

**Software Version**  
**600-Series**



**TiMax SoundHub**  
**User Manual**

# EVOLUTIONARY IMMERSIVE AUDIO AND SHOWCONTROL

*hear the sound not the system*

*ultraspatial audio*

*total control | total immersion*



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# What is TiMax

The combination of a versatile object-based spatial audio processor, integrated showcontrol and audio playback makes the award-winning TiMax SoundHub truly a show-in-a-box solution, with unparalleled functionality for a single self contained unit.

Individual or multiple TiMax units will sit and run shows or immersive installations without any computers attached, day after day and even start up automatically after powering off overnight and back on next day.

TiMax employs unique delay matrix Image Definitions which map a stage or space with multiple spatial reference points, artifact free real time delay morphing algorithms interpolate seamlessly between them for static or moving input objects.

TiMax can calculate these Image Definitions based on the spatial relationships between action areas and speaker positions, applying user adjustable adaptive level shading and over delay parameters to optimise the spatial rendering.

Image Definitions can also be manually set up or fine tuned to taste, and the intuitive task based Mac and PC software makes for a rapid and straightforward workflow.

This means TiMax automatically tailors immersive spatialisation to the relative positions of stage, loudspeakers and audience. And it does this equally well for any size and shape of stage or audience, employing untypically minimal and flexible speaker system configurations from virtually any brand or type. All while giving you full visibility and agency over every spatial audio parameter, to readily meet extreme sound design challenges or especially creative demands.

**Every attempt has been made to make the control of TiMax as obvious and intuitive as possible, if you need help, select Activate Detailed Onscreen Help from the Help Menu which will give you information on any controls you subsequently click on.**

# Quick Start

Versions of TiMax software are available for Mac and PC operating systems. To run the software simply copy the software folder onto your computer hard disk and launch the program by double clicking on the executable. There is no other installation or configuration required. The PC executable should be run from inside the folder containing the necessary dll files.

Connect your Mac or PC to the unit. The communication between the TiMax unit and the controller uses UDP Internet Protocol (IP) which can be wired or wireless. Connect a CAT5 cable from the computer to the unit directly or connect a wireless access point to the CAT5 connector on the unit and control your TiMax via a wireless link. The default setup for TiMax is for network IP addresses to be assigned by DHCP, your computer TCP/IP Properties should be set to "Obtain an IP address automatically". If no DHCP server is running on your network TiMax will self assign an IP address in the 169.254.xxx.xxx range and the computer should do the same.

There is also a fixed IP option.

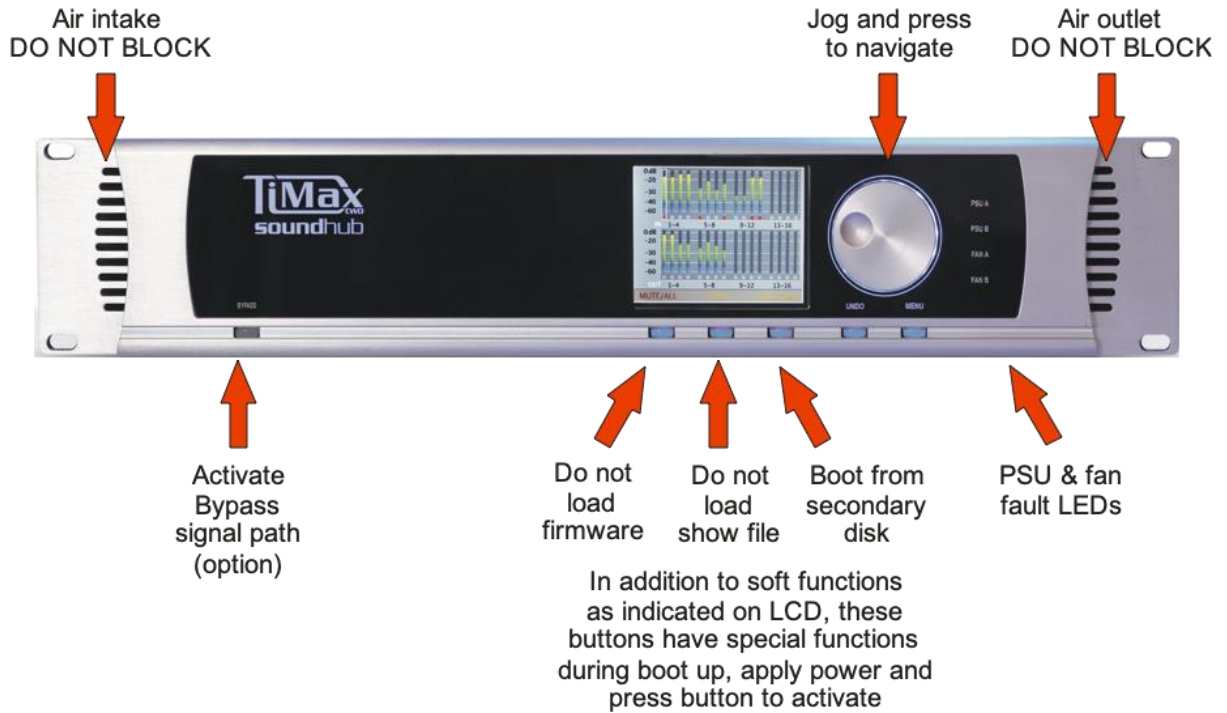
Launch the TiMax software and it will find the TiMax unit and connect automatically. If you see the green indicator on the Scan button flashing and the TiMax unit name or serial number appear in the top right hand corner of the screen then you are connected and able to control the unit.

