Film-Tech

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DIGITAL CINEMA

DIGITAL CINEMA SERVER
Model SMS-2K-1

Field Installer Manual

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SMS-2K-1 Digital Cinema Server Operation Manual, Version 1.0

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WARNING!!
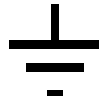
THIS DEVICE MUST BE GROUNDED.
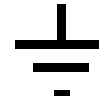
IMPORTANT

Power requirements for electrical equipment vary from area to area. Please ensure that your SMS-2K-1 meets the power requirements in your area. If in doubt, consult a qualified electrician or your DTS Digital Cinema dealer.

AVIS

Le voltage peut différer d'un pays a l'autre. Il faut que le SMS-2K-1 soit ajusté au voltage du pays.
LA SOURCE DE PUISSANCE DOIT AVOIR UN CONDUCTEUR CONNECTE A LA TERRE. Toutes réparations doivent être effectuées par une personne qualifiée. AFIN D'EVITER UN CHOC ELECTRIQUE, VEUILLEZ NE PAS ENLEVER LE CAPOT.

SMS-2K-1 Power Ratings

- AC Input: 100-240V~, 6-3A, 60-50Hz
- Maximum Power Consumption: 300W

WARNING: MULTIPLE SOURCES OF SUPPLY; DISCONNECT ALL SOURCES BEFORE SERVICING.

SMS-2K-1 Rack Mount and Thermal Information

- Maximum operating ambient temperature is 35°C.
- Never restrict the air flow through the devices' fan or vents.
- When installing equipment into a rack, distribute the units evenly. Otherwise hazardous conditions may be created by an uneven weight distribution.
- Connect the unit only to a properly rated supply circuit. Reliable earthing (grounding) of rack-mounted equipment should be maintained

PROTECTING YOURSELF AND THE SMS-2K-1

Never touch the AC plug with wet hands.

Always disconnect the SMS-2K-1 from the power supply by pulling on the plug, not the cord.

Allow only a DTS Digital Cinema dealer or qualified professional engineer to repair or reassemble the SMS-2K-1. Apart from voiding the warranty, unauthorized engineers might touch live internal parts and receive a serious electric shock.

Do not put, or allow anyone to put, any object, especially metal objects into the SMS-2K-1.

Use only an AC power supply. Never use a DC power supply.

If water or any other liquid is spilled into or onto the SMS-2K-1, disconnect the power and call your DTS Digital Cinema dealer.

Make sure the unit is well ventilated and away from direct sunlight. To avoid damage to internal circuitry, as well as the external finish, keep the SMS-2K-1 away from sources of direct heat (heater vents, stoves, radiators, etc.)

Avoid using flammable aerosols, etc. near the SMS-2K-1. They may damage the surface and may ignite. Do not use denatured alcohol, paint thinner, or similar chemicals to clean the SMS-2K-1. They will damage the finish.

Modification of this equipment is dangerous and can result in the functions of the SMS-2K-1 being impaired. *Never attempt to modify the equipment in any way.*

In order to ensure optimum performance of your SMS-2K-1, select the setup location carefully and make sure the equipment is used properly. Avoid setting up the SMS-2K-1 in the following locations:

1. In a humid or dusty environment.
2. In a room with poor ventilation.
3. On a surface which is not level.
4. Inside a moving vehicle where it will be subject to vibration.
5. In an extremely hot or cold environment.

Removable Drives Warning

Removal of the hot swappable hard drives allows access to pins and traces supplying power to the hard drive backplane. These are considered as energy hazards.

REMOVAL OF HARD DRIVES MAY ONLY BE PERFORMED BY TRAINED SERVICE PERSONNEL.

With regards to the energy hazard warning and removable drives, **the equipment may only be used in a restricted access location** (not accessible to the general public).

CAUTION

Battery is located on the motherboard.

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type
recommended by the manufacturer.
Dispose of used batteries according
to the manufacturer's instructions

WARNING!!

To prevent fire or shock hazard, do not expose this appliance to rain or moisture
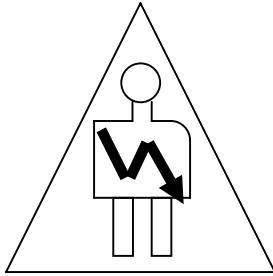
CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN
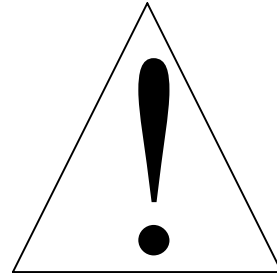
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
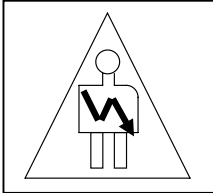
The lightning flash with the arrowhead symbol superimposed across a graphical representation of a person, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure; that may be of sufficient magnitude to constitute a risk of electric shock.
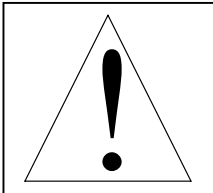
The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

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- EN 55022 "Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment."

A "Declaration of Conformity" in accordance with the above standard has been made and is on file at Doremi Labs, Europe - Valbonne, France.

1 Introduction

1.1 Purpose

This manual is designed to guide you through the setup and installation of the SMS-2K-1. It provides information about the following steps:

- Drive insertion
- Physical connections
- SMS-2K-1 IP address setup
- Projector(s) setup
- Automation setup
- Time zone setup

These steps correspond to sections **2** through **8**. Additional information is provided for reference within the other sections of this document as presented in paragraph **1.2** below.

1.2 Presentation

This document is structured according to the following sections:

- **Section 1**: Introduction – Overall presentation of the document
- **Section 2**: CAUTION – Information about proper power off and drive installation
- **Section 3**: SMS-2K-1 Presentation – Overview of the SMS-2K-1 server
- **Section 4**: Rear Panel Connectors – Description of the rear panel connectors
- **Section 5**: SMS-2K-1 IP Address – Procedure to change the SMS-2K-1 IP addresses
- **Section 6**: Device Manager Setup – Usage of Device Manager to setup connections between the SMS-2K-1, projector(s) and/or devices for automation management
- **Section 7**: Automation Setup – Usage of Macro Editor for automation cues and trigger cues setup.
- **Section 8**: Time Zone Setup
- **Section 9**: Vendor Specific Projector Setup Instructions – Information about vendor specific setups
- **Section 10**: SMS-2K-1 Software/Firmware USB Upgrade Instructions – Description on how to upgrade the SMS-2K-1 software/firmware
- **Section 11**: SMS-2K-1 Linux Terminal Commands – Basic Linux terminal commands
- **Section 12**: Troubleshooting
- **Section 13**: Appendix A: General Purpose Output Connection Diagram
- **Section 14**: Appendix B: General Purpose Input Connection Diagram
- **Section 15**: Appendix C: XML Structure used by Macro Editor
- **Section 16**: Acronyms

1.3 Software Version

This document complies with the SMS-2K-1 software version number 0.5.2-18 and above.

2   CAUTION

2.1 Drives Insertion

2.1.1 General Rule

Do **NOT** insert drives if the unit is powered ON.

2.1.2 HDDs Shipment

Drives (HDDs) might be shipped out of the chassis. In this case, insert them **BEFORE** the power cables according to the procedure presented below:

- Identify the label written on each HDD (you should have one TOP, one CENTER and one BOTTOM):

Figure 1: HDD Label Location – Example of "TOP" label

- For each HDD, press on the blue button located on its front side in order to release the grey handle and open the handle ALL THE WAY until it clicks, as presented below:

Grey handle

Blue button

Figure 2: HDD – Grey Handle Opening

- Open the door covering the HDD cage - located on the right side of the front panel

- Insert each drive all the way – one by one – in the chassis HDD cage according to the TOP-CENTER-BOTTOM location defined in the schema below and while making sure that the grey handle REMAINS OPEN ALL THE WAY to the right:
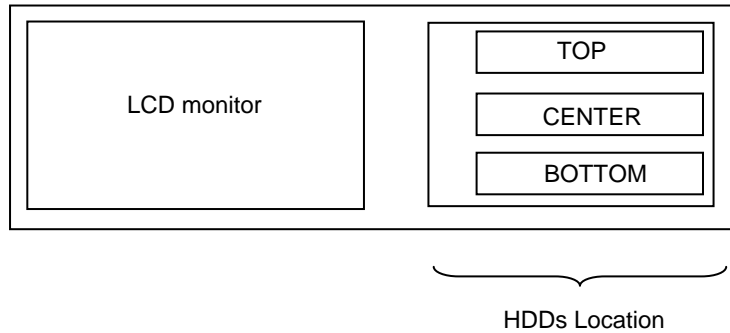
Figure 3: SMS-2K-1 Front View Schema – HDDs Location

The drive must be inserted <u>all the way</u> inside the HDD cage <u>BEFORE</u> trying to close the grey handle - otherwise the drive might not be plugged properly:
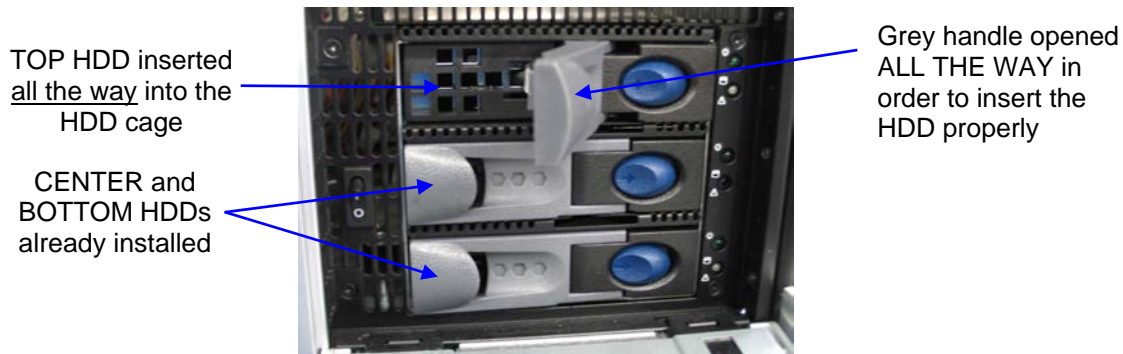
Figure 4: SMS-2K-1 HDD Cage – HDDs Insertion

Close the grey handle - by pushing it toward the HDD - until it clicks. The HDD properly installed should then look like the CENTER and BOTTOM HDDs presented on the **Figure 4** above.

- Power cables can now be plugged safely into the SMS-2K-1.

2.2 Proper Power Off

Follow the instruction below to power off the SMS-2K-1 safely. Any other method might DAMAGE THE RAID and result in RAID FAILURE:

- Select SHUT DOWN from the LOGOUT menu: "Menu->Logout...->Shutdown",

OR

- Press and release the Power button: DO NOT HOLD THE POWER BUTTON FOR MORE THAN ONE SECOND – *see section **3.1** for power switch location*.

To turn it back on, simply press and release the POWER switch.

3 SMS-2K-1 Presentation

Thank you for your choosing the DTS Digital Cinema SMS-2K-1. The SMS-2K-1 is a high quality DCI JPEG-2000 server capable of playing movie or trailer packages in MXF format at up to 250Mbits/sec.

The unit features a dual-link encrypted HD-SDI output capable of 12-bit 4:4:4 2048x1080p24 or 10-bit 4:2:2 for 48fps and 3D applications. Data storage is done on an internal RAID5 disk array.

The SMS-2K-1 is also capable of playing MPEG2 Interop movies, pre-show and alternative content playback.

3.1 SMS-2K-1 Front Panel

Figure 5: SMS-2K-1 Front Panel

POWER (or PWR):   Upper green LED lights when the unit is ON.
HDD: Red LED indicates hard drive access.

The door on the right covers the POWER switch and the 3 hard disks that make up the RAID-5 storage.

Figure 6: SMS-2K-1 Front Panel, Right Door Opened - Three HDDs

Each hard disk has a blue button that allows removal of the drive from the chassis. Be careful NOT to remove the hard disk when the SMS-2K-1 is running.

Additionally, there is one USB 2.0 connector on the center of the front panel that can accommodate an external hard drive as well as a mouse or keyboard.

The left side of the front panel provides an LCD screen with its associated power on/off button as presented below:

LCD power ON/OFF button – to be pushed with the provided stylus

Figure 7: SMS-2K-1 Front Panel, LCD Screen

The LCD is turned ON or OFF by pressing on the LCD power button using the stylus attached to the front panel.

Note that the use of this LCD screen requires that the two rear panel VGA connectors are linked using the VGA cable provided with the SMS-2K-1. See paragraph **4.1** for details about the VGA cable connections.

3.2 SMS-2K-1 Rear Panel

Figure 8: Rear Panel of SMS-2K-1

On the right side of the rear panel is the dual-redundant power supply. *Make sure that 2 AC power cables are used or the unit will sound an audible alarm until both power cables are connected.* To temporarily disable the audible alarm, press the red button next to the AC power connectors.

Note: *Powering the SMS-2K-1 with only one AC cable is NOT recommended.*

On the left side of the rear panel are the motherboard connections. These are for the keyboard, mouse, VGA, 9-pin serial, Ethernet and USB 2.0 connections. Please see Section **4.3** for detailed information on motherboard connections.

_____

4 Rear Panel Connectors

4.1 VGA Cable Connection for Server LCD Screen Usage

If the front panel LCD screen needs to be used, the server LCD screen VGA connector has to be linked to the motherboard VGA connector using the VGA cable (shown below) that is provided with the SMS-2K-1. Make sure that the VGA cable is secured to the SMS-2K-1 VGA connectors using the integrated screws:
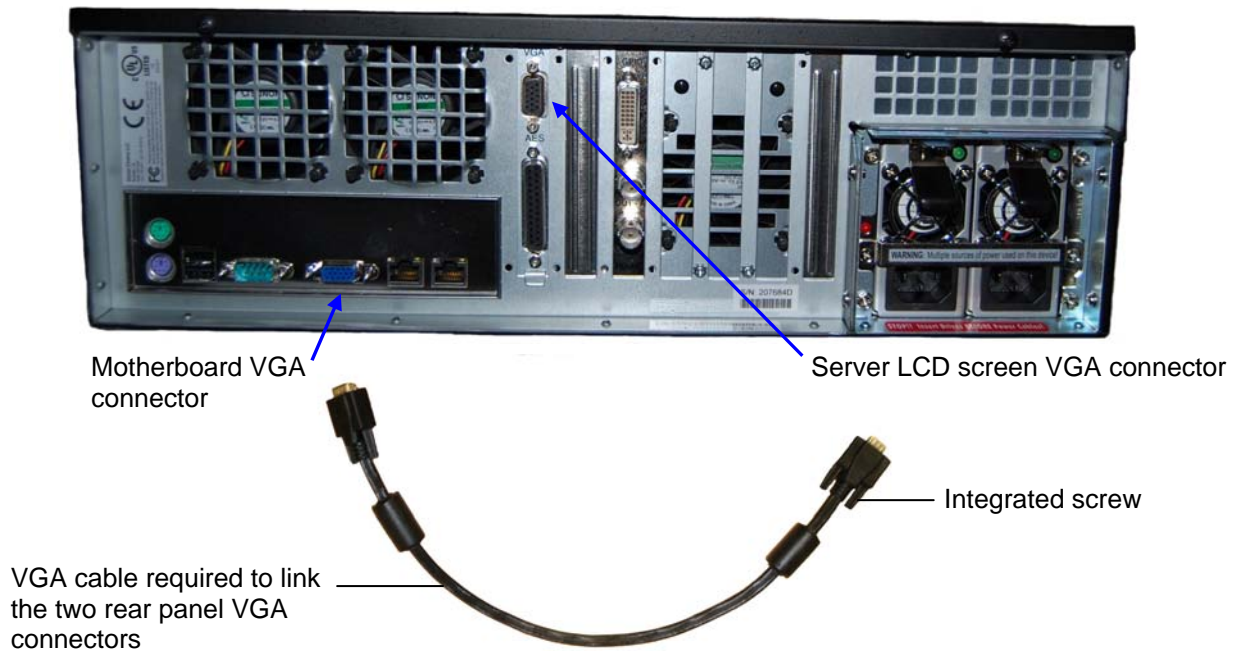
Figure 9: Rear Panel of SMS-2K-1 fitted with Dolphin DCI – VGA Cable

4.2 Rear Panel Card Slot Connectors

4.2.1 Card Slot Connectors Overview

On the center of the rear panel are the various card slot connectors. These connectors are illustrated below:
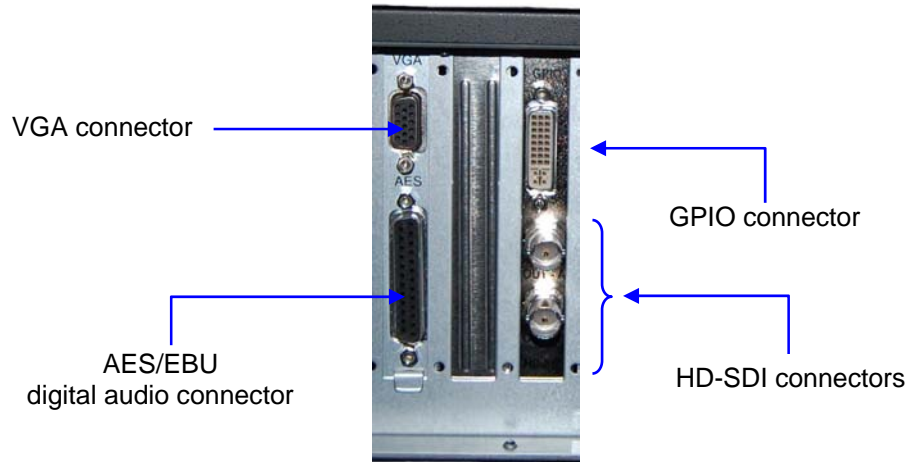
Figure 10: SMS-2K-1 fitted with Dolphin DCI – Card Slot Connectors

Use the card slot DB-25 connector for audio connections – see paragraph **4.2.3** for the audio pin-out.

4.2.2 HD-SDI Serial Digital Interface / *Dolphin* Decoder Card

Located in the rear panel card slots next to the Analog Audio card (or beside the AES/EBU audio card if the optional analog audio card is not present) is the standard-definition/high-definition serial digital interface. This is the *Dolphin* decoder card that contains the JPEG-2000 decoder hardware and BNC serial digital interface connectors.

The SMS-2K-1 utilizes a dual-link encrypted serial digital interface for output of DCI-compliant resolutions up to 2048x1080p24 (2K-film). It can also operate single-link for lower resolution material (i.e. trailers, advertisements, etc.).

The HD-SDI interface for the SMS-2K-1 server – the Dolphin DCI is described below.

4.2.2.1 Dolphin DCI Board Connectors

The Dolphin DCI board provides two different kinds of external connectors on the SMS-2K-1 rear panel:

- One GPIO (DVI-I) female connector
- Two HD-SDI BNC connectors

The connectors of the Dolphin DCI board from top to bottom are: GPIO, HD-SDI OUTPUT A, HD-SDI OUTPUT B. They are presented below:

GPIO Connector

HD-SDI Output - Link A

HD-SDI Output - Link B
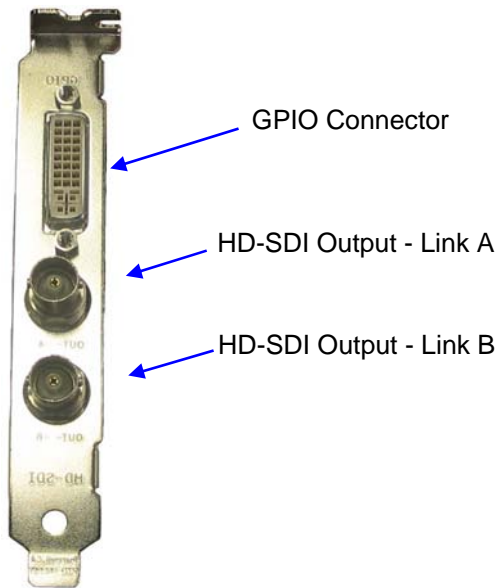
Figure 11: Dolphin DCI Board Bracket

Note that units fitted with the Dolphin DCI decoder board have the GPIO interface embedded in the Dolphin DCI board itself – no additional GPIO card is needed.

