are tied to pin 6.

Remote Video

Light Palette 90 can have remote monitors from any console. These are connected to a special connector on the rear of the console and require a Remote Video Interface module at the monitor end to receive the signal and convert it into local video format. Additional Remote Video Interface modules will be required to boost and condition the signal if the cable length exceeds *Max Length* in table 11.

Remote Video Interface Module

Remote Video Interface modules provide signal receiving and repeating capability for the Light Palette 90 Remote Video signal. These cards are buffered on the input and output and re-synchronize the video signal using the DOTCLK signal from the driving console. Each repeater card has two separate inputs (Desk Input and Loop Input) and three separate outputs (Local Video Output, Loop Output, and Remote Video Output). All inputs and outputs are isolated from each other. You can connect signals to both inputs and drive devices from all three outputs if required. Automatic sensing circuitry switches the console on-line and disconnects the Loop Input when you plug a console into the Desk Input. This lets you wire the system in a loop and create a system in which you can plug the console into any repeater board and get video to all other stations.

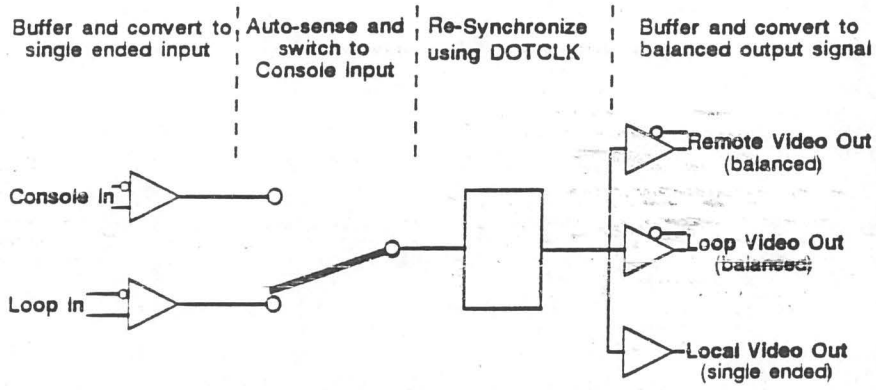


Figure 27. Repeater Card Conceptual Diagram

Note

Sensing and signal cleanup are done using the DOTCLK signal from the driving console. Some early Light Palette 90 consoles did not include this signal on their Remote Video Output connector. If you are retrofitting remote video into your system you should consult Strand Lighting Field Service to determine if your Console Processor card needs to be updated, and for instructions on update procedures.

Remote Video System Layout

In figure 28 the single console is in the control booth and monitors are places at other locations. In figure 29 the console has been moved to the "Designer's" location in the house. The loop is broken each time at the console plug-in location. This is done automatically to avoid signal conflicts. You can move the console to any other location with the same results.

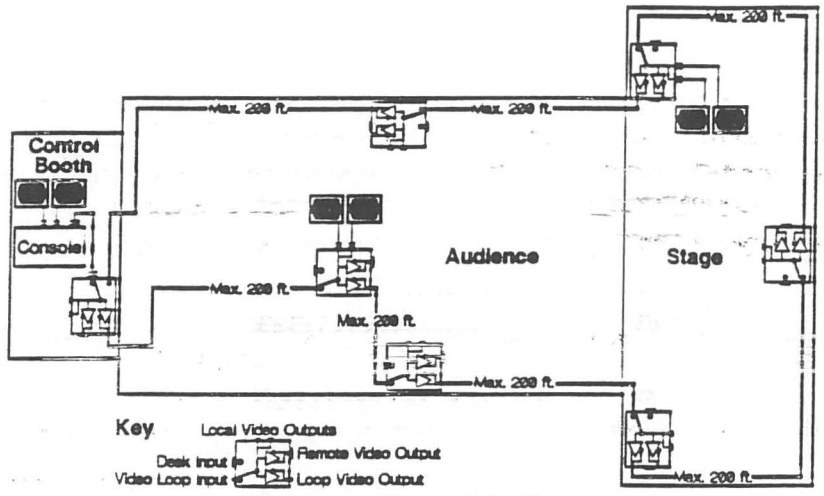


Figure 28. Console in Booth

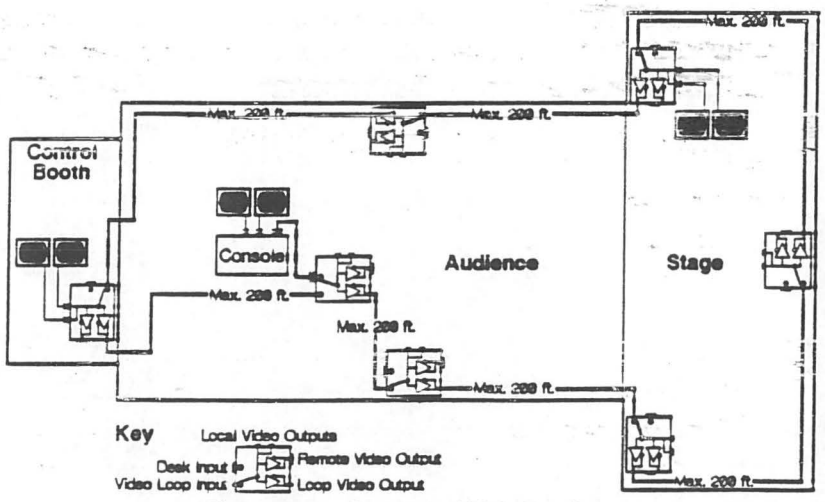


Figure 29. Console With Designer

Figure 30 shows a two console system with the backstage console feeding the loop so that the designer can monitor what is being done from the center of the house. In addition, a portable repeater is provided so that the feed from the center house position can be seen back stage. The main loop automatically splits into two sections when the two consoles are plugged in.