Audio connection to the unit depends on the hardware configuration if the TiMax, analogue and AES3 digital inputs and outputs are presented on D-Sub connectors wired to the Tascam standard, multi-channel audio interfaces available including MADI and Dante.

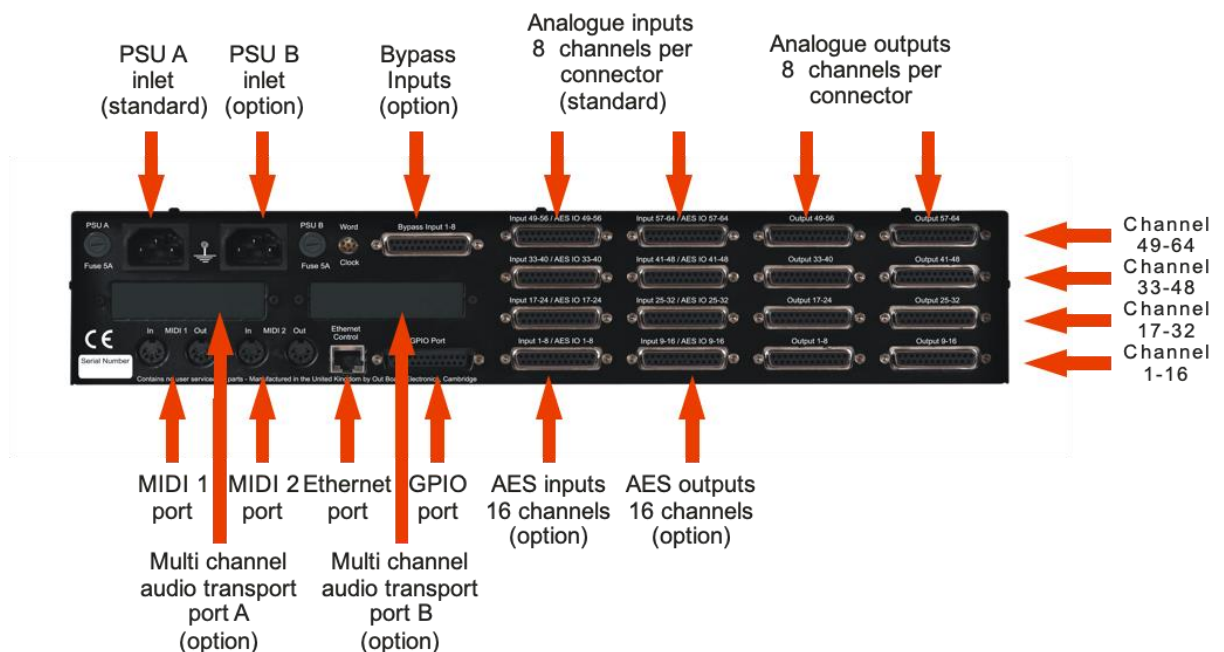
To create a signal path, open an input fader, route the signal to the desired outputs using the matrix faders and open the output faders.

# Hardware

TiMax is housed in a 2 unit high 19" rack mount case. Front panel menu and jog wheel controls allow the operator to select a show, recall presets, mute inputs and outputs, set group fader levels, assign DHCP or Static IP and view system Info.



Rear panel I/O and control ports are shown for a fully loaded 64 x 64 matrix system below. **Probably want to stripe in a more recent photo**