The GPIO DVI-I connector pin numbering is illustrated below:
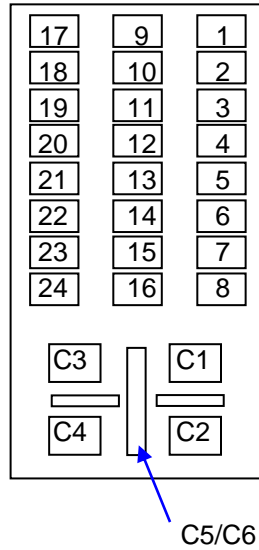
Figure 12: Dolphin DCI GPIO (DVI-I) Female Connector

The General Purpose I/O DVI-I connector pin-out follows:

GPIO (DVI-I) Female Connector			
Pin #	**Signal Description**	**Pin #**	**Signal Description**
1	GPO 3	16	GPI 2-
2	GPO 2	17	GPO 7
3	GND (ground)	18	GPO 6
4	N/C	19	GND (ground)
5	N/C	20	GPO 1
6	GPI 5-	21	GPO 0
7	GPI 3-	22	GPI 5+
8	GPI 2+	23	GPI 4+
9	GPO 5	24	GPI 3+
10	GPO 4	C1	GPI 1-
11	GND (ground)	C2	GPI 0-
12	N/C	C3	GPI 1+
13	N/C	C4	GPI 0+
14	5V / 0.2A	C5/C6	GND (ground)
15	GPI 4-		

The GPIO cable delivered with the SMS-2K-1 with a Dolphin DCI installed has an exposed wire end as shown here:

Connector to be plugged into the SMS-2K-1 GPIO adaptor cable

Unwired end
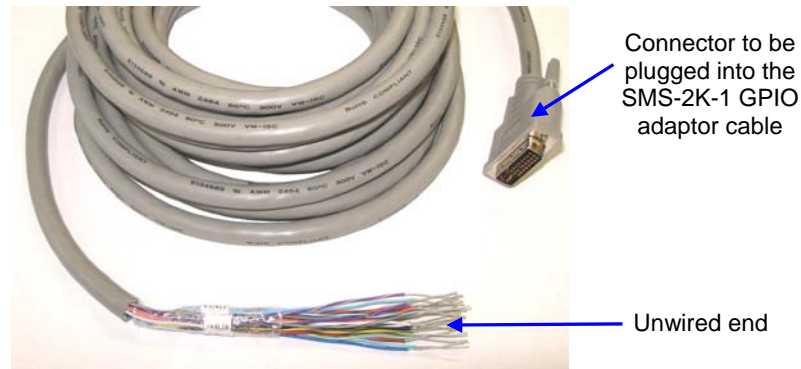
Figure 13: Dolphin DCI GPIO Cable

The GPIO channels are tagged on each wire of the exposed end to facilitate GPIO channel and signal/ground identification.

4.2.3 Digital Audio (AES/EBU)

The digital audio interface of the SMS-2K-1 is provided on a female DB-25 connector on the rear panel of the unit (see **Figure 10** or **Error! Reference source not found.**). Currently, 16 channels of balanced AES/EBU digital audio are provided. The pin-out for the digital audio connector is shown in the table that follows. The pin numbers are defined on the front face of the female DB-25 connector below:

pin 25

pin 1

Figure 14: Digital Audio Interface

The AES/EBU digital audio DB-25 connector pin-out follows:

Pin #	Signal Description	Pin #	Signal Description
1	Ch 15 & 16 plus	14	Ch 15 & 16 minus
2	Ch 15 & 16 ground	15	Ch 13 & 14 plus
3	Ch 13 & 14 minus	16	Ch 13 & 14 ground
4	Ch 11 & 12 plus	17	Ch 11 & 12 minus
5	Ch 11 & 12 ground	18	Ch 9 & 10 plus
6	Ch 9 & 10 minus	19	Ch 9 & 10 ground
7	Ch 7 & 8 plus	20	Ch 7 & 8 minus
8	Ch 7 & 8 ground	21	Ch 5 & 6 plus
9	Ch 5 & 6 minus	22	Ch 5 & 6 ground
10	Ch 3 & 4 plus	23	Ch 3 & 4 minus
11	Ch 3 & 4 ground	24	Ch 1 & 2 plus
12	Ch 1 & 2 minus	25	Ch 1 & 2 ground
13	no connection		

DCI Channel Map:

Channel 1: L (screen – left)
Channel 2: R (screen – right)
Channel 3: C (screen – center)
Channel 4: LFE (screen – low frequency effects subwoofer)
Channel 5: Ls (surround – left wall)
Channel 6: Rs (surround – right wall)
Channel 7: Lc (screen – mid left to center)
Channel 8: Rc (screen – mid right to center)

4.3 SMS-2K-1 Motherboard Connections

4.3.1 Motherboard Connectors

Keyboard & Mouse Connectors   USB Ports   Serial Port   VGA   Ethernet (Eth0)   Ethernet (Eth1)
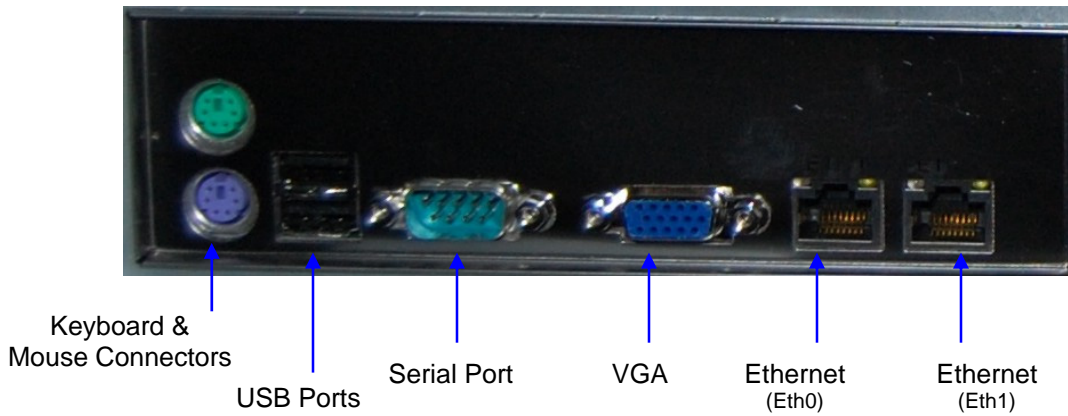
Figure 15: Rear Panel – Motherboard Connectors

On the rear panel of the unit are the connections to the motherboard. These connectors are labeled in the diagram above and described in the paragraphs **4.3.2** to **4.3.6** below.

4.3.2 Keyboard & Mouse PS-2 Connectors

On the left side of the connector panel are the PS-2 connectors for the PC keyboard and mouse. These jacks can be used interchangeably, but traditionally the purple jack is for a PC keyboard and the green jack is for a PS-2 mouse. If you have a USB keyboard or mouse, then use the USB ports. You may also use the upper USB port on the front panel of the unit for connecting the keyboard and mouse.

4.3.3 Serial Port

This is a standard 9-pin male DB-9 serial COM port on the motherboard.

4.3.4 VGA

Connect a standard VGA monitor here for display of the SMS-2K-1 software interface.

This connector can also be linked to the center rear panel VGA connector to facilitate use of the front panel LCD screen. The VGA cable provided with the SMS-2K-1 (and presented in section **4.1**) is then required.

4.3.5 USB Ports

Connect standard USB 2.0 peripherals here such as a PC USB keyboard, mouse, hard drive, etc.

4.3.6 Ethernet
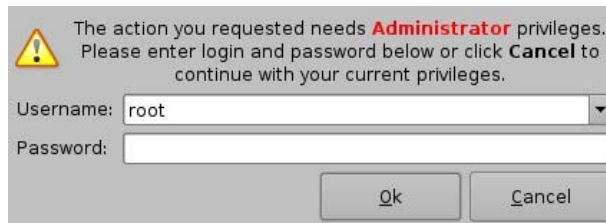
The Motherboard has two built-in Gigabit Ethernet connectors. The left one is identified as *Eth0* and the right one is identified as *Eth1*.

5 SMS-2K-1 IP Address

All SMS-2K-1 servers are shipped with a default IP address of 192.168.100.50 on the Ethernet port (*Eth1*) and a DHCP assigned dynamic IP address on the Ethernet port (*Eth0*) – see section **4.3** to locate each Ethernet connector.

To change the IP address of the SMS-2K-1 server, you need to go to "**Menu → System → Networking Setup**" and follow the steps below:

1.) From the SMS-2K-1 menu, select "**Menu → System → Networking Configuration**" and you should be asked for a password as illustrated below:

Figure 16: Authentication Windows

Then, just follow the steps starting with the following windows:
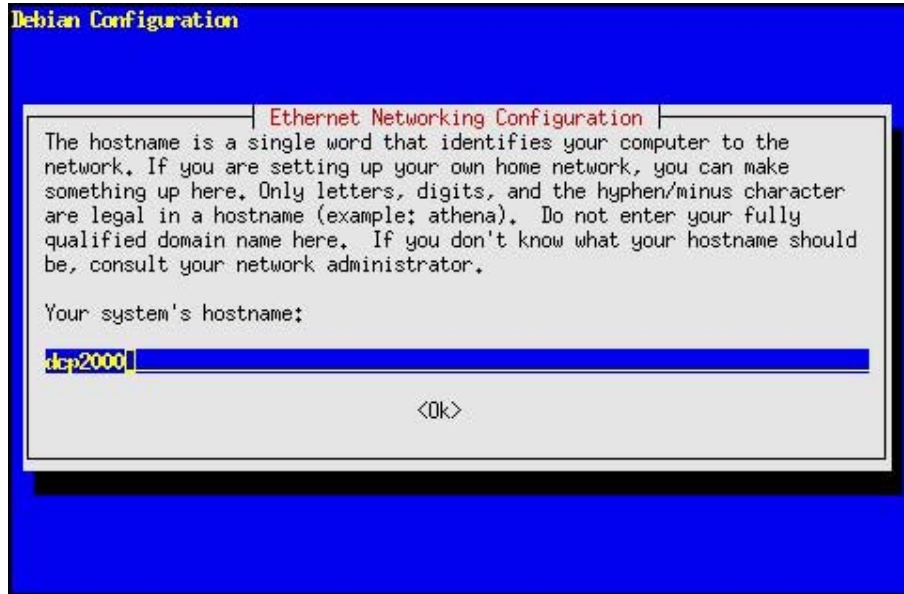
Figure 17: SMS-2K-1 Network Configuration

In the steps that follow, use the arrow down or the Tab key to select "OK" then hit **<enter>**:

2.) enter the desired system's hostname and select "OK"

3.) select "OK" for your system's domain name

4.) select "Yes" for eth0

5.) select "No" for Removable Device

6.) select "No" for automatically configure device with DHCP

7.) enter the desired IP address for eth0 and select "OK"

8.) enter the desired default gateway or leave empty and select "OK"

9.) enter the desired subnet mask and select "OK"

10.) enter the desired device broadcast address then select "OK"

11.) select "Yes" for eth1

12.) select "No" for Removable device

13.) select "No" for automatically configure device with DHCP

14.) enter the IP address of eth1 and select "OK" – in our example, enter 192.168.10.12

15.) enter the desired default gateway or leave empty and select "OK"

16.) enter the desired subnet mask and select OK – in our example, enter the same subnet mask as the projector: 255.255.255.0

17.) enter the desired device broadcast address then select "OK" – in our example, enter 192.168.10.255

18.) leave empty the system's domain name servers and select "OK"

You will now exit the setup utility.

To verify your setup, go to "**Menu → DTS Digital Cinema → Diagnostic Tool**" and verify the IP Address under the Diagnostic Tool "System" Tab.

6 Device Manager Setup

The Device Manager is a graphical user interface used to setup the connection between a SMS-2K-1 and cinema projector(s). It also provides for the use of Ethernet commands for the control of theater automation devices.

To run the Device Manager, go to "**Menu → DTS Digital Cinema → Device Manager**".

The following window should appear on the screen:
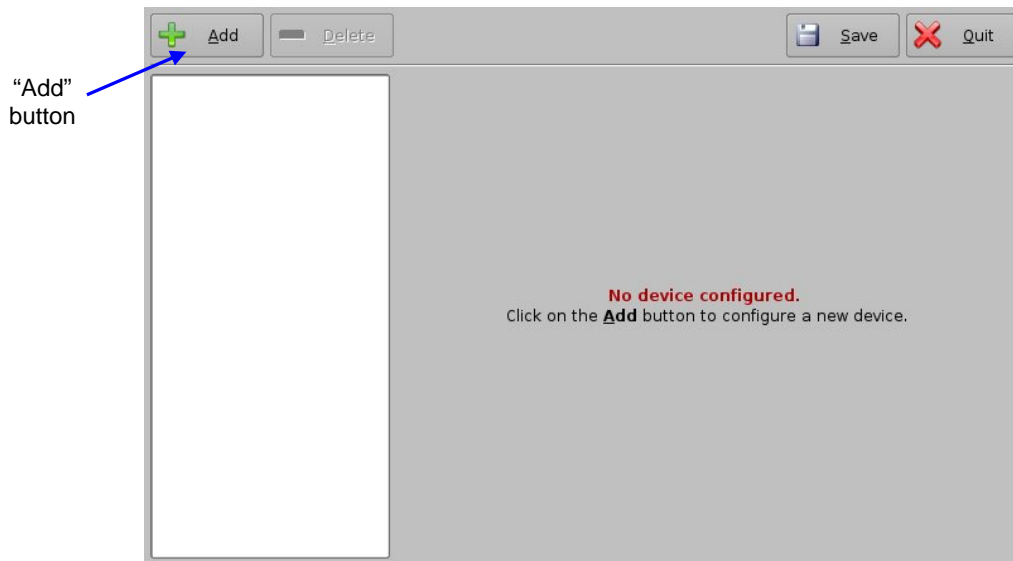
Figure 18: Device Manager Graphical User Interface (GUI)

6.1 Projector(s) Management

6.1.1 Adding a Projector

To connect a projector to the SMS-2K-1, click on the "Add" button – see **Figure 18**. The following window should appear:
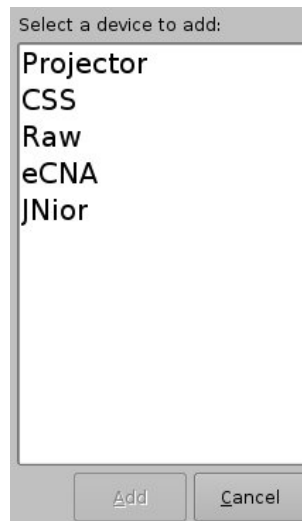
Figure 19: Device Manager GUI – Device Selection Window

Select the item called "Projector" and click on "Add" as illustrated below:

"Projector" item
selected

"Add" button
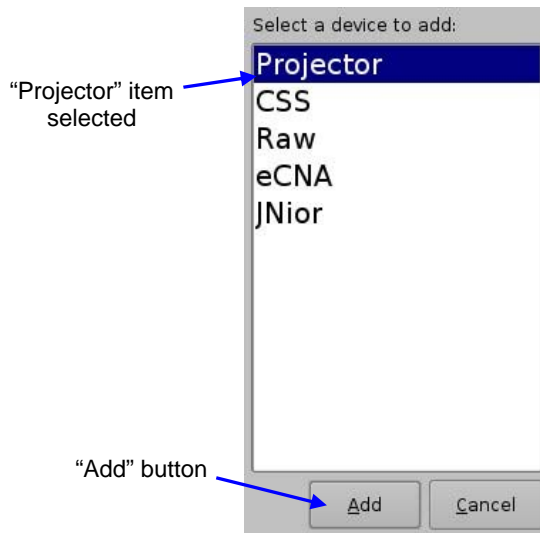
Figure 20: Device Selection Window – "Projector" Item Selected

You should then be back to the main configuration window and be able to enter the projector parameters as highlighted below:

"Delete" button

1- Projector Identifier

2- Projector model field

3- DLP Head IP field

"Test" button

4- Vendor IP field

DLP Username & Password

Enable or disable subtitles according to the required setup
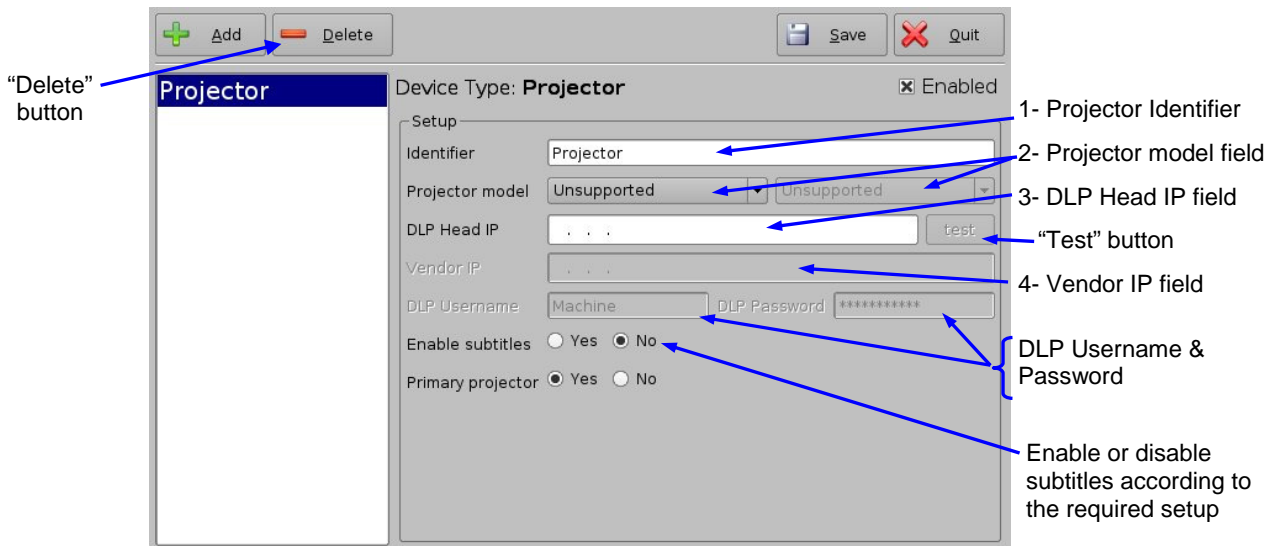
Figure 21: Device Manager GUI – Projector Fields Setup

To perform the projector setup, follow the steps below:

1. Specify a projector identifier (i.e. projector name, screen #, 3D-left, 3D-right, etc.) in the first field – especially if you setup several projectors.

2. Choose the correct projector model corresponding to the projector you want to connect to the SMS-2K-1 using the "Projector model" field(s).