In Figure 31 the same two console system has been set up with dual repeaters in the key locations so that extensions can be avoided.

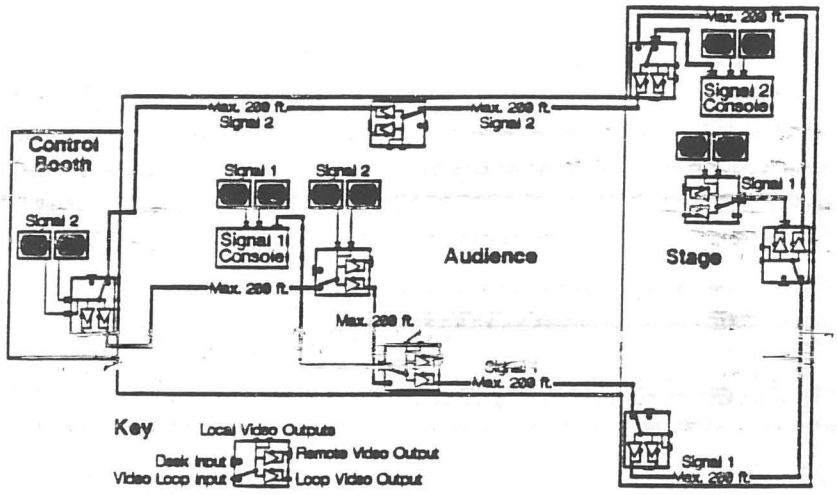


Figure 30. Dual Console System

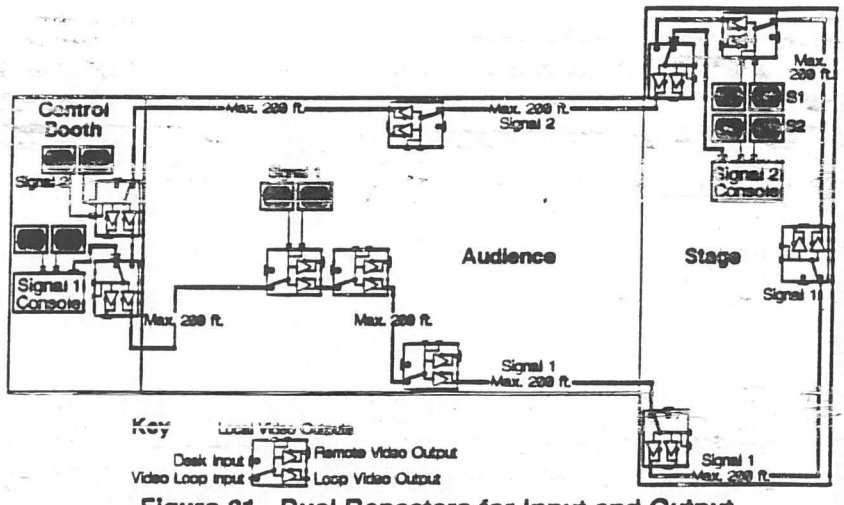


Figure 31. Dual Repeaters for Input and Output

Multiple console systems which require all locations to be able to receive feeds from all consoles will require the same number of repeater loops as the number of consoles involved.

Warning

The maximum number of Remote Video Interface modules allowed in a single string or loop is 10 units.

THe maximum distance allowed between any two Remote Video Interface modules is 200 feet.

Remote Video Cable

The cable used for remote video installations id Belden 8112. One end (and only one end) of the shield drain wire should be earth grounded.

Table 11. Remote Video Output From Console

Cable: Belden 8112
Max Length: 200 feet between repeaters
Max Repeaters: 10 per string or loop
Connector: Subminiature "D" 25 pin female (on console)