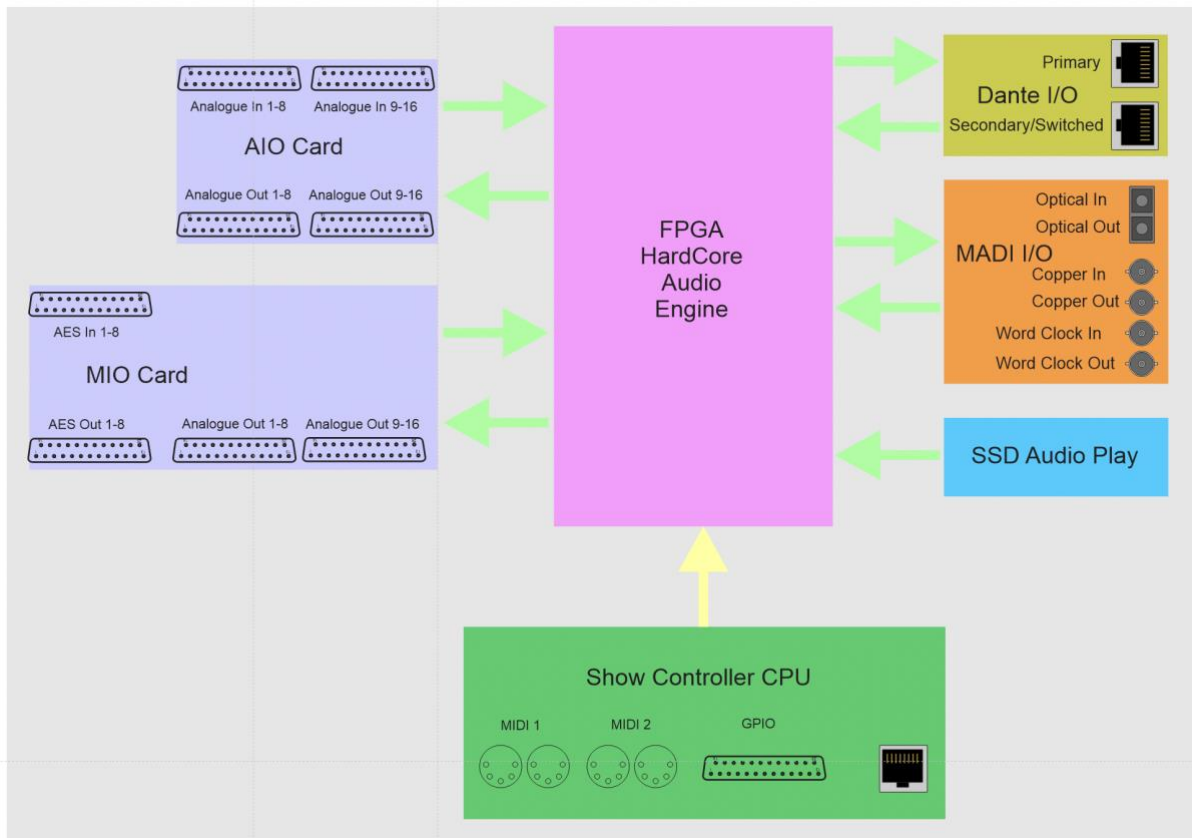
# System Block Diagram

The TiMax hardware platform will support:

- One 64 channel **Dante64** or **MADI64** interface (either / or, not both) fitted as standard

and, any combination of up to 4 discrete 16 channel I/O cards

- **AIO** (Analogue I/O)
- **MIO** (Mixed I/O with AES3 I/O & Analogue O)



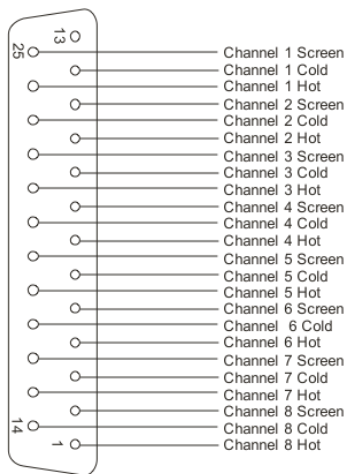
# Audio Inputs & Outputs

TiMax SoundHub can support any combination of 16 channel AIO and MIO cards for discrete audio connection as well as Dante and MADl for Multichannel transport.

## Analogue I/O interface (AIO Cards)

The following is the D-Sub 25-Pin configuration. This pinout is equivalent to Yamaha/Tascam/Digidesign standard analogue DB25>XLR cables.

Analogue input and output connectors on the TiMax are female and in groups of 8 balanced circuits. D-Sub line connectors are male for both input and output.

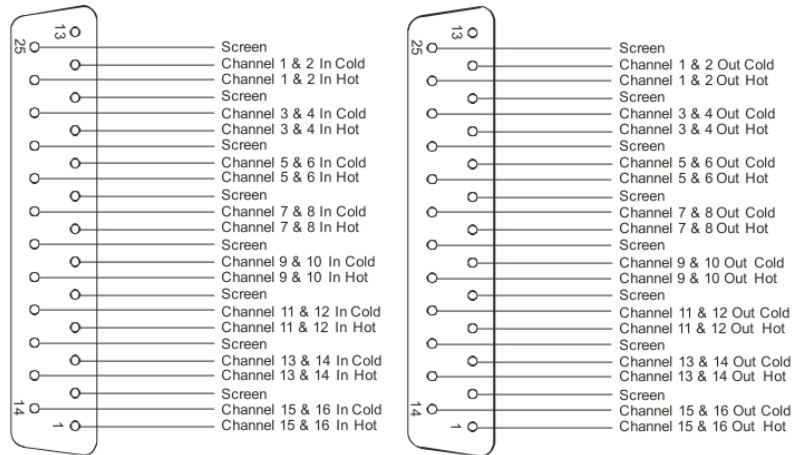


Analogue Audio Input & Output Connection

### AES3 Digital I/O plus Analogue Output interface (MIO Cards)

Each chassis female D-Sub carries 16 channels of input **or** output (8 stereo pairs) arranged in accordance with the **analogue** pin-out standard. This pinout is equivalent to Yamaha/Tascam/Digidesign standard **analogue** DB25>XLR cables.

TiMax D-Sub I/O Pinout  
(Custom Out Board for AES/EBU that works with analogue cables)

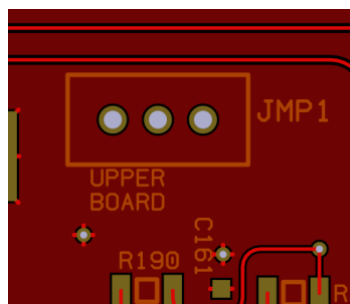


AES3 Digital Audio Input & Output Connection

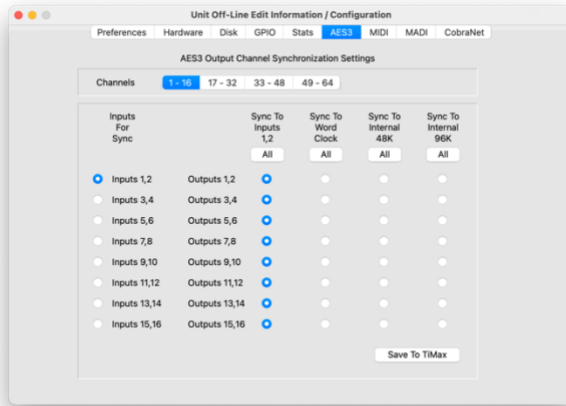
### MIO AES3 Board Installation & Configuration

Each Mixed Input Output (MIO) card has 16 channels of AES3 input and 16 channels of AES output as well as 16 channels of analogue output.