3. Enter the DLP Head IP address, then click on the "test" button located at the right.

4. Enter the Vendor IP value in the corresponding field.

5. Enable or disable subtitles if needed using the corresponding radio buttons on the bottom of this GUI.

   __Note__: If you enable subtitles without the SMS-2K-1 being connected to a projector, the server will not operate properly.

6. Specify if this is the primary projector or not using the corresponding radio button.

   __Note__: The DLP Username and Password are used for specific projectors only and cannot be changed. Please refer to vendor specific projector setup instructions in section __9__.

7. Make sure that the "Enabled" check box is checked at the top right corner of the GUI.

8. Click on "Save" to record these settings – you should be asked for a password.

6.1.2 Removing a Projector

To remove a projector, click on its name on the left part of the Device Manager GUI and press on the "Delete" button – see **Figure 21**.

6.1.3 Dual Projector for 3D Usage

When a dual projector configuration is used for stereoscopic content, just add two projectors to the Device Manager projector list according to the procedure presented in paragraph **6.1.1** above.

Connect the server HD-SDI A output to one projector for the left eye channel and connect the server HD-SDI B output to the second projector for the right eye channel. The first projector in the Device Manager list shall be the one linked to the left eye – then set its "Primary projector" property to "Yes" in the setup window presented in **Figure 21**.

6.2 Automation Libraries Management

Support for theater automation control through   oremi   t is also provided. The list of currently supported devices is the following:

- eCNA
- JNior

A pre-built library of supported automation commands is available for each of these two devices. These automation commands can then be added to Macro Cues as presented in section **7.2**.

6.2.1 eCNA Device

6.2.1.1 eCNA Device Addition

To use the eCNA device, click on the "Add" button and select "eCNA".

Then enter the eCNA device IP address in the appropriate field as presented below:
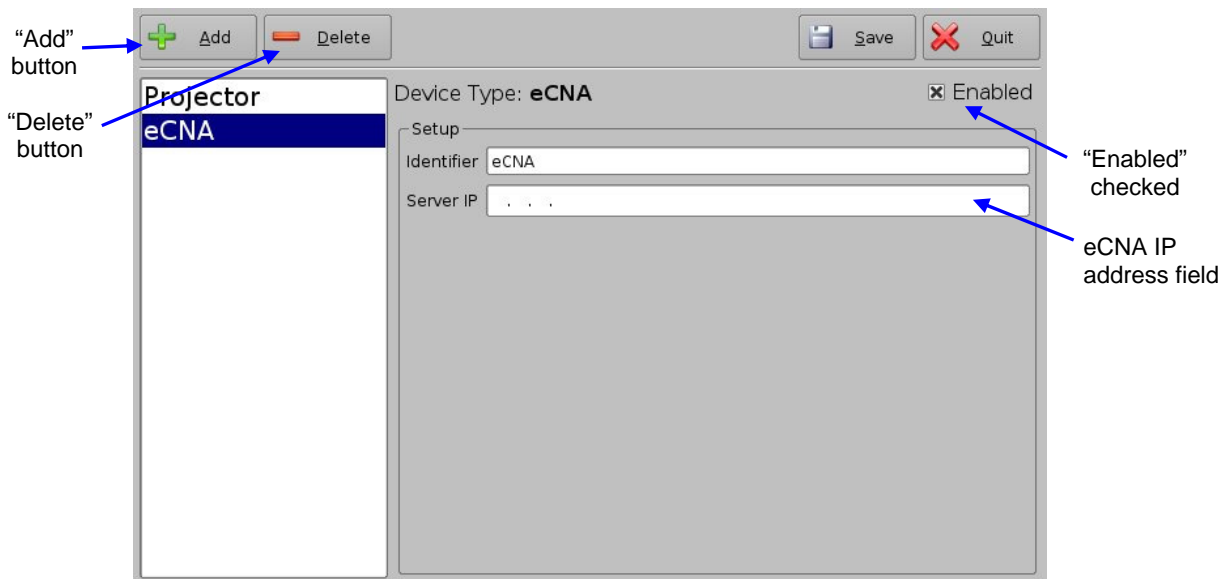
Figure 22: Device Manager GUI – eCNA Device Setup

Make sure the "Enabled" field is checked in the top-right corner of the GUI.

Click on "Save" in order to record your settings – you should be asked for a password.

6.2.1.2 eCNA Device Removal

To remove the eCNA device, select it in the left pane of the Device Manager and click the "Delete" button – see **Figure 22**.

6.2.2 JNior Device

6.2.2.1 JNior Device Addition

To use the JNior device, click on the "Add" button and select "JNior". The JNior device setting window should be displayed within the Device Manager as presented below:
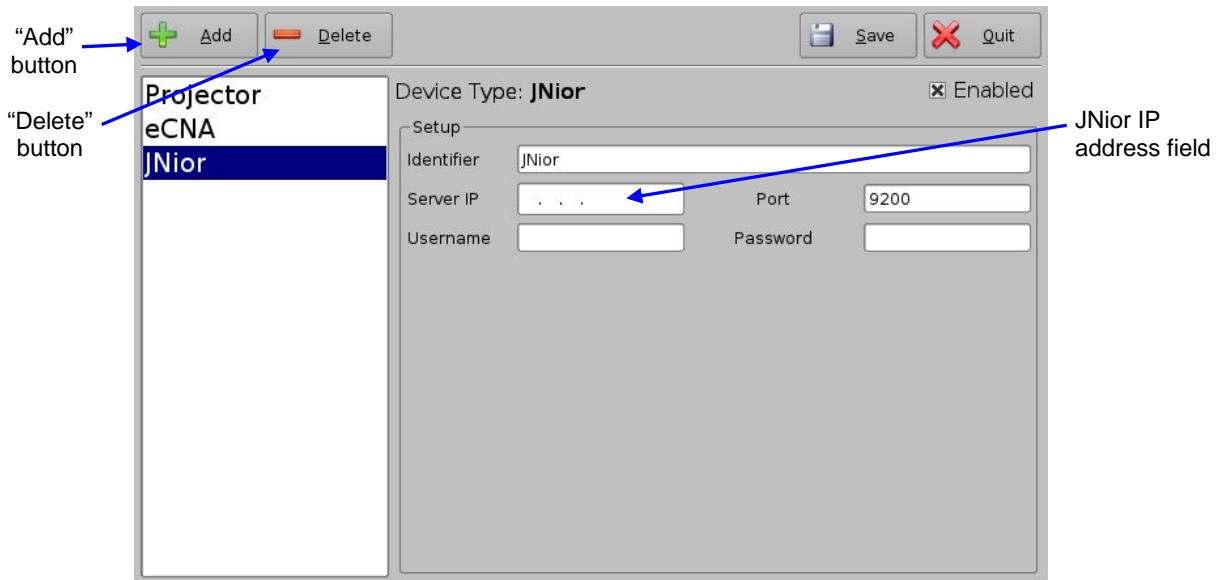
Figure 23: Device Manager GUI – JNior Device Setup

Enter the IP address of the JNior device in the "Server IP" field – the port number field should already contain the appropriate value (factory default value).

The JNior device documentation should provide you the correct Username and Password values (the factory default values).

Click on "Save" to record the settings – you should be asked for a password.

6.2.2.2 JNior Device Removal

To remove the eCNA device, click on its name on the left part of the Device Manager GUI and press on the "Delete" button – see **Figure 23**.

6.3 Projector Configuration for 3D or 48fps

In 3D or 48fps mode, the SMS-2K-1 video output is in the YCxCz color space. The projector itself needs to be properly configured to the YCxCz color space in 3D or 48fps mode for proper display. Contact your projector vendor to know how to configure the projector properly.

7 Automation Setup: Macro Editor Usage

Automation events can be created using the Macro Editor for use within the CineLister interface. The paragraphs below detail how to generate and manage automation events as part of Macro Automation Cues and/or Trigger Cues.

7.1 Macro Editor Interface Overview

In order to run the Macro Editor, go to the "Start Menu" of the server, then to "DTS Digital Cinema" and choose the item "Macro Editor".

The graphical user interface (GUI) should appear on the screen as presented below:
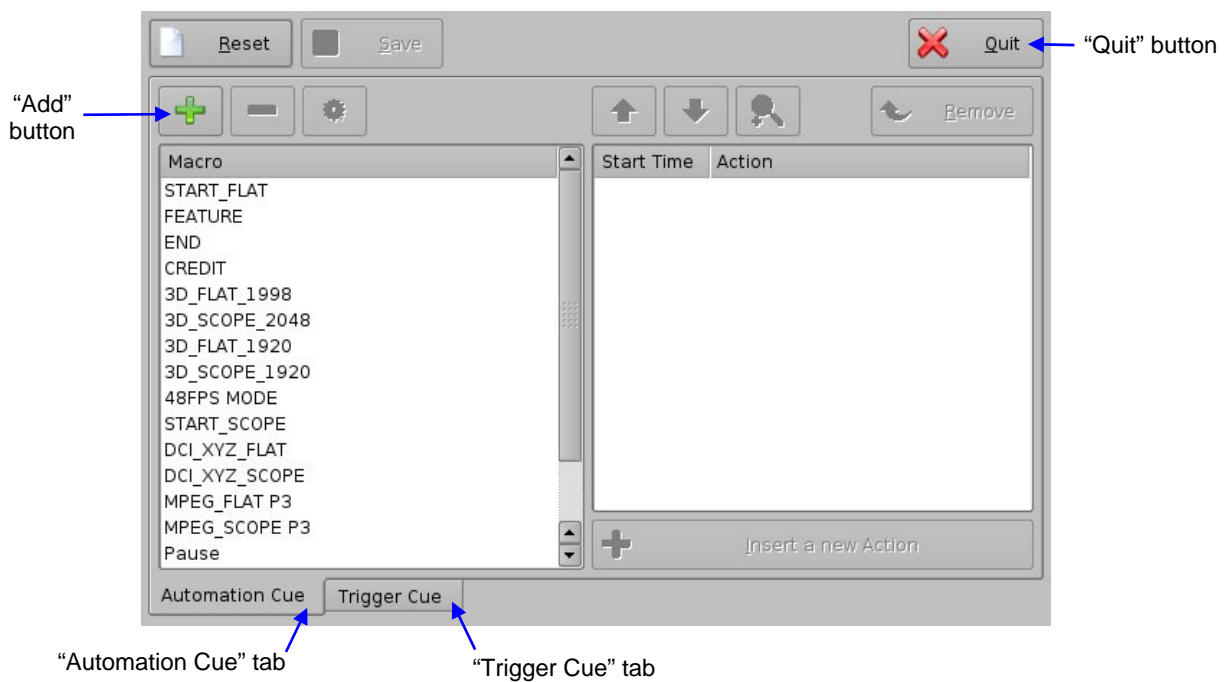
Figure 24: Macro Editor Graphical User Interface (GUI)

The GUI presented above is composed of two different tabs:
- **Automation Cue Tab** – used for the creation and editing of Macro Automation Cues
- **Trigger Cue Tab** – used for the creation and editing of Trigger Cues linked to dedicated Macro events (e.g. on GPI line #1 ON, execute Macro *xxMACRO NAMExx*).

The "Quit" button is used to close the Macro Editor user interface.

7.2 Automation Cue Tab

7.2.1 Macro Creation

Hit the "Add" button to start the creation of a new Macro Automation Cue – see **Figure 18**. The following window should be displayed:
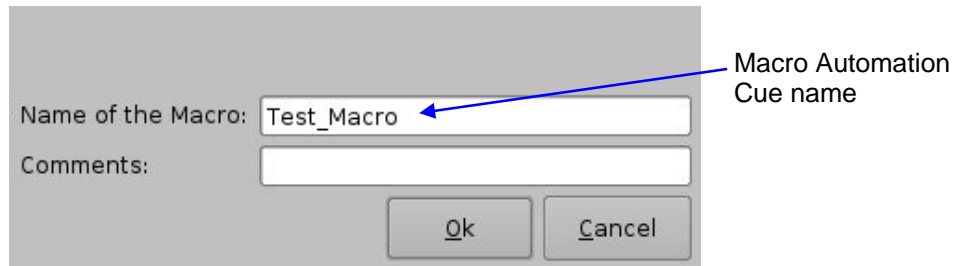
Figure 25: Macro Automation Cue Name Assignment

Enter a Macro Automation Cue name in the appropriate field. It will be the name used by the CineLister application in order to include this Macro Automation Cue within a Show Playlist.

Hit "Ok" when you are done. You should be back to the general Macro Editor GUI displaying the Macro Automation Cue name in the "Macro Window" as presented below:
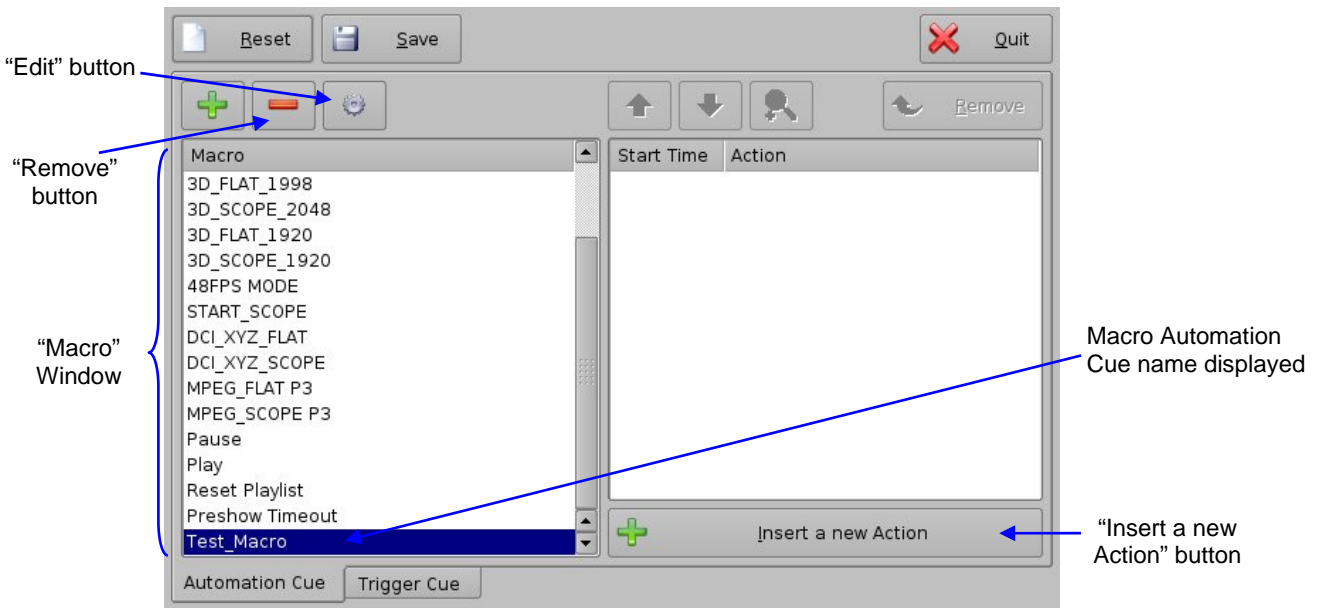
Figure 26: "Macro" Window Updated

To remove a Macro Automation Cue, select it in the "Macro" window and click on the "Remove" button – see **Figure 26** above.

To edit the name of an existing Macro Automation Cue, hit "Edit" and do the change – see **Figure 26**.

7.2.2 Action Insertion

To insert a new action in a Macro Automation Cue, select its Macro name in the "Macro Window" and hit "Insert a new Action".

The following window should be displayed:
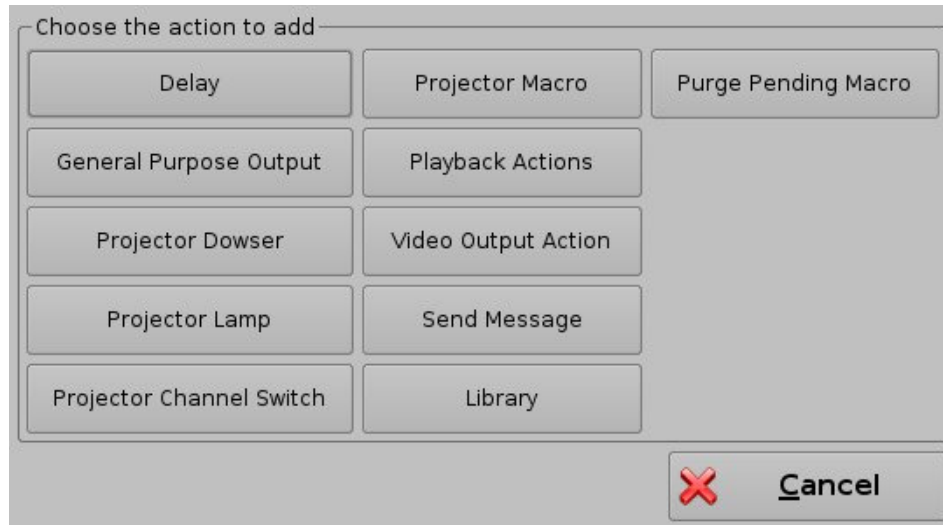
Figure 27: "Action" Window

The "Action Window" provides a list of available actions to be used within a Macro Automation Cue.

The actions available are the following:

- **Delay**: delay the macro execution for a specific duration
- **General Purpose Output**: change the position of a GPO line
- **Projector Dowser**: open or close the projector dowser
- **Projector Lamp**: turn the projector lamp ON or OFF
- **Projector Channel Switch**: switch to a projector channel number from 1 to 16
- **Projector Macro**: used to recall preset DLP projector macros by name (e.g. for Barco)
- **Playback Actions**: select an action between Play, Pause or Toggle Play/Pause
- **Video Output Action**: choose between "Default Video Output" and "Play all clips at 48fps"
- **Send Message**: used for sending a text or a binary message to a device
- **Library**: used for sending a pre-defined message to a specific device (e.g. eCNA, JNior)
- **Purge Pending Macro**: used to purge pending macros

Hit "Cancel" to cancel the action insertion.

To add an action to the Macro Automation Cue, click on its corresponding action button in the "Action" Window.

- **Example of Delay Action Insertion**

  To add a delay action to the selected Macro Automation Cue, hit "Delay" in the "Action" window and define the delay parameter using the following window:

Button used to increase or decrease the amount of minutes

Button used to increase or decrease the amount of seconds
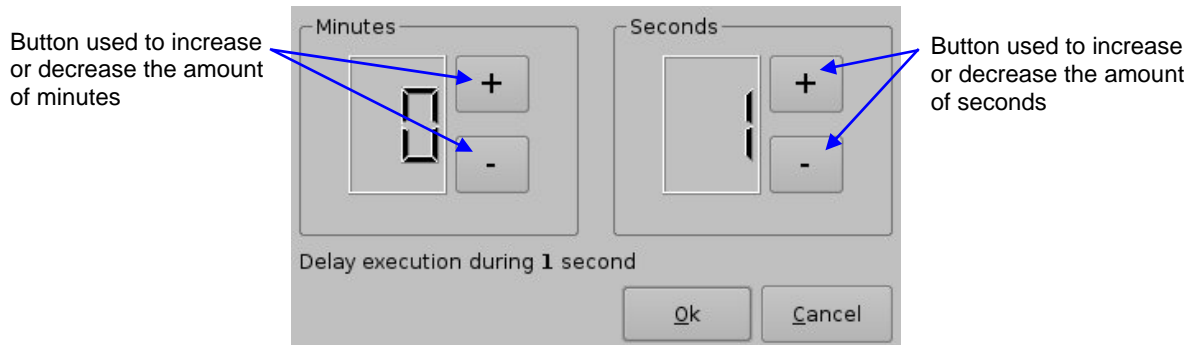
Figure 28: Delay Setup Window

Hit "Ok" when the setting is done.