Term #	Conn Pin #	Signal	Comments	Wire Color (Belden 8112)
1	1	#2RED+	Monitor #2 Red Signal+	white-blue stripe
2	14	#2RED-	Monitor #2 Red Signal-	blue-white stripe
3	2	#2BLUE+	Monitor #2 Blue Signal+	white-orange stripe
4	15	#2BLUE-	Monitor #2 Blue Signal-	orange-white stripe
5	3	#2GREEN+	Monitor #2 Green Signal+	white-green stripe
6	16	#2GREEN-	Monitor #2 Green Signal-	green-white stripe
7	4	#2HSYNC+	Monitor #2 Horizontal Sync+	white-brown stripe
8	17	#2HSYNC-	Monitor #2 Horiz. Sync-	brown-white stripe
9	5	#2VSYNC+	Monitor #2 Vertical Sync+	white-gray stripe
10	18	#2VSYNC-	Monitor #2 Vertical Sync-	gray-white stripe
11	6	GND	Chassis Ground	red-blue stripe
12	13	GND	Chassis Ground	blue-red stripe
13	7	DOTCLK+	Dot Generator Clock+	red-orange stripe
14	20	DOTCLK-	Dot Generator Clock-	orange-red stripe
15	8	#1VSYNC+	Monitor #1 Vertical Sync+	red-green stripe
16	21	#1VSYNC-	Monitor #1 Vertical Sync-	green-red stripe
17	9	#1RED+	Monitor #1 Red Signal+	red-brown stripe
18	22	#1RED-	Monitor #1 Red Signal-	brown-red stripe
19	10	#1BLUE+	Monitor #1 Blue Signal+	red-gray stripe
20	23	#1BLUE-	Monitor #1 Blue Signal-	gray-red stripe
21	11	#1GREEN+	Monitor #1 Green Signal+	black-blue stripe
22	24	#1GREEN-	Monitor #1 Green Signal-	blue-black stripe
23	12	#1HSYNC+	Monitor #1 Horizontal Sync+	black-orange stripe
24	25	#1HSYNC-	Monitor #1 Horiz. Sync-	orange-black stripe
25	19	COM	COMMON	black-green stripe

Note

To insure maximum noise immunity each true (+) and complement (-) signal pair is on a twisted wire pair.

Conn Pin # refers to the console Remote Video connector and to the Desk Input and Remote Video Output connectors on the Video Repeater cards.

Term # refers to the terminal inputs and outputs on Video Repeater cards.

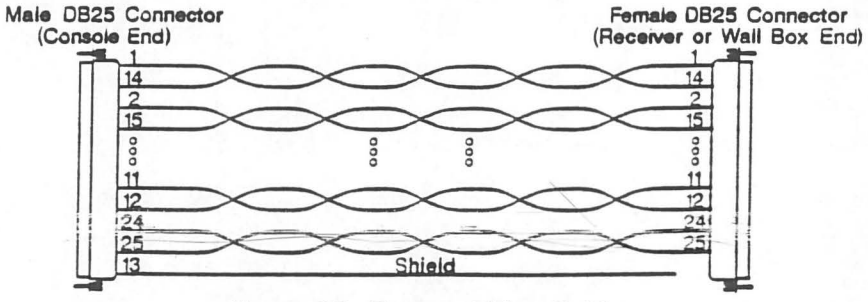


Figure 32. Remote Video Cable

Submaster Outrigger

Single tier consoles have a connector for a submaster outrigger, which lets you place the submaster section of the console up to 1500 feet from the console.

Table 12. Console Input From Submaster Outrigger

Cable: 9844
Max Length: 1500 feet - one outrigger per run
(all EIA RS422 restrictions also apply)
Connector: Subminiature "D" 9 pin female (on Control Console)

Pin #	Signal	Comments
1	COM	Serial Common
2	KSYSON	System Keyswitch OFF
3	KSEL	
4	RXD-	Receive Complement
5	TXD-	Transmit Complement
6	KSYSOFF	System Keyswitch ON
7	KSYSCOM	System Keyswitch Common
8	RXD+	Receive True
9	TXD+	Transmit True

Table 13. Submaster Outrigger Output to Console

Cable: 9844
Max Length: 1500 feet - one outrigger per run
(all EIA RS422 restrictions also apply)
Connector: Subminiature "D" 9 pin female (on Submaster Outrigger)

Pin #	Signal	Comments
1	COM	Serial Common
2	KSYSON	System Keyswitch OFF
3	COM	Serial Common
4	TXD-	Transmit Complement
5	RXD-	Receive Complement
6	KSYSOFF	System Keyswitch ON
7	KSYSCOM	System Keyswitch Common
8	TXD+	Transmit True
9	RXD+	Receive True

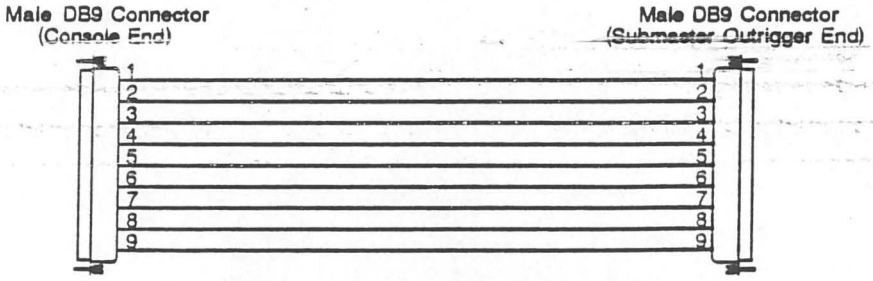


Figure 33. Submaster Outrigger Cable

Note

Since submaster outriggers can be up to 1500 feet from the console you can set up a single tier console with remote submasters and place the submasters back stage for the stage manager, or set up the Main Console in a locked enclosure and the submasters somewhere else for limited access to the system.