When installing the MIO board, a jumper needs to be placed to select the word clock routing. There can be one to four MIO boards installed in a TiMax2 unit, stacked in the IO board area. On the uppermost board, the jumper is installed between the left two of the three posts at the JMP1 location. On all lower boards, the jumper is installed between the right two posts.



MIO inputs pass through an input Sample Rate Converter (SRC) which converts and synchronises incoming input data to the TiMax internal clock. The SRC capture range includes 44.1KHz, 48KHz and 96KHz, and can be different on adjacent AES input pairs.



Each pair of AES outputs can be set to clock to any one of several clock sources including external word clock, internal 48kHz or 96kHz or a clock derived from any one of the input pairs on the same MIO card.

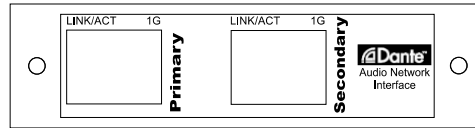
From the Unit menu select Unit Information / Configuration and click on the AES3 tab.

After making the desired output clocking selection, click Save to TiMax for the selection to become effective.

The AES output clocking is not saved in the show file as this selection is totally dependent on the hardware configuration of the TiMax unit.

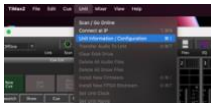
## Dante Interface

There are 2 Dante redundant or switched interface options available, both have a primary and a secondary port that can either be internally switched or form the second leg of a redundant network.



**Dante64** – Single Audinate Brooklyn card 64 channel 48kHz digital audio transport on CAT 5.

**Dante64X** – Dual Audinate Brooklyn card 64 channel 48kHz & 96kHz digital audio transport on CAT 5.



The Dante interface when fitted is automatically detected and should show up in the Unit > Unit Information/Configuration > Hardware Tab when the software is logged on to the SoundHub.

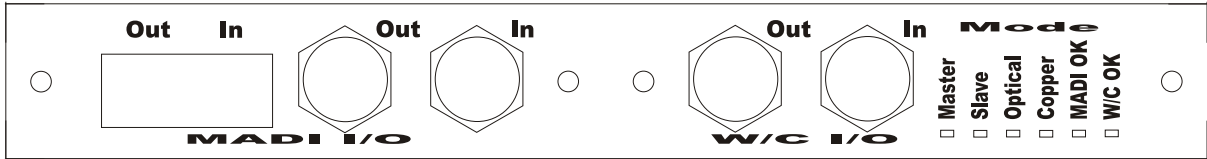
Dante audio signals and interface configuration is set through Dante Controller.

Dante64X will show up in Dante Controller as two separate 32-channel Dante nodes when switched to 96KHz sample rate mode.

## MADI Interface

**MADI64** 64-channel 48kHz digital audio transport on 75 ohm coax or SC multimode optical connection, or 32-channel in 96KHz mode.

The MADI interface is set up through the TiMax software interface, the MADI module can be set to master or slave and 56 and 64 channel format.



LEDs on the MADI card show current status:

Master – TiMax is set to be clock master

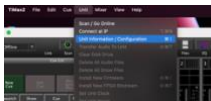
Slave – TiMax is slave to incoming clock

Optical – TiMax is set to receive MADI on the optical input

Copper – TiMa is set to receive MADI on the copper input

MADI OK – TiMax is detecting an incoming MADI stream

Word Clock OK – TiMax is detecting an incoming word clock



The MADI interface when fitted is automatically detected and should show up in the Hardware list when the software is logged on to the SoundHub.

Select Unit from the menu bar and choose Unit Information / Configuration, click on the MADI tab



Master: TiMax is clock master for the MADI stream, the device on the other end of the MADI connection must be set to Slave.

Slave: TiMax will be clocked from the device on the other end of the MADI connection.

Transmit Default Channels: sets the number of channels transmitted in each MADI frame.

**Follow Receiver:** MADI Config Tab - Tx Channel Mode - Follow Receiver = This mode detects the number of channels/frame on the MADI receiver and replicates it on the MADI transmitter. E.g.

If MADI RX is 64 Ch, MADI TX will be 64 Ch

If MADI RX is 56 Ch, MADI TX will be 56 Ch

**Receive Cable Selection:** Choose between copper and optical transport.

**Synchronization:** Sync to Madi will sync to a clock extracted from the incoming MADI stream, sync to Word Clock will sync to the external word clock signal connected to the external word clock coaxial connector.

After changing settings click **Save to TiMax** for the new settings to take effect.

MADI settings are not saved in the show file as this selection is dependent on the hardware configuration of the TiMax unit.

The status of the MADI card is refreshed by clicking on the **Update Status** button. The MADI card status report (None or Valid) is only updated when the Update Status button is clicked.

# Control of Inputs & Outputs

## Ethernet

TiMax communicates with one or more host computers on the local area network via an Ethernet connection. The Ethernet port operates at 100 megabits per second, carrying Internet Protocol (IP) packets that conform to the UDP protocol.