- **Example of GPO Action insertion**

  To add a GPO action, hit "General Purpose Output" in the "Action" window – see **Figure 27**. The following window will appear:

Button used to choose the GPO line number

GPO state button
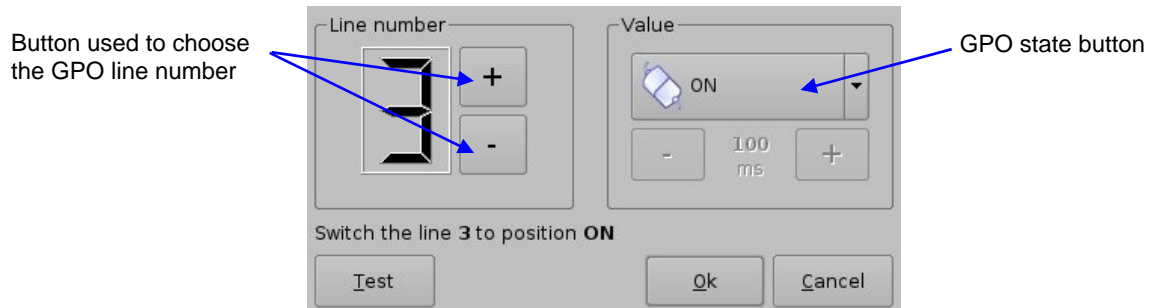
Figure 29: GPO Setup Window

Set the line number and value according to the usage you plan for this action and hit "Ok".

- **Example of Playback Action Insertion**

  To add a "Playback Action", hit "Playback Actions" in the "Action" window – see **Figure 27**. The following window should appear:

Playback action selection button
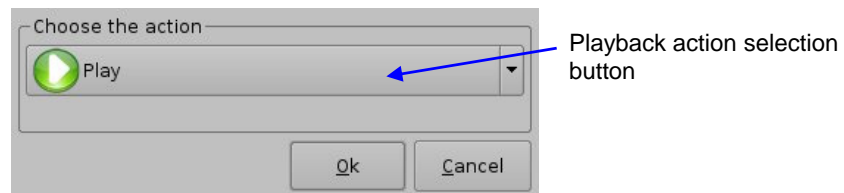
Figure 30: Playback Actions Setup Window

Select the proper playback action between "Play", "Pause" or "Toggle Play/Pause" and hit "Ok".

- **Example of Automation Library Usage**

  When one of the supported devices (e.g. eCNA and JNior) is added according to Section **6.2**, the Macro Editor should allow you to use the corresponding commands for each device. In order to do this, follow the procedure below:

  1. To use a library command, hit "Library" in the "Action" window – see **Figure 27**.

  2. Select one of the available devices in the left part of the following window and choose the appropriate command (belonging to the selected device) in its right part:
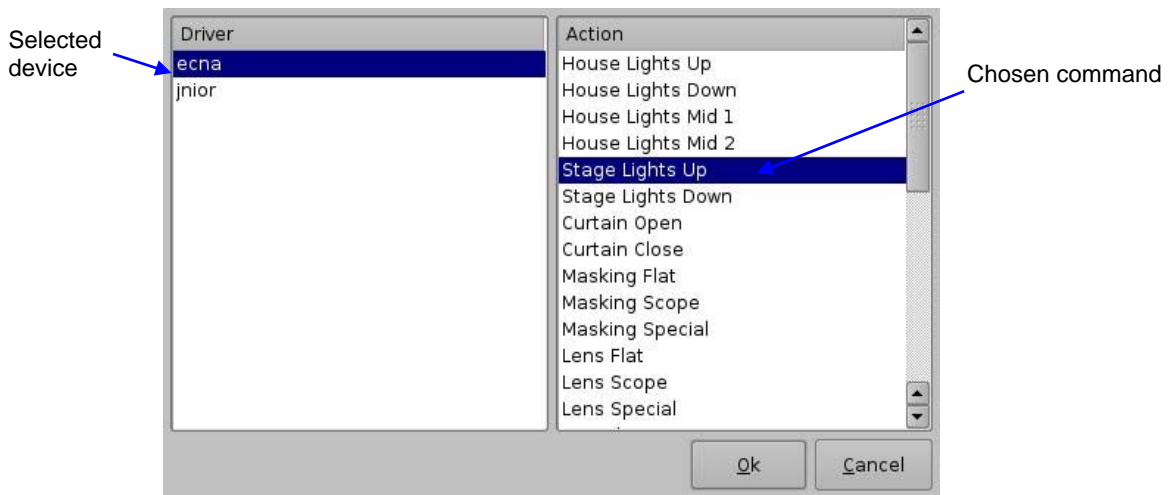
Figure 31: Macro Editor GUI – eCNA Automation Setup Example

  3. Press "Ok" to validate, or "Cancel" to cancel this command addition.

- **Example of Resulting Macro Setting**

  After having inserted the three actions "Delay 1s", "GPO line #3 ON" and "Playback: Play" in the Macro "Test_Macro" as called in this example, the right part of the "Automation Cue" tab should display the added actions as presented below:
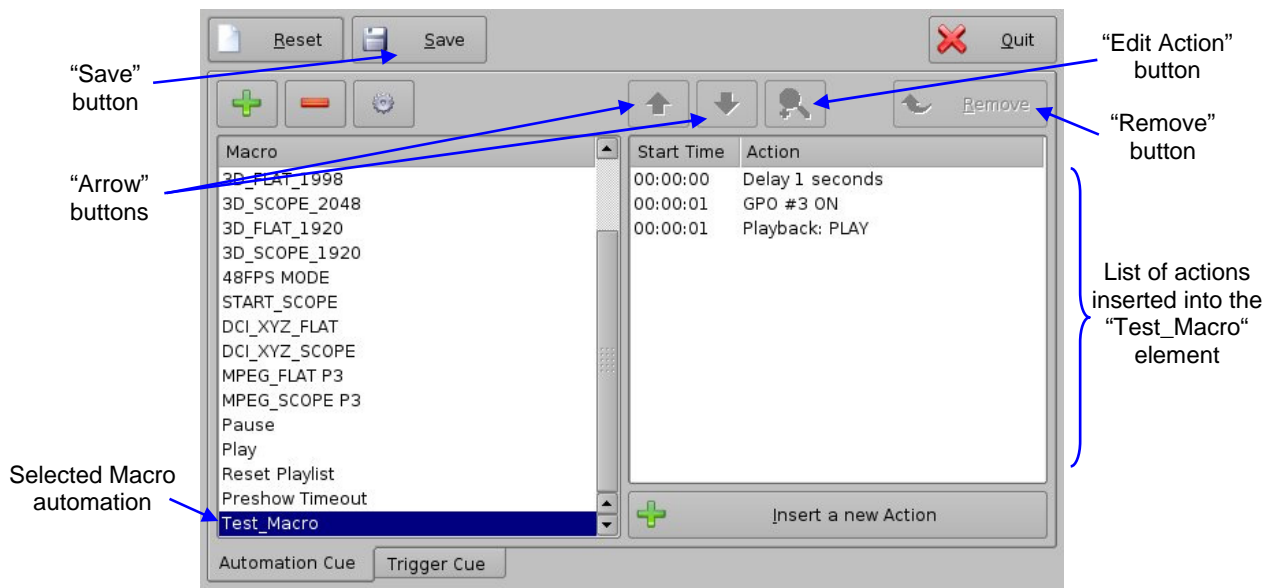
Figure 32: Example of "Macro Actions" Window Updated

_____

Press "Save" to save the "Test_Macro" settings. A password will be needed.

7.2.3 Action List Management

- **Action Reordering**

  Two arrows allow the user to change the order of the actions in the Macro Automation Cue – see **Figure 32**. Using those arrows, each action can be moved to the top or to the bottom of the "Macro Actions" window:
  - In order to move an action to the top, select it and click on the arrow pointing to the top
  - If an action needs to be moved to the bottom of the "Macro Actions" window, select it and click on the arrow pointing to the bottom.

  Repeat these operations until the required actions order is obtained.

- **Action Edition**

  You can edit an action of a given Macro Automation Cue by selecting it in the right part of the interface – it will be reverse highlighted – and by clicking on the "Edit Action" button presented in **Figure 32**.

  You will be able to edit the properties you were asked to set when the action was added to the Macro Automation Cue.

- **Action Removal**

  To remove an action from the list of actions associated to a Macro Automation Cue, select the action in the "Macro Actions" window and hit "Remove" – see **Figure 32**.

7.2.4 Macro Saving

Repeat the Macro creation operations for all the Macro Automation Cues you need to create and click "Save". You will be asked for a password to be able to perform this operation:
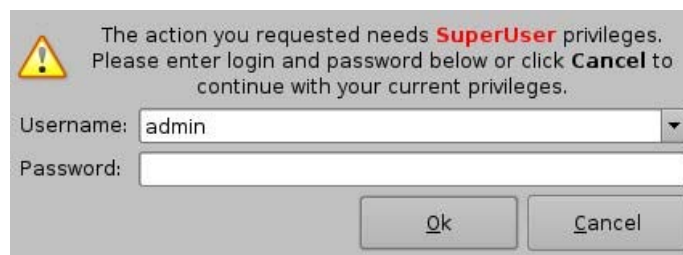
Figure 33: Authentication Window

Enter the appropriate password and hit "Ok". These Macro Automation Cues will be available in CineLister in order to create a Show Playlist.

Note that this saving operation will not only save the Macro Automation Cues, but also the Trigger Cues that were created according to the procedure described in the following paragraph.

_____

7.3 Trigger Cue Tab

7.3.1 Trigger Cue Tab Overview

The Trigger Cue Tab is shown below:
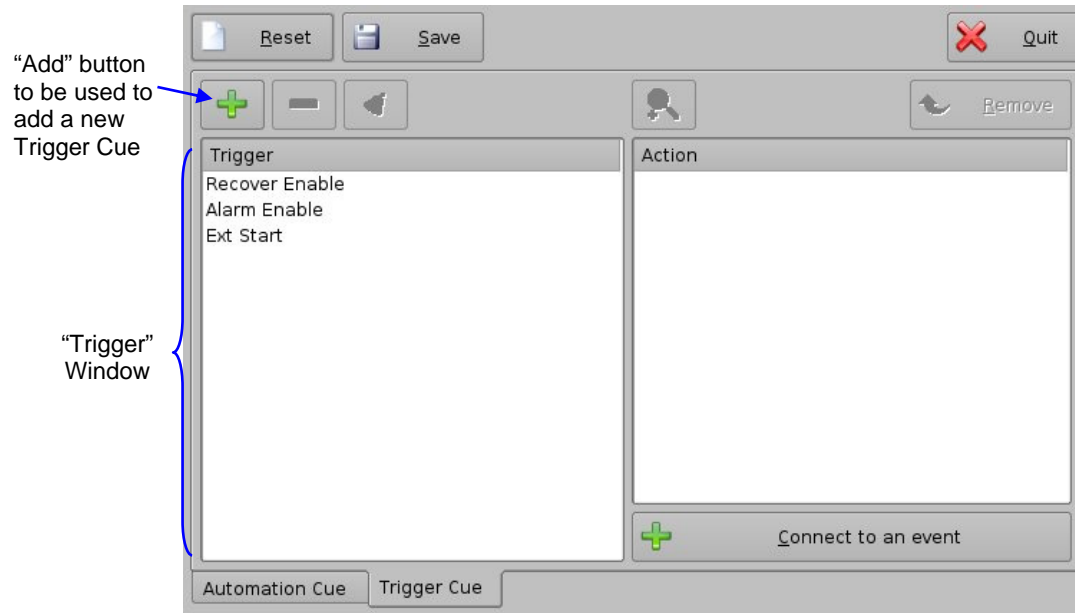
Figure 34: Trigger Cue Tab

7.3.2 Trigger Cue Creation

To create a new Trigger Cue, click on the "Add" button presented in the previous figure. The same type of window as for the Automation Cue tab allowing you to enter the Trigger Cue name will appear – see below:
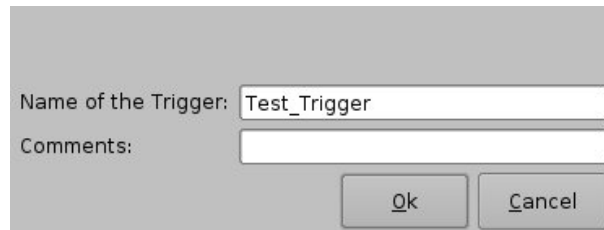
Figure 35: Trigger Cue Setting Window

Enter the appropriate name – it will be the name used by the CineLister application to insert this Trigger Cue in a Show Playlist.

The new created Trigger Cue will appear in the "Trigger" window, ready to be connected to a GPI event:
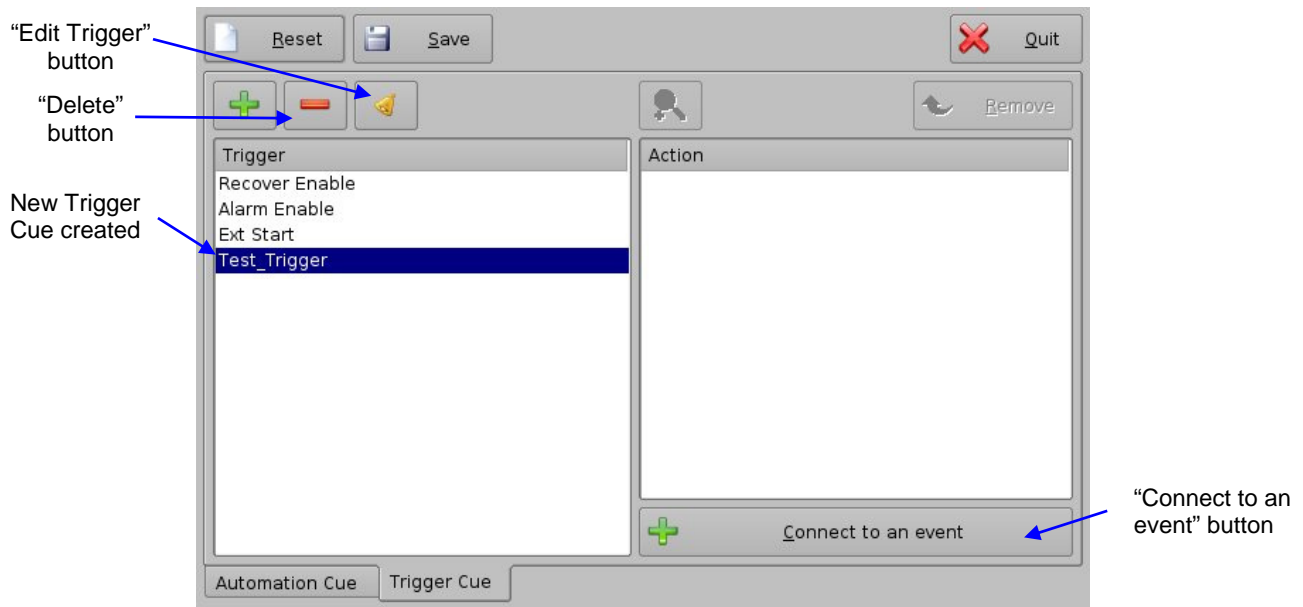
Figure 36: Trigger Cue Defined

To edit an existing Trigger Cue, select it in the "Trigger" window and click on the "Edit Trigger" button shown in the figure above. You will be able to edit the name of the Trigger Cue using the same kind of window as presented in **Figure 35**.

To remove a Trigger Cue, select it in the "Trigger" window and click on the "Delete" button – see figure above.

7.3.3 Connection to an Event

To connect a Trigger Cue to an event, select it in the "Trigger" window and hit "Connect to an event" – see **Figure 36**. The following window should appear:
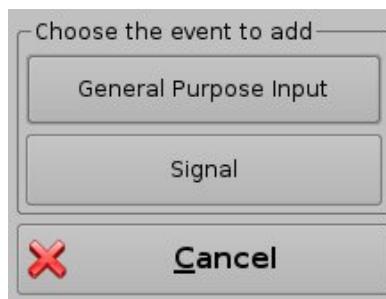
Figure 37: "Choose the event to add" Window

- To connect the selected Trigger Cue to a GPI event, click on the "General Purpose Input" button of the "Choose the event to add" window – see figure above. The following windows should appear:

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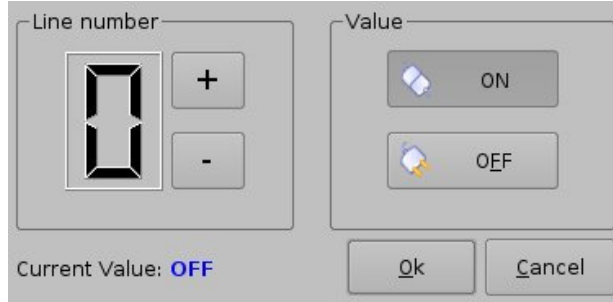
Figure 38: Connection to a GPI Event

Define the GPI line number and value you want to connect to the Trigger Cue and hit "Ok" when you are done. The connected GPI event will then appear in the right part of the GUI.

- To connect the selected Trigger Cue to another signal, click on the "Signal" button of the "Connect to an event to add" windows above – see **Figure 37**. The following window should appear:
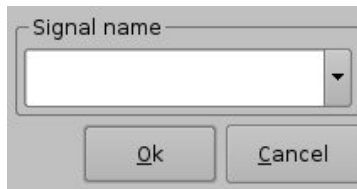
Figure 39: "Signal name" Window

Click on "Ok" when the appropriate signal name is defined.

7.3.4 Trigger Cue Saving

Repeat the Trigger Cue creation operations for all the Trigger Cues you need to create and hit "Save". You will be asked for a password to be able to perform this operation:
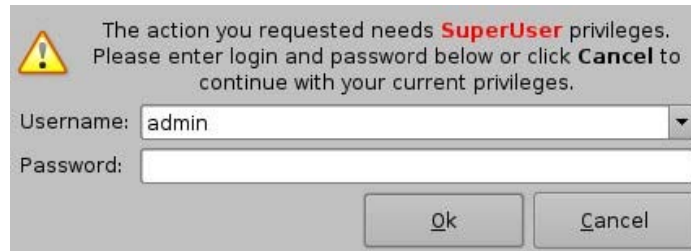
Figure 40: Authentication Window

Enter the appropriate password and hit "Ok". These Trigger Cues will then be available within CineLister in order to create a Show Playlist.

Note that this saving operation will not only save the Trigger Cues, but also the Macro Automation Cues that were created according to the procedure described in paragraph **7.2**.

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7.4 Automation Setup to Play 2D Contents in 3D Mode

The purpose of this paragraph is to provide guidance on how to create a Macro Automation Cue for playback of 2D content within Stereoscopic (3D) Shows. This is useful, for example, to play 2D Trailers within a Stereoscopic Show without having to generate stereoscopic versions of these Trailers.

7.4.1 "48FPS_PLAYBACK" Macro Creation

A specific Macro Automation Cue has to be created: it will be called the "48FPS_PLAYBACK" Macro in the following procedure and will force all 2D content to be played out at 48fps.