A CAT5 cable is used to connect the network port on the back of TiMax to a port on a switch, hub or router. It is also possible to connect TiMax directly to a host computer's Ethernet port (**most Macs and modern PC computers will work with a standard Ethernet cable**). Cables used must be less than 100 meters in length. Note when using a direct cable connection it may be necessary to turn wireless networking off on the host computer, **especially MacBooks**.

Each TiMax unit has a unique Ethernet MAC (hardware) address programmed into its ROM at the time of manufacture. The TiMax firmware uses this MAC address with the ARP, DHCP and ICMP protocols to establish and maintain connections with host computers on the local area network using IP addresses. The IP address that the TiMax uses may be assigned dynamically by a DHCP server on the network, or manually by the user. If there is no DHCP server present then TiMax will auto-assign ("Auto-Config") an IP address. TiMax will respond to a "ping" request on its assigned IP address.

## Manual Network Configuration using fixed IP addresses

There are a number of reasons why you may consider using fixed IP addresses, it is possible that the control computer is connected to TiMax via a Local Area Network (LAN) which is also used for internet access or part of a wider intranet facility and for reasons of access control you wish to limit the visibility of the system to unauthorized wired or wireless access. Using the TiMax front panel controls scroll and press the jog wheel to select IP Address and the scroll wheel and tab key to set the designated address for the TiMax unit, **eg. 192.168.001.100**

The IP address and subnet mask of the control computer will also need to be set in the same range. Refer to your computer network setup in Control Panel/Network Connections

Select the connection type, i.e. wired or wireless, go to the TCP/IP properties and set the address. The Mac Network Preferences window offers similar options.



**BEWARE** of the following possible reasons for failure to connect:

Windows and anti virus Firewall may prevent connection, turn firewalls off for fault diagnosis.

If your computers' Wired and Wireless TCP/IP settings are in the same range connection can be prevented. Disable the one you are not using for fault diagnosis. **Always disable Mac Airport to ensure stable wired Ethernet connection and operation.**

Failure to connect after changing TCP/IP settings in Windows can sometimes be cured by just waiting for a few minutes for the new settings to become effective or by restarting the computer.

Another device on the network has the same address as the control computer.

#### **GPIO Input**

TiMax provides a General Purpose Input / Output (GPIO) parallel contact closure interface for triggering 256 TiMax cues and controlling external equipment.

All inputs and outputs are opto-isolated for reliable operation in a variety of electrical environments. There are eight address inputs, two trigger inputs and two outputs. Each of these inputs and outputs is a two-wire current loop, a signal line and a current return line.

For detailed information on GPIO interfacing, see appendix.

#### **GPIO Output**

To be implemented in future software release.

#### **MIDI**

TiMax has two standard MIDI ports on the rear panel. Input Port 1 is a general-purpose port. Any MIDI-formatted TiMax command, including standard MIDI continuous-controller commands for control of Group Faders from generic MIDI faders, as well as MIDI ShowControl and MIDI system exclusive commands can be received on the MIDI 1 IN.

In the TiMax2 SoundHub-R version, the Cue List's Preset/Cue numbers are hard-programmed to trigger from equivalent MIDI Program Change numbers sent to MIDI IN1 on MIDI Channel 1.

In the S-Version MIDI Note or Program Change triggers can be freely mapped to any values using the New Cue or Update Cue dialogue (more later).

The second MIDI port is for interfacing to legacy TiMax Tracker performer tracking system or to a console for remote preset recall.

The legacy tracking system interface sends MIDI controller messages to TiMax to automatically recall TiMax inputs to level/delay Image Definitions when the appropriate MIDI controller signals are sent from a TiMax Tracker computer (see later and Appendix2)

**OSC**

TiMax has an extensive and flexible OSC interface allowing control of: Pan Space positions in the x,y and z planes.

Input, output and group fader levels, input, output and group mutes Cue Recall and Stop functions can also be controlled external via OSC.

Incoming OSC message can be viewed in the View > View OSC Window. Messages in any OSC format can be grabbed and mapped to any of the allowed TiMax functions.

See the main OSC section for full details of the OSC interface.

# Front Panel Controls

## **Group Faders & Mute**

These are live controls accessible via the front panel of the unit. Press the Menu button, scroll to Groups and press the jog wheel to select. To select a Group to control, scroll to the desired channel and press the jog wheel to select, then scroll to adjust the level.

The channels controlled by a Group fader are assigned in the TiMax PC or Mac control software and may be freely defined in each Show to control any combination of inputs and outputs. So for example Group 1 could be setup as a grand master controlling all outputs, while others may be assigned to control sub zones, announcer mics, DJ, Band or stage sources.

Group assignments and levels will be remembered if TiMax is switched off and on again. Group assignments are stored in a Show, **Group levels are not.**

Group fader levels may be controlled by physical MIDI faders plugged into the rear panel MIDI 1 input port. After booting up, the unit will respond to an incoming controller message, as sent by a MIDI fader arriving on any enabled MIDI channel, setting the level for the group that corresponds to the controller number in the message (controller zero mapped to the first group). The default is all channels enabled. There is a command in the firmware to enable a specific MIDI channel; message from other channels are ignored.

**NB TiMax does not respond to running status MIDI controller messages.**

## **Channel Meters & Mutes**

Signal levels on each input and output can be seen on the front panel LCD, the 16 channel wide display may be scrolled with the jog wheel and input or output selected by pressing the jog wheel switch in order to access the Mute and Solo functions .

Note: To mute and un-mute all channels, press and hold the Mute switch.

## **Select a Show**

Use the jog wheel scroll and press to go to and select a show from the list

## **Select a Preset**

Use the jog wheel scroll to a preset from the list. Use the Select button to select that preset and again to recall the next preset in the list.

## **IP Address**

Allows setting of fixed or DHCP assigned IP addresses. (See P8.- Ethernet)

## **Setup & Information**

Displays unit information and provides facility to reset the unit to factory default.

**\*>\*>\*>\*>\*>\*> Get out of Jail Free <\*<\*<\*<\*<\*<\*<\***  
**(Cut out and stick on the fridge)**

In the event of a system crash due to possible Show file corruption or firmware corruption, here are a couple of things to try...

**Don't Load Show File From Disk** – Power-cycle the unit and immediately press the **centre** button under the LCD display for a couple of seconds – this will boot the unit without auto loading the most recent show file and show the above message. To reinstate the show file select File/Open Show Online, this will upload the show file from the PC or Mac disk to the TiMax unit.

**Don't Load Firmware From Disk** - Power-cycle the unit and immediately press the **left** button under the LCD display for a couple of seconds – this will boot the unit from ROM, pause the boot and display the above message on the display, to allow the firmware to be re-installed from the PC or Mac. When the TiMax software is launched you will be prompted to load the version of firmware that is embedded into the control software. This is also used to roll-back to earlier firmware versions if necessary.

# High Reliability Options

## **Dual Power Supply and cooling fan**

An optional 2<sup>nd</sup> power supply and cooling fan can be fitted into TiMax for high reliability applications. The 2<sup>nd</sup> power supply has its own power cord and fuse.

# Software overview

## Overview

Versions of the software are available for Mac and PC operating systems.

The control software is based on a client server architecture in which the server is the TiMax unit and the computer runs client software.

Up to 4 clients can be connected to a single TiMax unit. Changes made by the operator on any of the client computers will reflect in real time on all the other clients connected. **NB: All clients must run the same TiMax software version.**

All clients have identical rights to edit and save shows in the TiMax unit. Any client Save Show command updates the Show saved on the TiMax unit and on the local client computer's disk drive. Other clients can do their own local Save Show.

Connection may be direct using a Cat5 cable from the control computer to TiMax (older computers may need a cross-over cable) or via a switch or hub on a network using wired or wireless connection.

The software is both a live control surface and a programming interface for one or more TiMax units offering control of up to 64 channels on each TiMax unit of input EQ, output EQ, level and delay at each matrix crosspoint as well as sound file playback, spatialisation and sophisticated snapshot and dynamic automation.

## Getting Started

Software boot-up options can be set in the **Unit / Information Configuration / Preferences** tab.

(The user preferences set save to the computer when the software is closed.)?

### **Go into Off Line Edit mode when the program boots**

When **un-checked** the software connects to TiMax hardware, then loads and displays on the PC/Mac software the show that is currently open in the TiMax unit.

If the software cannot find the TiMax hardware it will show Off-Line in the top-left connection status drop down list in the Main/Mixer Window.

When **checked** the software will mount a virtual TiMax emulator in the PC/Mac, and will load the show that was most recently open in the Off Line editor.

Before programming, first Save Show As and name a Show file; you are prompted for where on your computer's disk to save the file.

Subsequent saves are to that location. If you open a Show file, subsequent saves are to that file. The save name location can always be changed by using the Save Show As ... command. **Regular Saves and backups are recommended practice.**

#### **Emulate FPGA in Offline Edit Mode**

When unchecked offers legacy support for older DSP based audio processing.

#### **High Contrast Interface**

This mode offers better visibility of selected items

#### **Don't check show for save when switching units**

In mulit frame configurations this option when checked stops the software warning the user to save the show file on the other units if two or more TiMax frames are used to create a larger system.

#### **Matrix Channels Displayed in Off-Line Edit Mode**

This preference changes the displayed matrix size when the software is offline for legacy support

#### **Light / Dark Colour scheme**

Changes the GUI display to be more suitable for bright/daylight or subdued lighting.

#### **Hardware**

For information only, shows internal hardware configuraion

#### **Disk**

For information only, shows the disk information

#### **GPO**

For information only, and allows GPIO port trigger lockout interval to be set, to avoid switch-bounce double-triggers from external GPIO commands.

#### **Stats**

For information only, TiMax power-users and service techs only. Also tells you its Serial Number and current running temperature.

#### **AES3**

AES3 output sample rate conversion setup, see the AES card configuration section.

#### **MIDI**

MIDI preferences setup has moved to the System Preset page

#### **MADI**

MADI source selection and setup, see the MADI setup section

#### **Cobranet**

Legacy



### **Password Protection**

As supplied the TiMax unit and TiMax software do not have password protection enabled.

To set a password to allow the software to log on to TiMax or to allow user access to the front panel controls, select the Set Unit Password from the Unit menu and set a password of between 4 and 8 numbers with value of 1, 2 or 3. i.e., 123123. Please note that you will be prompted to enter a new password twice.