Run the Macro Editor GUI as presented in paragraph **7.1**. The following window should appear on the screen:
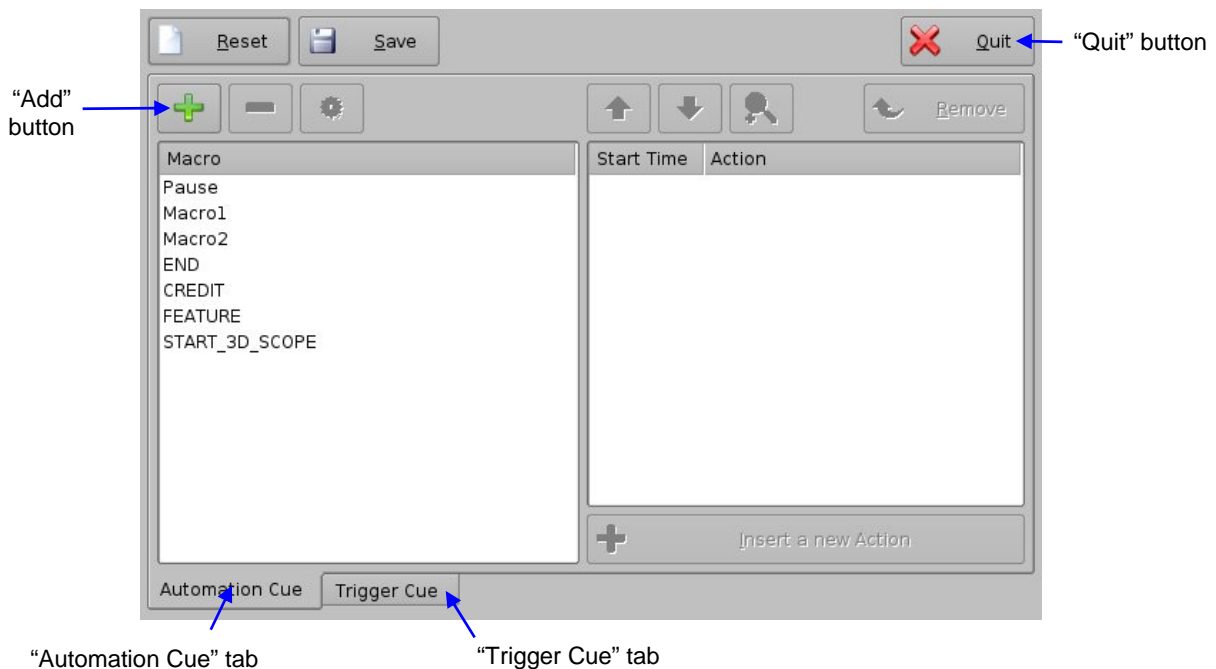
Figure 41: Macro Editor Graphical User Interface (GUI)

Hit the "Add" button to start the creation of a new Macro Automation Cue – see figure above. The following window should appear:
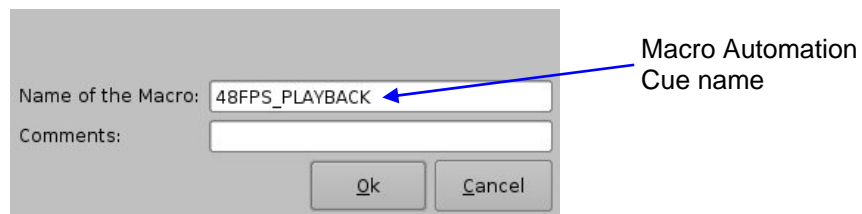
Figure 42: Macro Automation Cue Name Assignment

Enter a Macro Automation Cue name in the appropriate field. It will be the name used by the CineLister application when displaying this Macro Automation Cue in a Show Playlist.

Hit "Ok" when you are done. You should be back to the general Macro Editor GUI displaying the Macro Automation Cue name in the "Macro Window" as presented below:
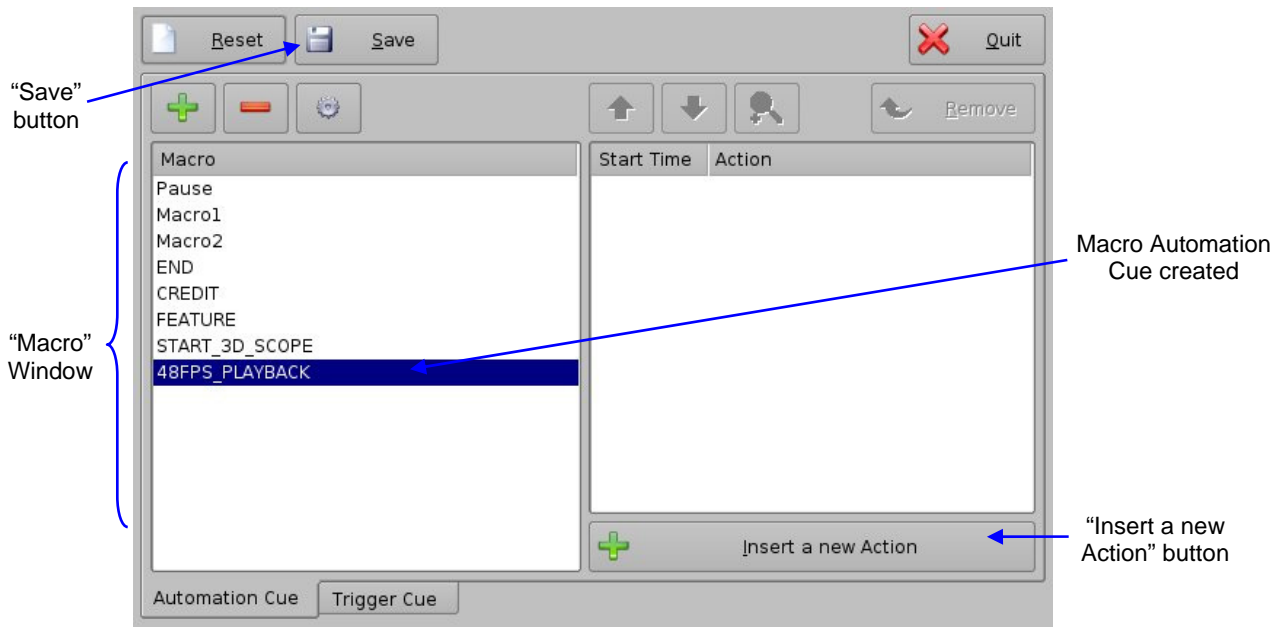
Figure 43: "Macro" Window Updated

7.4.2 Action Insertion

To insert the proper Action in this new Macro Automation Cue, select its Macro name in the "Macro Window" and hit "Insert a new Action".

The following window should be displayed:
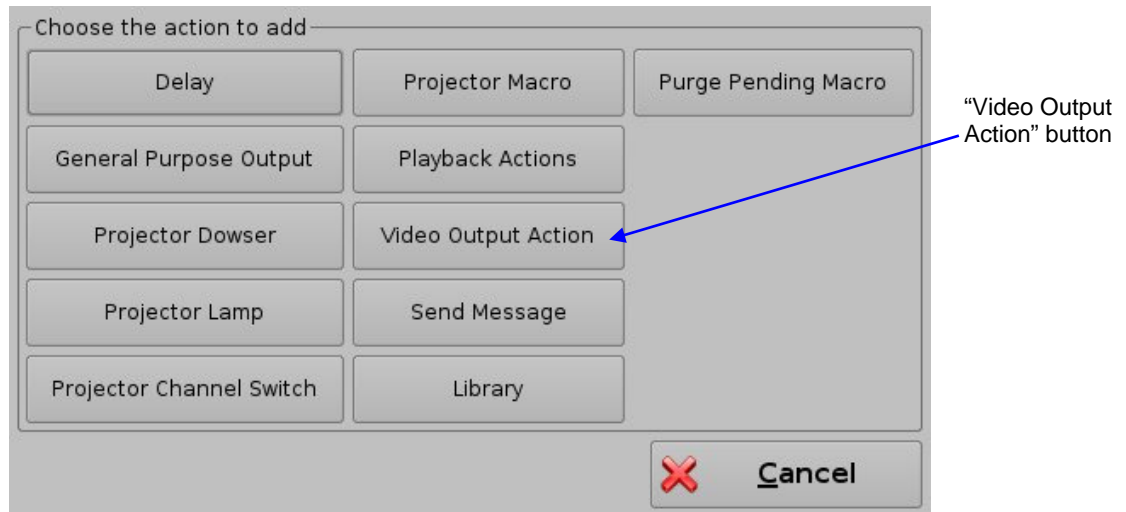
Figure 44: "Action" Window

Hit "Video Output Action". It will allow you to choose between "Default Video Output" and "Play all clips at 48fps".

Select "Play all clips at 48fps" as presented below:
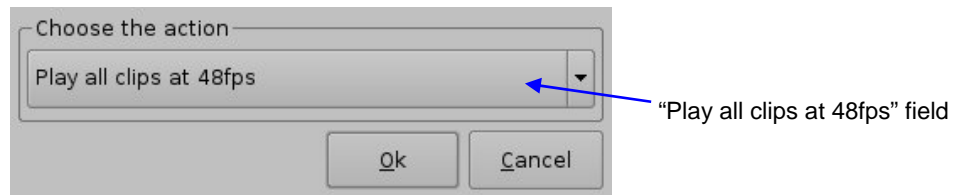
Figure 45: "Choose the action" Window

Hit "Ok" to validate the selection. You should be back to the "Automation Cue" tab.

7.4.3 Macro Saving

To save the Macro you just created, click "Save" – see **Figure 43**.

You should be asked for a password to be able to complete this operation as presented below:
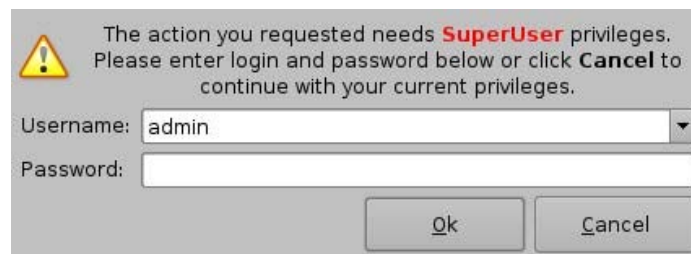
Figure 46: Authentication Window

Enter the appropriate password and hit "Ok". This new Macro Automation Cue will be available within CineLister in order to create a 3D Show Playlist.

7.4.4 Restore Default Video Output Macro

Note that you can create a second Macro Automation Cue to be able to restore the default video output mode (for example 24 frames per second) by doing the same procedure as presented in paragraphs **7.4.1**, **7.4.2** and **7.4.3** – with another Macro name i.e. "DEFAULT_VIDEO_OUTPUT". Just select "Default Video Output" when you are at the step illustrated in **Figure 27**.

Such a Macro to restore the video output is not applicable for the application presented in this document.

7.5 Pre-defined Macro Usage

If you have a pre-defined **macros.xml** file containing automation and trigger cue definitions, just copy it into the **/ oremi/etc/** folder and the corresponding macros will be visible in the Macro Editor GUI. You should then be able to update these cues if needed from the Macro Editor GUI as presented in the previous paragraphs.

7.6 Default Cues

The **default_cues.xml** file can be used to load an automation and trigger cues playlist prior to any playback (for example to avoid having to add a "Fire Alarm" trigger cue to each show). If you are provided a **default_cues.xml** file, just copy it into the **/ oremi/etc/** folder.

8   Time Zone Setup

SMS-2K-1 units may or may not be localized with your time zone. This section provides you information on how to check and/or change the time zone.

8.1   Checking the Time Zone

To confirm that the time zone of your SMS-2K-1 is set correctly, open a terminal window by going to the "**Menu → System → Terminal**" menu of the SMS-2K-1. Then do the following:

type: **date**   <enter>
   The current time and time zone will be displayed

8.2   Changing the Time Zone

To change the time zone, follow the steps below:

type: **su**   <enter>

   Then type the root password in order to login as root – consult your system administrator to know your root password or DTS Digital Cinema to know the default root password.

Type: **/sbin/rwdo tzsetup**   <enter> (Note: For software version 5.2-26, type **/sbin/rwdo tzconfig**)

   Then follow the graphical wizard
type: **reboot**   <enter>

After this point in the manual, the installation should be completed and you should be able to use the SMS-2K-1 within your system. The information provided in the following sections is provided for reference.

9   Vendor Specific Projector Setup Instructions

9.1 Adding a Christie Projector

To add a Christie CP2000 projector, run the Device Manager as presented in section **6** by going to the "**Menu → DTS Digital Cinema → Device Manager**" menu of the SMS-2K-1.

The GUI illustrated in **Figure 18** should appear on the screen. Click on the "Add" button. The window presented below, allowing you to add a projector, should be displayed.
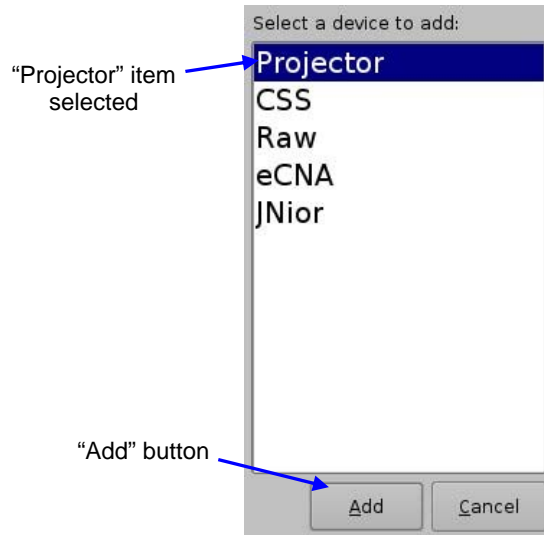
Figure 47: Device Selection Windows – "Projector" Item Selected

Select the item called "Projector" and click on "Add" as highlighted above. You should then be back to the main GUI window to enter the projector parameters as presented below:
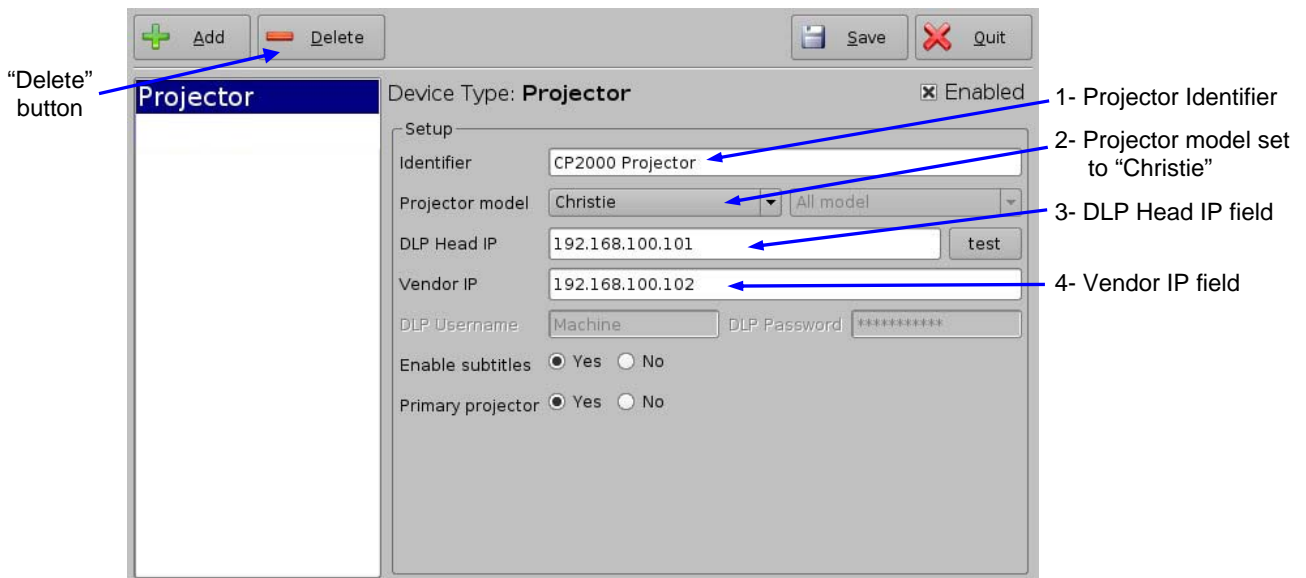
Figure 48: Device Manager GUI – Christie Projector Setup Fields

To perform the projector setup, follow the steps below:

1. Specify a projector identifier in the first field – especially if you setup several projectors.

2. Choose the correct projector model – "Christie".

3. Enter the DLP Head IP address, then click on the "test" button located at the right, that should have been activated. This is an IP 'ping' test to the DLP head to verify   oremi t connectivity.

4. Enter the Vendor IP value in the corresponding field – it should be set to the TPC address.

5. Enable or disable subtitles if needed using the corresponding radio buttons on the bottom of this GUI.

6. Specify if this is the primary projector or not using the corresponding radio button (useful mainly when there are several projectors configured.)

   Note: The DLP Username and Password are used for specific projectors only and cannot be changed.

7. Make sure that the "Enabled" check box is selected at the top right corner of the GUI.

8. Click on "Save" to record these settings – you should be asked for a password.

9.2 Adding a NEC Projector

To add a NEC projector, perform the same procedure as in the previous paragraph using "NEC" for the "Projector model" field and choose the appropriate NEC projector model as presented below:
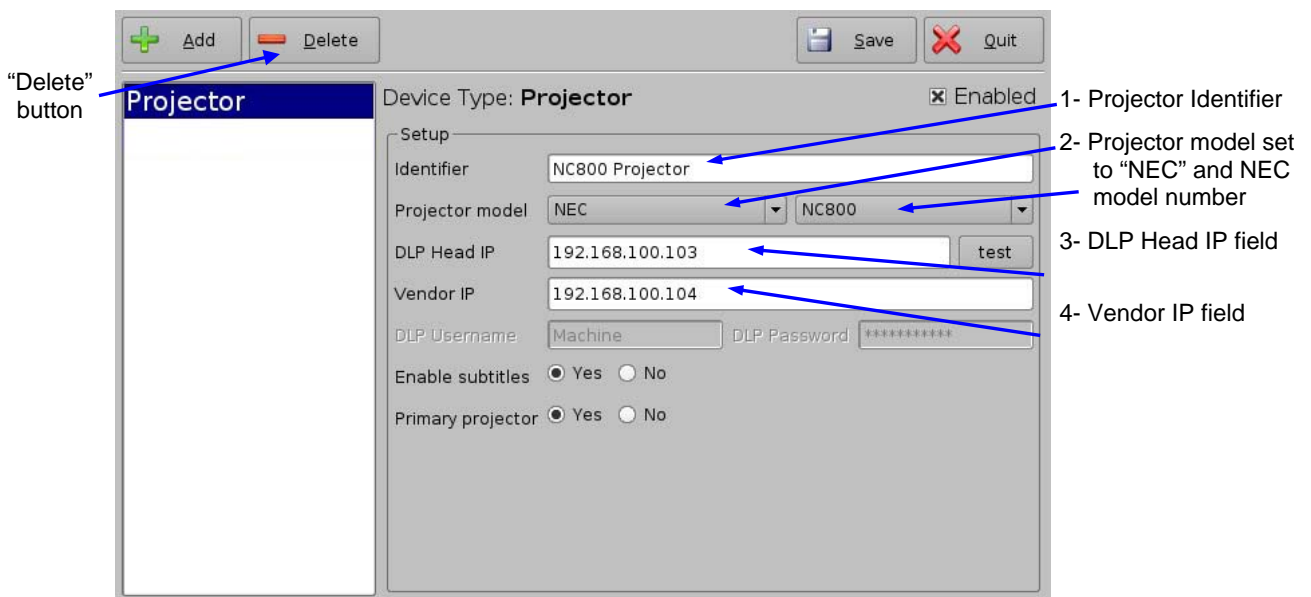
Figure 49: Device Manager GUI – NEC Projector Setup Fields

Click on "Save" to record these settings – you should be asked for a password.

9.3 Adding a Barco Projector

To add a Barco projector, perform the same procedure as in paragraph **9.1** using "Barco" for the "Projector model" field as presented below – no Vendor IP is needed:
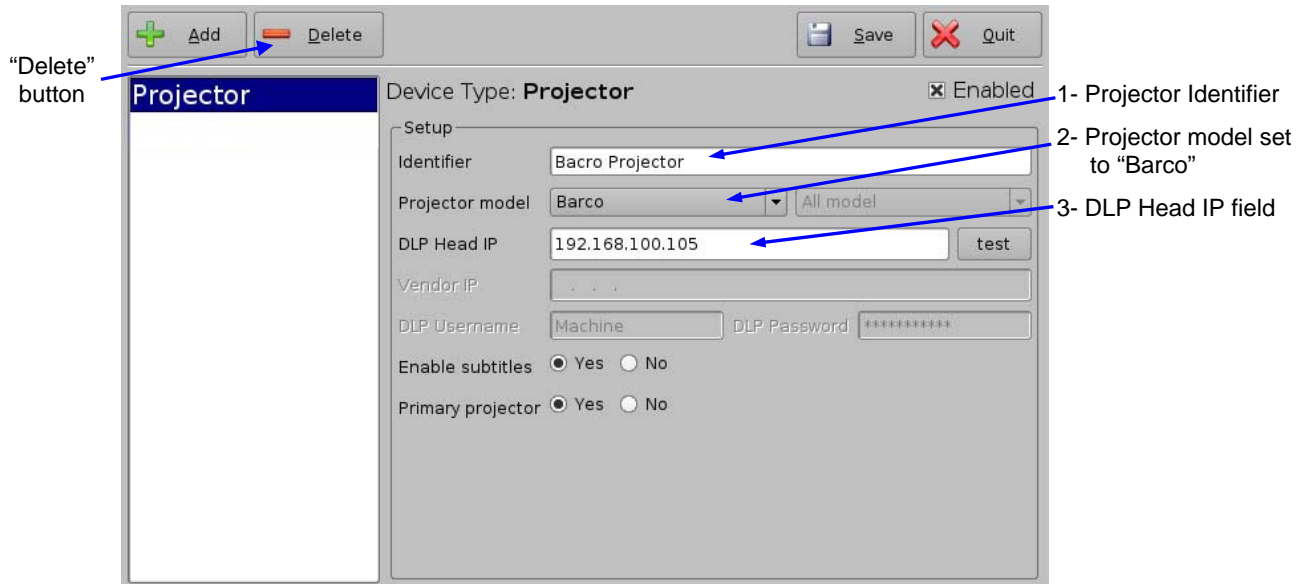
Figure 50: Device Manager GUI – Barco Projector Setup Fields

Click on "Save" to record these settings – you should be asked for a password.

10 SMS-2K-1 Software/Firmware USB Upgrade Instructions

10.1 Displaying the SMS-2K-1 Software/Firmware Versions

To display the software version of the SMS-2K-1, go to the "**Menu → DTS Digital Cinema → About**" menu of the SMS-2K-1.

The following window will appear on the screen:
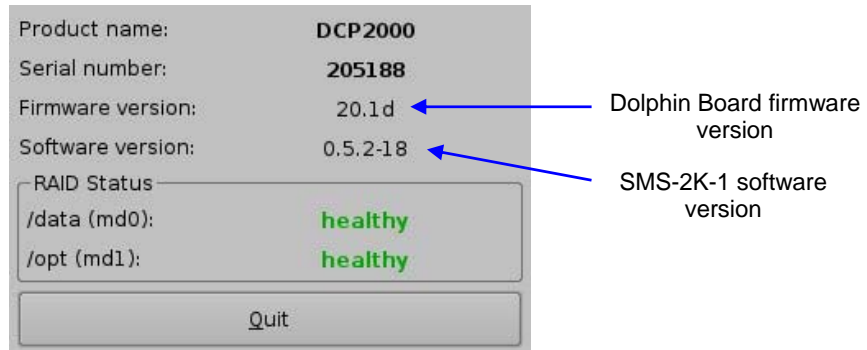
Figure 51: "About" Window – Software/Firmware Versions

10.2 Updating Firmware/Software via USB

If you are unsure about the current software/firmware revisions, contact DTS Digital Cinema Technical Support for information and downloading instructions. Once you have downloaded the update, it can be ingested through the Ingest GUI from a USB drive:

• Transfer the update file to a USB drive.

• Plug the drive into the SMS-2K-1.

• Then wait for the graphical user interface to appear on the screen as presented below:
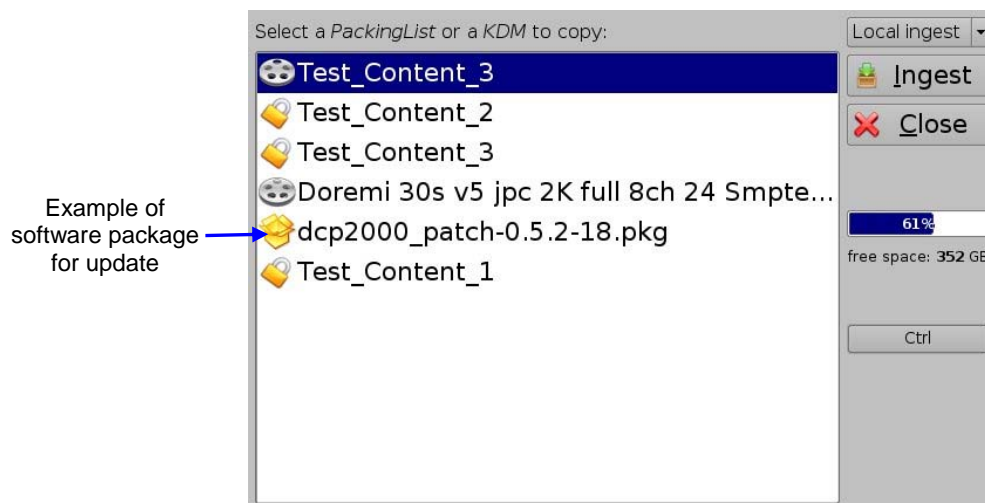
Figure 52: Graphical User Interface

_____

- Choose the update from the list of files displayed in the above GUI.

- Click on "Ingest". You will be asked for a password to be able to perform this operation:
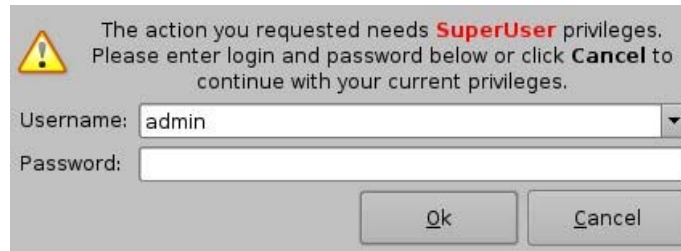
Figure 53: Authentication Window

- Enter the appropriate password and select "Ok".

- When the ingest is complete, reboot the SMS-2K-1 by going to "**Menu → Logout**", then click on "Reboot" – the update will not be applied without rebooting the unit.

11 SMS-2K-1 Linux Terminal Commands

The SMS-2K-1 uses the Linux operating system. Here are some basic instructions on how to navigate the Linux interface and access setup options to configure your system.

11.1 Linux Login & Terminal Window (Local Connection)

Connect a standard VGA monitor, keyboard, and mouse to the SMS-2K-1 and power up the unit.

*Note: For more information on how to connect peripheral hardware, please see sections **2** and **4**.*

After the SMS-2K-1 boots up at power ON, a login window comes up within the Linux GUI. To login, type the following:

> *login:* **root** <enter>
> *password:* **xxxxx** <enter>   *// consult your system administrator for the root password or DTS*
> *Digital Cinema to know the default root password.*

This is the default login name & password for the SMS-2K-1. ***Use this login for basic setup and configuration of the SMS-2K-1.*** To change the login password, see section **11.10**. If the password has already been changed, contact your system administrator for the new password.

Once you have logged in, you will see the Linux desktop. Next, open a *terminal* window. To do this, click the *terminal* icon on the taskbar or select "**Menu → System → Terminal**" from the Linux programs menu in the lower left corner of the GUI.

11.2 Linux Login & Terminal Window (Remote Connection)

To login to the SMS-2K-1 from a remote computer, you need to use "ssh" – a secured shell terminal.

11.2.1 Remote Login From a Linux PC

To login to the SMS-2K-1 remotely, you need to know the IP address of the SMS-2K-1 that you want to connect to.

From a Linux PC *terminal* command line,

> *type:* **ssh** *<SMS-2K-1 IP address>* <enter>

An example would be:

> *type:* **ssh 192.168.100.50** <enter>

This will bring up the login window on the remote SMS-2K-1. Login as follows:

> *login name:* **root** <enter>
> *password:* **xxxxx** <enter>   *// consult your system administrator to know the root password or*
> *DTS Digital Cinema to know the default root password*

You should now be connected to the selected SMS-2K-1 remotely.

11.2.2 Remote Login From a Windows PC

From a Windows PC, you need to install an ssh client in order to login remotely. An example ssh client is "PuTTY", a free ssh client that can be found on the internet. The connection and login process is similar to that described in section **11.2.1** for a Linux PC.

11.3 *Displaying the Dolphin Firmware/Software Version*

To display the SMS-2K-1 software and the Dolphin board firmware version of the SMS-2K-1, type the following command from a *terminal* command prompt:

>   *type: /* **oremi/bin/drminfo.out** <enter>

This command will print out the following info (specific to your machine):

```
| Doremi Labs, Inc.          |
+ – – – name        : DCP2000
Serial number      : 200027
Firmware version : 21.1v
Software version  : 0.5.2-26
```

11.4 *Generating Status Reports*

When a problem appears on the SMS-2K-1 (i.e. freezes, loses video or audio output, etc.), a report can be generated that gives detailed technical information on the nature of the problem. This file can be sent via emai lto Technical Support at DTS Digital Cinema to determine the reason for the problem and to address any fixes/updates that may be needed to resolve the issue.

To generate a status report, execute the following command from the *terminal* prompt after the problem occurs and before rebooting the server:

>   *type:* **sh /DTS Digital Cinema/sb   oremiort.sh** <enter>

This command will generate a report file in the **/DTS Digital Cinema/tm   oremi**er. You can then connect via FTP and bring this file in to send it (via email) to DTS Digital Cinema Technical Support for analysis.

To write the report file to a USB drive, do the following:

1) Plug in the USB drive, it will be automatically scanned and mounted in Read-Only mode. Assuming it has been mounted as "/dev/sdd1 mounted onto /media/usb0", follow the instructions below to remount it and write to it.

2) *type:* **umount /media/usb0/** <enter>   // this command will unmount the drive

3) *type:* **mount /dev/sdd1 /media/usb0/** <enter>   // this will mount the drive in read/write mode

4) *type:* **cp /DTS Digital Cinema/tm   oremieport_xxxx.tgz /media/usb0/** <enter> // this command will copy the report onto the USB drive.

5) *type:* **sync** <enter>   // this command will commit the copy to the drive

6) *type:* **umount /media/usb0/** <enter>   // this command will unmount the drive. The file is now on the USB drive.

11.5 Software/Firmware Upgrade

11.5.1   Sending the Software File to the SMS-2K-1

To send a new software update file to the SMS-2K-1, use an FTP client and login as follows:

- *type:* **ftp 192.168.100.50** <enter>   (enter the IP address of your SMS-2K-1)
- when prompted for a user name, *type:* **admin** <enter>
- when prompted for a password, *type:* **1234** <enter>
- *type:* **bin** <enter>
- *type:* **cd ./etc/rc.once** <enter>
- *type:* **put dcp2000_patch-0.5.2-26.pkg** <enter> (dcp2000_patch-0.5.2-18.pkg is the upgrade file that you received from DTS Digital Cinema)
- When the transfer is completed, *type:* **bye** <enter>

<u>*Note*</u>*:   These steps may vary depending on your FTP client and whether you are on a Linux or Windows PC. The login information, file names, and destination folder are the same in either case.*

11.5.2   Performing the Software Upgrade

To perform the upgrade of the SMS-2K-1 software, simply reboot the SMS-2K-1.

To do this, login as 'root' an' fro' the *terminal* command prompt, *type:* **reboot** <enter>.

Once the SMS-2K-1 has rebooted, login again, open the *terminal* command prompt and *type:* **halt** <enter>.

This will initiate the shutdown of the SMS-2K-1. After 20 seconds or so, the unit will shut off automatically. After the SMS-2K-1 has shutdown, power it ON again and login as you normally would. This will complete the software update.

11.5.3   Sending the Firmware File to the SMS-2K-1

To send a new firmware file to the DCP JPEG-2000 decoder, use an FTP client and login as follows:

- *type:* **ftp 192.168.100.50** <enter> (enter the IP address of your SMS-2K-1)
- when prompted for a user name, *type:* **admin** <enter>
- when prompted for a password, *type: use the admin password here* <enter>
- *type:* **bin** <enter>
- *type:* **cd ./etc/rc.once** <enter>
- *type:* **put fw-1.53.pkg** <enter>   (fw-1.53.pkg is the upgrade file that you received from DTS Digital Cinema)
- When the transfer is completed, *type:* **bye** <enter>

<u>*Note*</u>*:   These steps may vary depending on your FTP client and whether you are on a Linux or Windows PC. The login information, file names, and destination folder are the same in either case.*

11.5.4   Performing the Firmware Upgrade

To perform the upgrade of the Dolphin firmware, simply reboot the SMS-2K-1.

To do this, login as 'root' an' fro' a *terminal* command prompt, *type:* **reboot** <enter>.

After rebooting, you can check your firmware version from a *terminal* command prompt to verify the new software/firmware versions by repeating Section **11.3**.

11.6 Network Restarting

To restart networking from the *terminal* command line, do the following:

   type: **/etc/init.d/networking restart** <enter>

11.7 RAID

Two RAIDs are presents in the SMS-2K-1: "/dev/md0" which is mounted on "/data" and '/dev/md1" which is mounted on "/opt". The following paragraphs explain how to check the health of the RAID – see **11.7.1** – and how to reinit the RAID – see **11.7.2**.

11.7.1   RAID Failure Identification

To check the health of the RAID, just open a terminal, switch to "root" if you are not, and then execute the following command:

   type: **more /proc/mdstat** <enter>

On a healthy RAID, this command will print for example:

   Personalities : [raid5]
   md1 : active raid5 sda1[0] sdb1[1] sdc1[2]
       21125248 blocks level 5, 64k chunk, algorithm 2 [3/3] [UUU]

   md0 : active raid5 sda2[0] sdb2[1] sdc2[2]
       760291968 blocks level 5, 64k chunk, algorithm 2 [3/3] [UUU]

On a failed RAID, this command will print:

   Personalities : [raid5]
   md1 : active raid5 sdb1[1] sdc1[2]
       21125248 blocks level 5, 64k chunk, algorithm 2 [3/2] [_UU]

   md0 : active raid5 sdb2[1] sdc2[2]
       760291968 blocks level 5, 64k chunk, algorithm 2 [3/2] [_UU]

In the failed example above, the hard disk drive "/dev/sda" is failed. This failure could be the result of a hardware failure or it could simply be that the user inadvertently pulled the drive out.

11.7.2   RAID Reinit

To reinit the RAID, type the following command:

type: **sh /DTS Digital Cinema/sb   oreminit_raid.sh** <enter>

Caution: This process is a DESTRUCTIVE process and ALL DATA (FEATURES, TRAILERS, ETC…) ON THE HARD DRIVES WILL BE LOST.

11.8 Ingest from Ethernet (FTP Server)

11.8.1   Uploading Files to a Remote SMS-2K-1 via FTP

This section describes how to send package files from a local Linux machine to a networked SMS-2K-1 for ingest.

Open a *terminal* command prompt window and follow these steps:

type: **cd <foldername>/** <enter>

The descriptor *<foldername>* is the name of the folder that contains the package files that you want to send to the networked SMS-2K-1 for ingest.

An example would be:

type: **cd dcp_package/** <enter>

Here, the folder called **dcp_package** contains our source material to be sent to the SMS-2K-1 for ingest.

*Note: For this example, it will be assumed that the movie package is in a folder called **dcp_package**. In practice, the folder name can be whatever you choose.*

type: **ftp <ipaddress>** <enter>

The descriptor *<ipaddress>* is the IP address of the SMS-2K-1 to send the package files to.

An example would be:

type: **ftp 192.168.100.50** <enter>

You will then be prompted for a login name and password for the networked SMS-2K-1. Type the following at the command prompt:

name: **ingest** <enter>
password: **ingest** <enter>

This login will automatically put you into the **/data/incoming/** folder on the destination SMS-2K-1. This will bring you to the FTP command prompt: **ftp >**

From here, *type:*

ftp> prompt off	this command turns off prompting for each individual file to be copied.
ftp> mput *	this command 'puts' al' fil's from the source directory specified above (**dcp_package/**) into the **/data/incoming/** directory of the destination SMS-2K-1.

When completed, *type:* **bye** <enter> at the command prompt to quit the FTP session.

The SMS-2K-1 will then automatically scan the **/data/incoming/** directory and ingest the files contained in it.

11.9 Watermark Status

In order to check the actual SMS-2K-1 Watermark status, do the following:

> *type:* **cd /DTS Digital Cinema/et   oremi**<enter>
> *type:* **more watermark** <enter>

If the status is '1', it means that watermarking process is ON. If the status is '0', it means that the watermarking process is OFF.

The following commands also allow you to change the watermarking status:

> *type:* **echo 0 > watermark** <enter>   ## turn OFF the watermark process
> *type:* **echo 1 > watermark** <enter>   ## turn ON the watermark process

11.10 Changing the Linux Login Password

To change the SMS-2K-1 login password, open a *terminal* window and do the following:

type: **mount -o rw,remount /** <enter>		
type: **passwd root**	<enter>	(this changes the password for the login named 'root')
t'pe: '*your new password*	<enter>	(type the new password that you want)
retype: your new password	<enter>	(retype the new password)
type: **sync** <enter>		
type: **mount -o ro,remount /**	<enter>	

> **Caution**:   If you change the root password, please make sure to record the password in a secure place. If the password is lost, you will no longer be able to access the unit.

11.11 Changing the Linux Display Resolution

To set up the SMS-2K-1 display resolution for an external VGA or front panel server LCD screen, do the following:

- **External VGA:**

> *type:* **mount -o rw,remount /** <enter>   ## allows writing to FLASH card
> *type:* **cd /etc/X11/** <enter>
> *type:* **cp XF86Config-4.org XF86Config-4** <enter>

You will be prompted to overwrite the previous configuration.

Type: **y** <enter>

Then do the following:
type: **sync** <enter>
type: **mount -o ro,remount /** <enter>

Close X windows (GUI) and login again. You should now be at the new resolution.

- **SMS-2K-1 Front Panel LCD Screen:**

type: **mount -o rw,remount /** <enter>   ## allows writing to FLASH card
type: **cd /etc/X11/** <enter>
type: **cp XF86Config-4.640 XF86Config-4** <enter>

You will be prompted to overwrite the previous configuration.
type: **y** <enter>

Then do the following:
type: **sync** <enter>
type: **mount –o ro,remount /** <enter>

Close X (GUI) and login again. You should now be at the new resolution.