To clear all passwords, select the "Set Unit Password" from the "Unit" menu and put a check in the box as shown

**Please note that if you lose or forget your password, there is a master password that will allow access to any TiMax anywhere on the planet ..... it is the least memorable number imaginable and so, being instantly forgettable it is written here in almost invisible ink:**

[3,1,2,1,1,2,3,3]

### **Show files**

When the TiMax software is first launched, you will need to create a New Show. When subsequently launched the software automatically retrieves the copy of the Show file from the TiMax disk when it logs on-line to a unit, or if the user preference is to go into Off Line Edit, the software loads the last show file edited off-line.

The loaded Show file name will be displayed at the top of the Cue List and the PanSpace window.

From the **File** menu select **Save As..** to save the current Show file to a new name on the control computer. This will change the Show file name to the new name on the TiMax internal disk

From the **File** menu select **Save** to save the Show file to the control computer using the current show file name.

A Show file consists of the the system, spatialisation and automation information only and does not contain any media such as audio files or PanSpace graphic files.

### **Show Archive**

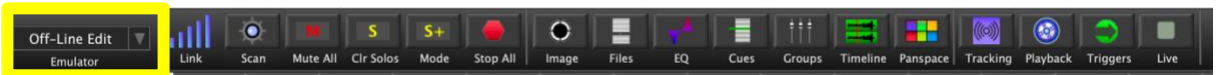
A Show Archive contains the show file and all of the media associated with the show file including all audio clips and the PanSpace Venue graphic (see later). **Always Save As to name and create a Show file first, then Make Show Archive to of it afterwards (if required).**



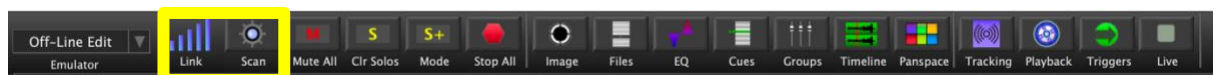
# Navigation

## Main Toolbar Buttons

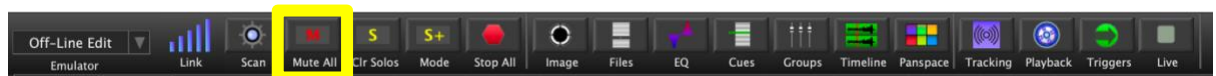
The software connection status indicated here can be in one of 3 modes; Offline, Off Line edit or On line to a TiMax unit in which case the unit name is displayed.



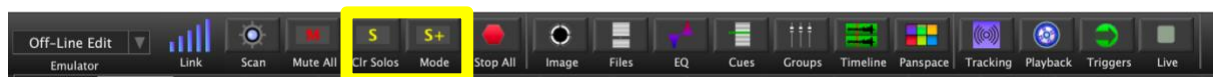
The drop down list shows all the TiMax units on the Local Area Network. Switch to a different unit by selecting the unit in the list. Refresh the list by clicking the "Scan" button. If the unit has been named, the name appears in the list rather than the serial number.



The blinking status indicator on the Scan button indicates that the software is Online when it is connected to a TiMax. The quality of the connection indicated by the bars is showing the ping speed between computer and unit.



The Mute All button Toggles between muting and unmuting all inputs and outputs.



The Clear Solo button will flash if any channel or group solo is active, clicking the button will clear all active solos. TiMax offers additive and self-cancelling solo modes is indicated by S+ or S- .

Solo works like a solo-in-place system, i.e. when a channel is solo button is active then all others are muted.



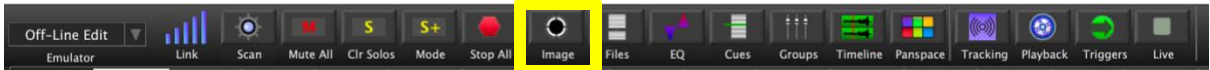
Stop all will stop all cues and playback when clicked.

## Image Library

The Image button will open the Image Definition library... for the uninitiated, an Image Definition (ImDef for short) is a level and delay relationship to the the outputs that has been saved.

An ImDef can be used in a variety of ways to send audio signals to the outputs.

They can be applied to inputs in the Mixer page, in the TimeLine and in the Panspace window.



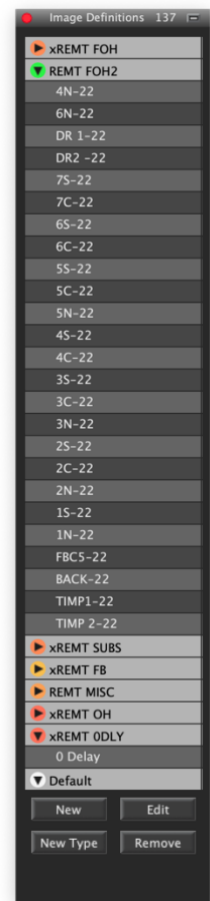
ImDefs can be created by setting levels and delays in the matrix with live audio running. Once the levels and delays are all set the routing relationship can be saved to the ImDef library with a right click in the box below the input fader and selecting New Image Definition.

ImDefs can be created and edited from within the library by clicking New and setting the levels and delays without disturbing the live status of the matrix.

Image Definitions can be created and levels and delays calculated from the PanSpace page (which is most very clever!)

ImDefs can be organised into folders that can be expanded and collapsed. To create a folder, click New Type.

Drag and drop to move an ImDef from one folder to another.



## Files Window

To see the show files and audio files on the TiMax internal disk, open the files window by clicking on the Files button.