12 Troubleshooting

12.1 SMS-2K-1 BIOS Settings

In case the system does not complete the boot sequence upon powering up, the BIOS settings may have to be checked. Follow the procedure below to confirm the BIOS settings.

__Note__: The BIOS settings detailed here are for the SE7221 server motherboard.

To access the BIOS settings of the SMS-2K-1, press **F2** just after powering ON the unit.

This will bring up the **System Setup** screen in the **Main** menu. From here, set the system date and time if necessary.

Next, select the **Advanced** menu, enable AHCI mode, scroll down to **IDE Configuration** and press <enter>. Verify that the drives are present on Primary IDE Master, Primary IDE Slave, Secondary IDE Master, Third IDE Master.

Go to Third IDE Master and press <enter>.

Verify that the Third IDE Master says:

Vendor   PQI IDE DiskOnModule   (This is the boot device for the SMS-2K-1. It is a
                                            flash drive)

Next, press ESC and select the **Boot** menu. Press <enter> and select the **Hard Disk Drive**.

The following info should appear – this is the boot drive order:

1st Drive [3M-PQI IDE Dis]
2nd Drive [PM-Hitachi HDT]
3rd Drive [PS-Hitachi HDT]
4th Drive [SM-Hitachi HDT]

Next, press ESC and go to the **Boot Device Priority**. Set the flash drive to be the first boot device.

Next, select the **Exit** menu. Press <enter> for **Exit Saving Changes**. At the prompt, press 'OK' <ent'r>'

The SMS-2K-1 will now continue the boot process with the new BIOS settings.

12.2 Server LCD Screen Maintenance

When the server LCD screen needs recalibration, this section provides the required steps to follow.

12.2.1 "Root" Logging

In order to perform the screen recalibration, you have to be logged in as "root" as presented in the procedure below:

1. Go to the "**Menu ➔ System**" menu of the SMS-2K-1 and select "**Terminal**" in order to launch a terminal window.

2. In the terminal window, do the following:

    type: **su**   <enter>

    Then use the root password - *Consult–your system administrator to know the root password or DTS Digital Cinema to know the default root password*.

12.2.2 Server LCD Screen Calibration

Verify that you can use the stylus on the server LCD screen as a mouse – make sure that the server LCD screen VGA connector is linked to the motherboard VGA connector as presented in **4.1**.

Then go to "**Menu ➔ System ➔ Touchscreen Calibration**".

Using the pen located on the left side of the server LCD screen, press on the four blinking dots one after the other as shown below – there is one dot in each screen corner:
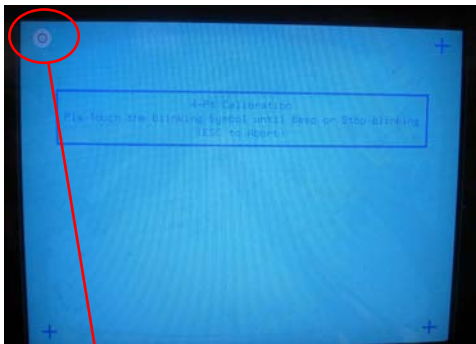
First blinking dot
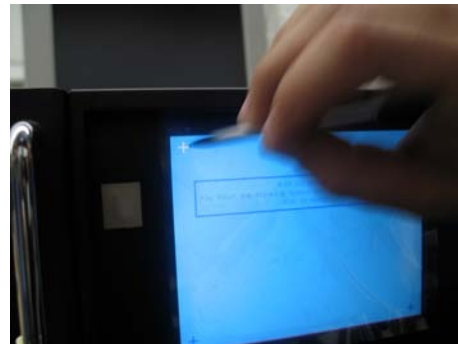
(a)   (b)

Figure 54: Server LCD Screen Calibration

13 Appendix A: General Purpose Output Connection Diagram

GPIO Male Connector

GPIO Cable Female Connector

GPO 7 — Pin 1 (Pin 17)

GPO 6 — Pin 14 (Pin C5/C6)

GPO 6 — Pin 2 (Pin 18)

GPO 5 — Pin 15 (Pin 9)

GPO 4 — Pin 3 (Pin 19)

GPO 4 — Pin 16 (Pin 10)

GPO 3 — Pin 4 (Pin 1)

GPO 2 — Pin 17 (Pin 11)

GPO 2 — Pin 5 (Pin 2)

GPO 1 — Pin 18 (Pin 20)

GPO 0 — Pin 6 (Pin 3)

GPO 0 — Pin 19 (Pin 21)

Common Ground

...

DCP-2000

Pin 1 (Pin 17) — GPO 7
Pin 14 (Pin C5/C6) — GND
— GND
Pin 2 (Pin 18) — GPO 6
Pin 15 (Pin 9) — GPO 5
Pin 3 (Pin 19) — GND
— GND
Pin 16 (Pin 10) — GPO 4
Pin 4 (Pin 1) — GPO 3
Pin 17 (Pin 11) — GND
— GND
Pin 5 (Pin 2) — GPO 2
Pin 18 (Pin 20) — GPO 1
Pin 6 (Pin 3) — GND
— GND
Pin 19 (Pin 21) — GPO 0

GPO 7
GPO 6
GPO 5
GPO 4
GPO 3
GPO 2
GPO 1
GPO 0

...

GPIO Cable

Typical Application

+5V up to +24V

GPO 0

DCP-2000

Each general purpose output has an open collector stage. The stage can turn on relays with voltage range of +5V to +24V, and current up to 200 mA.

In the schema on the left, the upper GPIO connector pin numbers provided correspond to the Dolphin Rev B based unit, and the pin numbers of the Dophin DCI based units are provided between bracket (in blue):

Pin x: Pin number x for Dolphin Rev B based units
(GPIO connector is a DB25 connector)

(Pin y): Pin number y for Dolphin DCI based units
(GPIO connector is a DVI-M connector)

DCP-2000 General Purpose Output Connection Diagram

14 Appendix B: General Purpose Input Connection Diagram

GPIO Male Connector

GPIO Cable Female Connector

DCP-2000 General Purpose Input Connection Diagram
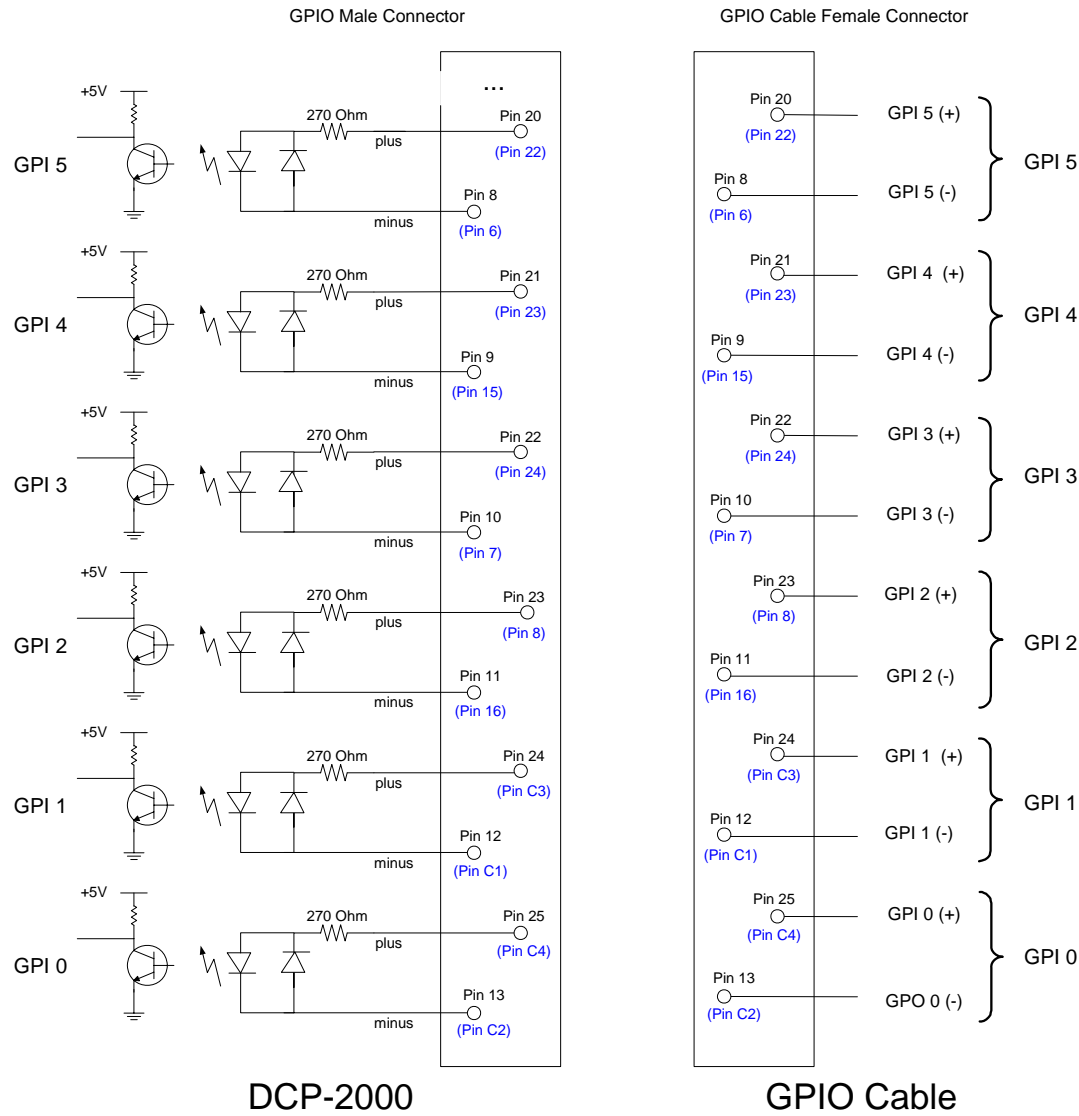
Pin x: Pin number x for Dolphin Rev B based units (DB25 connector)
(Pin y): Pin number y for Dolphin DCI based units (DVI-M connetor)
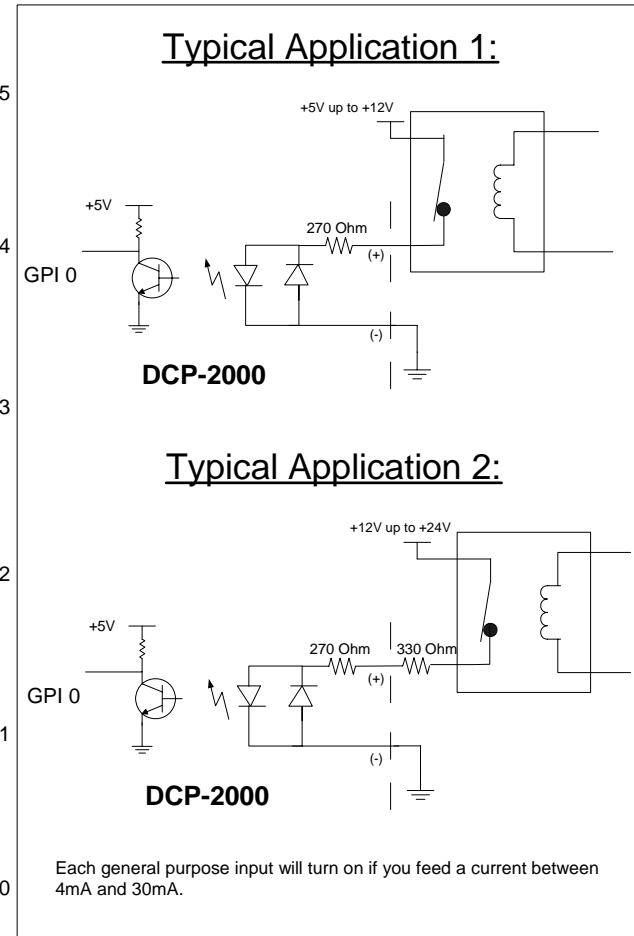
15 Appendix C: XML Structure Used by Macro Editor

The Macro Automation Cues and Trigger Cues generated using the Macro Editor GUI presented in this document (see section **7**) are saved using one single XML file according to the structure presented in this appendix.

15.1 *AutomationCueMacroList Sample*

An example of such resulting XML file is provided below. Each Macro Automation Cue (created according to **7.2.1**) is saved in one "`AutomationCueMacro`" element and each Trigger Cue (created according to **7.3.1**) is saved in one "`TriggerCue`" element.

```
<?xml version="1.0"?>
<AutomationCueMacroList>
   <IssueDate>2007-01-31T10:25:11-08:00</IssueDate>
   <Issuer>DTS Digital Cinema</Issuer>
   <Creator>CineLister Macro Editor v0.4</Creator>
   <AnnotationText>Generated by Doremi Labs Macro Editor version 0.4</AnnotationText>
   <AutomationCueMacro>
       <Name>FEATURE_START_FLAT</Name>
       <Id>urn:uuid:f9bd304e-8c81-4a62-8de5-0805fd91f160</Id>
       <AnnotationText>start a FLAT feature</AnnotationText>
       <CommandList>
          <Command>
             <Type>GPO</Type>
             <Line>1</Line>
             <Value>2</Value>
             <PulseDelay>500</PulseDelay>
          </Command>
          <Command>
              <Type>GPO</Type>
              <Line>4</Line>
              <Value>2</Value>
              <PulseDelay>500</PulseDelay>
          </Command>
       </CommandList>
   </AutomationCueMacro>
   <AutomationCueMacro>
       <Name>FEATURE_START_SCOPE</Name>
       <Id>urn:uuid:3922e0c2-84af-407a-9cde-edd8f551af94</Id>
       <AnnotationText>start a SCOPE feature</AnnotationText>
       <CommandList>
          <Command>
             <Type>GPO</Type>
             <Line>2</Line>
             <Value>2</Value>
             <PulseDelay>500</PulseDelay>
          </Command>
          <Command>
             <Type>GPO</Type>
             <Line>4</Line>
             <Value>2</Value>
```

```
            <PulseDelay>500</PulseDelay>
        </Command>
    </CommandList>
</AutomationCueMacro>
<TriggerCue>
    <Name>Trigger_1</Name>
    <Id>urn:uuid:ada0f7e7-172a-4490-a48f-365349946b22</Id>
    <CueType>GPI</CueType>
    <CueTypeParameters>
        <Line>2</Line>
        <Value>1</Value>
    </CueTypeParameters>
</TriggerCue>
<TriggerCue>
    <Name>Trigger_2</Name>
    <Id>urn:uuid:807f29ee-40bc-4f54-810a-3c6f73209a95</Id>
    <CueType>GPI</CueType>
    <CueTypeParameters>
        <Line>7</Line>
        <Value>0</Value>
    </CueTypeParameters>
</TriggerCue>
</AutomationCueMacroList>
```

15.2 AutomationCueMacroList Structure

The `AutomationCueMacroList` element is illustrated in **Figure 55** and the individual elements that comprise the `AutomationCueMacroList` element are defined in the remaining subsections.
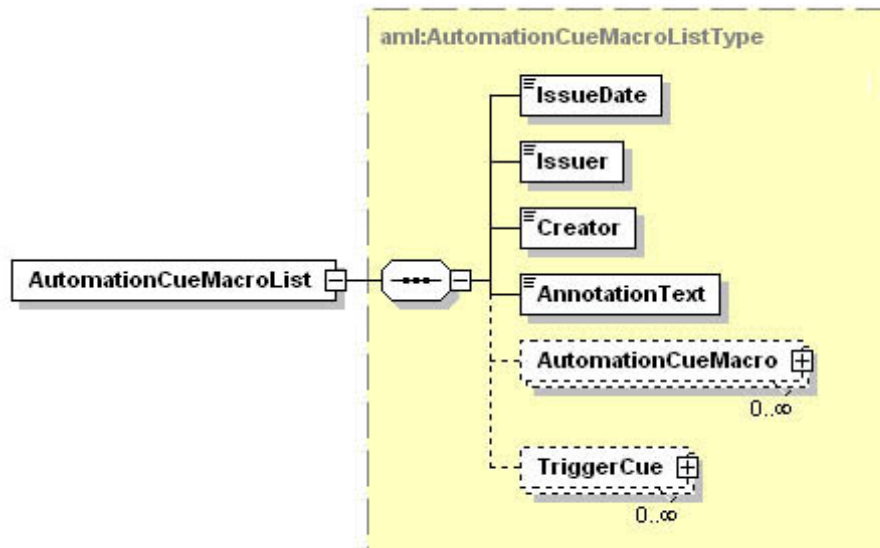
Figure 55: AutomationCueMacroList Structure.
Dotted lines denote optional elements that can be omitted during the creation based on Macro Editor.

15.2.1   IssueDate Node

The `IssueDate` node is used to define the time and date at which the AutomationCueMacroList XML file was issued. It is meant for display to the user.

15.2.2   Issuer Node

The `Issuer` node contains a free-form human-readable annotation that identifies the entity that created the AutomationCueMacroList XML file. It is meant for display to the user. The default value generated by the Macro Editor GUI is "Doremi Cinema LLC".

15.2.3   Creator Node

The `Creator` node contains a free-form human-readable annotation that identifies the application used to create the AutomationCueMacroList XML file. It is meant for display to the user.

The default value generated by the Macro Editor GUI is "CineLister Macro Editor vx.y", where x.y corresponds to the Macro Editor application version number used to create the file.

15.2.4   AnnotationText Node

The `AnnotationText` element is a free-form human-readable annotation describing the AutomationCueMacroList XML file. It is meant as a display hint to the user.

The default value generated by the Macro Editor GUI is "Generated by Doremi Labs Macro Editor version x.y", where x.y corresponds to the Macro Editor application version number used to create the file.

15.2.5   AutomationCueMacro Nodes

Each `AutomationCueMacro` element contains all the parameters associated to one Macro Cue defined using the Macro Editor GUI presented in the previous sections.

An `AutomationCueMacro` element contains the subnodes presented in the paragraphs below.
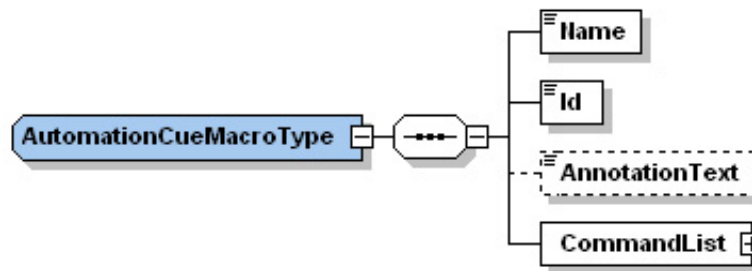
Figure 56: AutomationCueMacro Structure.
Dotted lines denote optional elements that can be omitted during the creation based on Macro Editor.

15.2.5.1 Name Node

The `Name` element is a human-readable annotation corresponding to the name given to this Macro Cue when it was created. It is the name chosen by the user in **7.2.1** for the field "Name of the Macro".

15.2.5.2 Id Node

The `Id` element uniquely identifies the AutomationCueMacro for asset management purposes. It is encoded as a urn:uuid per [RFC 4122].

15.2.5.3 AnnotationText Node [optional]

This `AnnotationText` element is a human-readable annotation corresponding to the comment assigned to this Macro Cue when it was created. It is the name chosen by the user in **7.2.1** for the field "Comments".

15.2.5.4 CommandList Node

The `CommandList` element contains a list of zero, one or more `Command` elements. Each `Command` element corresponds to the set of parameters describing one automation individual command composing the Macro Automation Cue.

An empty `CommandList` can be used to generate an Automation Cue Macro executing no command. It will just be used to maintain portability between theaters.

15.2.6   Command Node [optional]

A `Command` node contains the parameters associated to a specific command to be used as part of the overall `AutomationCueMacro` element. These parameters depend on the type of command defined by the Type node below.
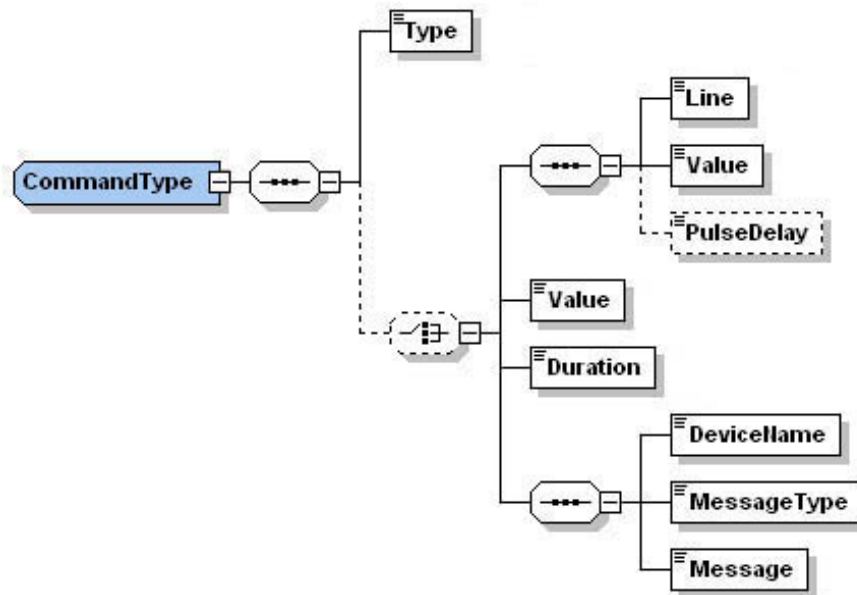
Figure 57: Command Structure.
Dotted lines denote optional elements that can be omitted during the creation based on Macro Editor.

15.2.6.1 Type Sub-Node

The available types of commands are listed below:

Table 1: Command Types Available

Type	Description
Black	Black video and silent audio signals will be generated by the server
GPO	A GPO will be sent by the server
Dowser	The command concerns the projector dowser
Lamp	The command concerns the projector lamp
Channel	The command concerns the projector channel
Play	The command will put the server in play mode
Pause	The command will put the server in pause mode
TogglePlayPause	The command will put the server in TogglePlayPause mode
VideoOutputMode	The command will set the video output mode
ProjectorMacro	The command will specify a DLP projector macro
DeviceRawSendMessage	The command will send a message to a device
PurgePendingMacro	The command will purge pending macros

Note: In case the command type is Play, Pause, TogglePlayPause or PurgePendingMacro, no additional parameters are required within the `Command` element.

15.2.6.2 Duration Sub-Node [optional]

The `Duration` element has only to be used for the "Black" command type. It specifies the duration – as a number of seconds - of the –ssociated black video and silent audio output.

15.2.6.3 Line Sub-Node [optional]

The `Line` element has only to be used for the "GPO" command type. It specifies the GPO line number to be used for the associated command. It contains an integer to be chosen between 0 and 7.

15.2.6.4 Value Sub-Node [optional]

The `Value` element has only to be used for "GPO", "Dowser", "Lamp", "Channel", "VideoOutputMode" and "ProjectorMacro" command types.

When used for the "GPO" command, it has to be the `Value` element grouped with the `Line` and optional `PulseDelay` elements sequence. When used for the "Dowser", "Lamp", Channel", "VideoOutputMode" or "ProjectorMacro" commands, it has to be the standalone `Value` element defined at the same level as the `Duration` element in the schema – see **Figure 57**.

The format of this `Value` element also depends on the kind of command type. The table below presents the usage of such elements for each command type:

Table 2: Value Formats

Type	Associated Value Format Description
GPO	Possible values: - 0: means GPO OFF - 1: means GPO ON - 2: means GPO Pulse mode
Dowser	Possible values: - 0: means Dowser OFF - 1: means Dowser ON
Lamp	Possible values: - 0: means Lamp OFF - 1: means Lamp ON
Channel	The Value element is an integer chosen between 0 and 16. This integer indicates to which projector channel to switch.
VideoOutputMode	Possible values: - DolphinIorConversionDefault: default video output mode - - DolphinColorConversion444to422: video output mode allowing playback of the corresponding 24fps Package at 48fps.
ProjectorMacro	The value indicates the concerned projector macro name

15.2.6.5 PulseDelay Sub-Node [optional]

The `PulseDelay` element has only to be present for the "GPO" command when the associated value is set to 2 (Pulse Mode) – see **Table 2** above. Its value is the duration, in milliseconds, during which the associated GPO will remain ON level before going to OFF.

15.2.6.6 DeviceName Sub-Node [optional]

The `DeviceName` element has only to be present for the "DeviceRawSendMessage" command. It will contain the name of the device to which the message has to be sent.

### 15.2.6.7 MessageType Sub-Node [optional]

The `MessageType` element has only to be present for the "DeviceRawSendMessage" command. It will define the type of the message (e.g. text, binary).

15.2.6.8 Message Sub-Node [optional]

The `Message` element has only to be present for the "DeviceRawSendMessage" command. It contains the actual message to be sent to the device.

15.2.7   TriggerCue Node [optional]

Each `TriggerCue` element corresponds to all the parameters defining a `TriggerCue`. These parameters are recorded in the sub-nodes presented in the following paragraphs.
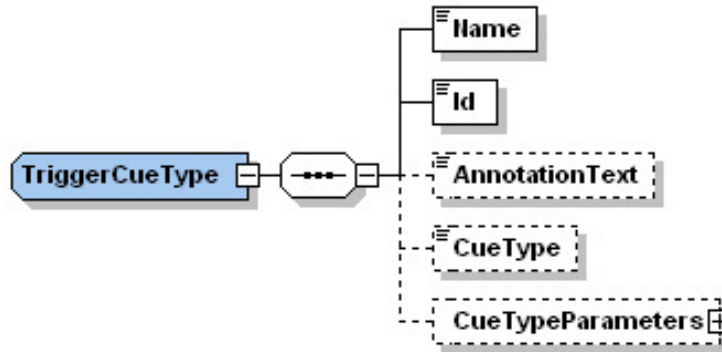
Figure 58: TriggerCue Structure.
Dotted lines denote optional elements that can be omitted during the creation based on Macro Editor.

Several `TriggerCue` elements can be generated. They just have to be put back to back at this XML level (see **Figure 55**).

A `TriggerCue` node without `CueType` and `CueParameter` element can be used to generate a Trigger Cue executing no command. It will just be used to maintain portability between theaters. In such a case, the only required sub-elements are the `Name` and the `Id` element below.

15.2.7.1 Name Node

The `Name` element is a human-readable annotation corresponding to the name given to this `TriggerCue` when it was created. It is the name chosen by the user in **Figure 35** for the field "Name of the Trigger".

15.2.7.2 Id Node

The `Id` element uniquely identifies the `TriggerCue` for asset management purposes. It is encoded as a urn:uuid per [RFC 4122].

15.2.7.3 AnnotationText Node [optional]

This `AnnotationText` element is a human-readable annotation corresponding to the comment assigned to this `TriggerCue` when it was created. It is the name chosen by the user in **Figure 35** for the field "Comments".

15.2.7.4 CueType Node [optional]

The `CueType` element corresponds to the type of Cue used by the `TriggerCue`. The available Cue Types are listed in the table below:

Table 3: Cue Types Available

Type	Description
GPI	Allows assignment of a GPI line and value to the Trigger
Signal	Allows assignment of another signal to the Trigger

15.2.7.5 CueTypeParameters [optional]

The `CueTypeParameters` element contains the parameters associated to the Cue type defined in the `CueType` element.
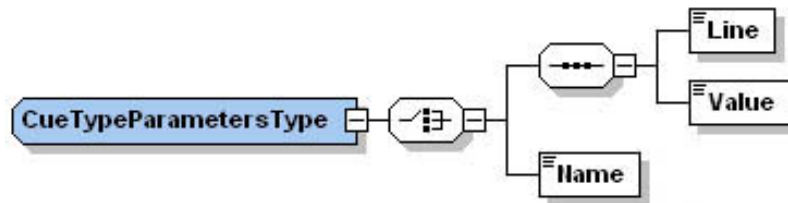
Figure 59: TriggerCue Structure.
Dotted lines denote optional elements that can be omitted during the creation based on the Macro Editor.

- For <u>GPI Cue Type</u>, the two following parameters have to be used: `Line` and `Value`.

  The `Line` element specifies the GPI line number to be used for the associated command. It contains an integer to be chosen between 0 and 7.

  The `Value` element indicates the state of the GPI: ON (Value = 1) or OFF (Value = 2).

- For <u>Signal Cue Type</u>, the following parameter has to be used: `Name`.

  The `Name` element specifies the signal name.

15.3 Schema

The XML Schema document presented in this paragraph defines the structure of a Macro Automation Cue List using a machine-readable language. While this schema is intended to faithfully represent the structure presented in the prose portions (see paragraph **15.2**) of this document, conflicts in definition may occur. In the event of such a conflict, the prose shall be the authoritative expression of the structure.

```
<?xml version="1.0"?>
<"s:s"hema targetNamespace="http://w"w.doremilabs.com/schemas/xxx/AML"
      "     xmlns:aml="http://w"w.doremilabs.com/schemas/xxx/AML"
      "     xmlns:ds="http://w"w.w3.org/2000/09/xmldsig#"
      "     xmlns:xs="http://w"w.w3.org/2001/XMLSchema"
      "     elementFormDefault="qualifie"" attribu"eFormDefault="unqualif"ed">
  <xs:i"port namespace="http://w"w.w3.org/XML/1998/namespace"
                          schemaL"cation="http://w"w.w3.org/2001/03/xml.xsd"/>


 <"-- Automa—nCueMacroList -->
  <xs:element name="Automati"nCueMacroList" type="a"l:Auto"ationCueMacroListType"/>
  <xs:"omplexType name="Automati"nCueMacroListType">
    <xs:"equence>
      <xs:element name="IssueDat"" type="x":dateT"me"/>
      <x":element name="Issuer" "ype="a"l:User"ext"/>
      <x":element name="Creator""type="a"l:User"ext"/>
      <x":element name="Annotati"nText" type="a"l:User"ext"/>
      <x":element name="Automati"nCueMacro" type="a"l:Auto"ationCueMacroType" minOccurs="0"
                    maxOc"u"s="unbounde""/>
      <x":element name="TriggerC"e" type="a"l:Trig"erCueType" minOccurs="0"
                    maxOc"u"s="unbounde""/>
    </x":sequence>
  </xs:complexType>


  <!-- Automa—nCueMacro -->
  <xs:complexType name="Automati"nCueMacroType">
    <xs:"equence>
      <xs:element name="Name" ty"e="a"l:User"ext"/>
      <x":element name="Id" type""a"l:UUID"/>
      <x":element name="Annotati"nText" type="a"l:User"ext" minOccu"s="0"/>
      "x":element name="CommandL"st">
        <x":complexType>
          <xs:sequence>
            <xs:element name="Command""type="a"l:Comm"ndType" minOccu"s="0"
                      maxOc"u"s="unbounde""/>
          "/xs:sequence>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>


  <!-- Trigge—e -->
  <xs:complexType name="TriggerC"eType">
    <xs:"equence>
      <xs:element name="Name" ty"e="a"l:User"ext"/>
      <x":element name="Id" type""a"l:UUID"/>
      <x":element name="Annotati"nText" type="a"l:User"ext" minOccu"s="0"/>
      "x":element name="CueType""type="a"l:User"ext" minOccu"s="0"/>
      "x":element name="CueTypeP"rameters" type="a"l:CueT"peParametersType" minOccu"s="0"/>
    <"x":sequence>
  </xs:complexType>
```

```
    <!-- CueTyp—rameters -->
    <xs:complexType name="CueTypeP"rametersType">
       <xs:"hoice>
          <xs:sequence>
             <xs:element name="Line" ty"e="x":long"">
             <"s:element name="Value" t"pe="a"l:User"ext"/>
          </xs:sequence>
          <xs:element name="Name" ty"e="a"l:User"ext"/>
       </x":choice>
    </xs:complexType>


    <!-- Comman—->
    <xs:complexType name="CommandT"pe">
       <xs:"equence>
          <xs:element name="Type" ty"e="a"l:User"ext"/>
          <x":choice minOccurs="0">
             "x":sequence>
                <xs:element name="Line" ty"e="x":long"">
                "xs:element name="Value" t"pe="a"l:User"ext"/>
                "xs:element name="PulseDel"y" type="a"l:User"ext" minOccu"s="0"/>
             "<"xs:sequence>
                <xs:element name="Value" t"pe="a"l:User"ext"/>
                <"s:element name="Duration" type="x":long"">
                <"s:sequence>
                   <xs:element name="DeviceNa"e" type="a"l:User"ext"/>
                   "xs:element name="MessageT"pe" type="a"l:User"ext"/>
                   "xs:element name="Message""type="a"l:User"ext"/>
                <"xs:sequence>
             </xs:choice>
          </xs:sequence>
    </xs:complexType>


    <!-- UUID -—<xs:simpleType name="UUID">
    "<xs:"estriction base="xs:anyUR"">
          <xs"pattern value="urn:uuid"[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-
                              [0-9a-fA-F]{12}"/>
       </x":restriction>
    </xs:simpleType>


    <!-- UserTe—-->
    <xs:complexType name="UserText">
       <xs:"impleContent>
          <xs:extension base="xs:strin"">
             <x":attribute name="language" type="x":langu"ge" use="op"ional" default""en"/>
       "<"s:extension>
       </xs:simpleContent>
    </xs:complexType>
</xs:schema>
```
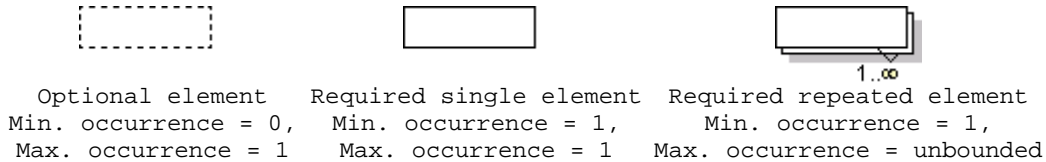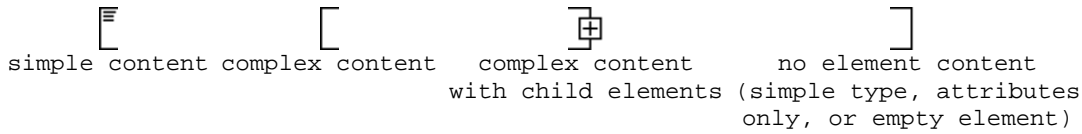
15.4 XML Diagram Legend

The following provides a legend for notation used in diagrams depicting XML structures.

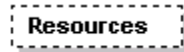## 15.4.1   Element symbols

In the schema design diagrams presented above in this document, only the elements are drawn. Attributes are not visible. The cardinality of the element (0..1, 1 exactly, 0..n, 1..n) is indicated by the border of the elements. Optional elements are drawn with a dashed line, required elements with a solid line. A maximum occurrence greater one is indicated by a double border.

Optional element   Required single element   Required repeated element
Min. occurrence = 0,   Min. occurrence = 1,   Min. occurrence = 1,
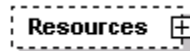Max. occurrence = 1   Max. occurrence = 1   Max. occurrence = unbounded

The content model of elements is symbolized on the left and right side of the element boxes. The left side indicates whether the element contains a simple type (text, numbers, dates, etc.) or a complex type (further elements). The right side of the element symbol indicates whether it contains child elements or not:

simple content   complex content   complex content   no element content
                            with child elements (simple type, attributes
                                         only, or empty element)

15.4.1.1 Examples

Optional single element without child elements. Minimum Occurrence = 0, Maximum Occurrence = 1, content = complex.

As above, but with child elements. The "plus" at"the "ight side indicates the presence of one or more undisplayed child elements.

Mandatory single element. Minimum Occurrence = 1, Maximum Occurrence = 1, content = complex, no child elements (i.e. this denotes an empty element). The gray or green text below the element displays the xml-schema annotation associated with the element.
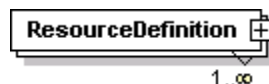
Mandatory multiple element containing child elements (content = complex). This element must occur at least once (Minimum Occurrence = 1) and may occur as often as desired (Maximum Occurrence = unbounded).

Mandatory single element with containing simple content (e.g. text) or mixed complex content (e.g. text with xhtml markup). Minimum Occurrence = 1, Maximum Occurrence = 1, type = xsd:string (for example), content = simple. The three lines in the upper left corner are used for both text and numeric content.

15.4.2   Model symbols ("composit"rs")

A sequ"nce of elements. The elements must appear exactly in the sequence in which they appear in the schema diagram.

A choice of elements. Only a single element from those in the choice may appear at this position.
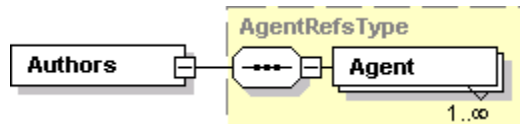

The "all" mod"l, "n which the sequence of elements is not fixed.


15.5 Types

If an element refers to a complex global type, the type is shown with a border and yellow background. You can click on the gray type name shown at the top to jump to the type definition itself.
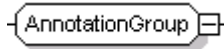

Depending on the settings in xml spy when generating the schema diagrams, the type name may be shown in the line below the element name:
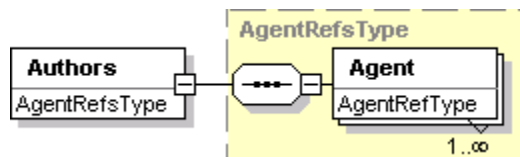
In that case, the type names of simple types are shown as well:
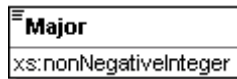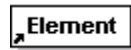
15.6 Model groups and references

An *element group* is a named container with one or several elements. The group of elements can be reused at multiple places in the schema. Model groups are invisible in the instance document (in contrast to types, which require). Model groups have been used sparingly since they do not map to a feature in object-oriented programming languages (unless they support multiple inheritance).

Import note on reading the diagrams for model groups: If the model group symbol is drawn with simple lines (i.e. not dashed), this does not imply that the elements in the model group are required. The optionality of the group depends on the optionality of elements contained in the model group. (Model groups can be made optional, e.g. to make a model group with required elements optional in some cases, but this has not been used.)
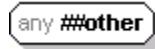
The *"any"* gro"p is a special kind of model group. It is a placeholder for elements not defined in the schema. The "any" element defines points where the schema can be extended. After the "Any" keyword, the namespace from which the elements may come is defined. For example, "##other" specifies that the extension elements may come from any namespace, except from the current schema namespace.

Element references are indicated through a link arrow in the lower left corner. They are similar to references to model groups within a schema, but instead of refining the model group, they directly refer to a single global element. The global element can then be reused in multiple places.

DTS P/N:9301H29700V1.0

16 Acronyms

Term	Definition
FPS	Frames Per Second
GPI	General Purpose Input
GPO	General Purpose Output
HDD	Hard Disk Drive
KDM	Key Delivery Message
LCD	Liquid Crystal Display
LED	Light Emitting Diode
RAID	Redundant Array of independent Disks
SDI	Serial Digital Interface
SPL	Show Play List
VGA	Video Graphics Array