Left click to launch  
Right click to select target

• Explorer / Finder

Double click to load a show  
file from TiMax internal disk

• Show files on disk

Click and drag to playback area  
above input channel fader to load  
audio to input

• Audio files on disk



By right clicking on the Explorer / Finder button, the default location for the window to open can be set, i.e. the location of your sound effects library - this can be any drive anywhere on the network.

Audio files can be organised in folders, right click to create a new folder and drag and drop to move audio files from one folder to another.

## EQ Library

To open the EQ library or bring to the top if hidden, click on the EQ button.

Input and output EQ settings can be saved to the EQ library. The EQ library is saved as part of the Show File.



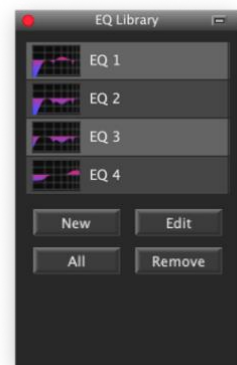
To save an EQ curve to the library, set the EQ on an input or output channel, close the EQ window and drag the thumbnail curve above the input or output fader to the library.

To name the EQ curve, double click on the library object or select and click the Edit button, change the name and close.

EQ curves can also be created from within the library.

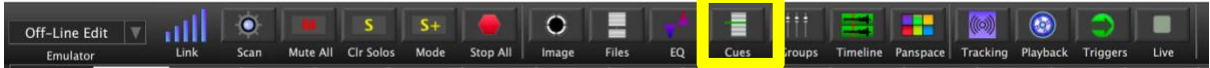
An EQ curve in the library can be applied to an input or output by dragging from the library to the EQ thumbnail area above the input or output fader.

The All and Remove buttons do pretty much what you would expect.



## Cues

To open the Cue list or if hidden to bring it to the top, click on the Cues button.



The Cue list is one of three places where cues can be created and manually recalled.

A word about Cues ... in TiMax world, a Cue is a general term for an event, it may be a Snapshot event or a TimLine or PanSpace programmed event or sequence of events.

From left to right:

- **New Cue** create a new empty cue in the cue list
- **Edit Cue** opens the cue edit dialogue
- **Recall System Preset;** is a special output only snapshot that does not appear in the Cue list
- **Store System Preset;** see following section

From top to bottom:

- Show file name and internal clock setting
- The buttons described above
- Buttons to show or hide various clocks
- The cue list
- Cue Recall cues may be recalled manually by lining up the target cue against to GO button and clicking on the GO button.



**TiMax requires you to create a Show and make at least one New Cue to start**

## System Preset

The 'System' Preset is a special system configuration preset and output snapshot that contains **Output Level**, **Output Delay** and **Output EQ** data as well as other show file related configuration parameters.

The System preset can be updated at any time by clicking on the System button, so if any changes are made to any of these parameters during the run of a Show, they can be saved independent of the main preset list.

### **The system preset is automatically recalled whenever a Show is loaded.**

The System Preset can be thought of as analogous to a conventional sound system loudspeaker controller or drive-rack settings.

The System Preset's settings can subsequently be overridden live during the Show by normal presets if they include changes to outputs.

The check boxes for options:

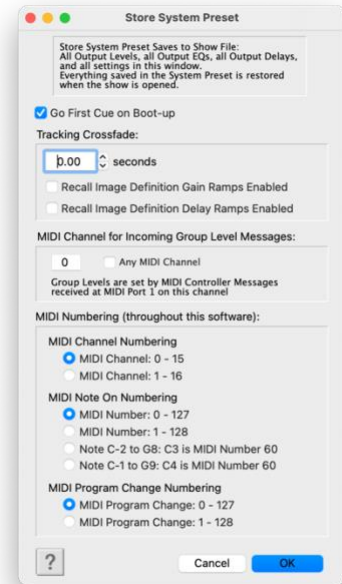
- **Recall Image Definition Gain Ramps Enabled**
- **Recall Image Definition Delay Ramps Enabled**

are for Zoned tracking with TiMax Tracker D4 as well as continuing legacy tracking system support. It sets how the tracking system control morphs levels and or delays from stage zone to zone, the Recall Routing Ramp Time box allows a user defined ramp time to be set if either box is checked.

The MIDI Channel for Incoming Group Level Messages section of the System Preset allows the user to set the channel that the TiMax Group master faders will respond to MIDI controller messages.

The MIDI Numbering setup is to allow TiMax MIDI message display format to be matched to external equipment that may be controlling TiMax or being controlled by TiMax. This is often referred to as US or Japanese format. MIDI messages sent and received are not altered by changing this setup, only how they are displayed.

**NB The Store System Preset button will flash on/off when any changes are made to mixer settings (Output Level/EQ/Delay) contained in the stored System Preset. Recalling the Cue to eliminate the changes, or re-Store-ing the System Preset will stop it flashing.**



## Groups

TiMax has up to 32 DCA groups that can be freely assigned and overlapped as required. Click the Groups button to open the group faders to assign inputs or outputs to group faders.



The group faders can be docked to the Mixer page below the Output faders.

Group master faders are used to boost and cut the gain of all input and output channels assigned to the group.

Groups contain any selection of input or output channels or both.

Group Solos and Mutes are also available. Up to 32 groups can be assigned.



Group levels may be controlled by using MIDI faders attached to MIDI port 1, or from the front panel of the TiMax unit.

A set of channels is assigned to a Group by double clicking the Group buttons on the desired input and/or output channels in the mixer window (the buttons flash on and off), then double clicking the Group button of the desired Group master.

Shift & double click can be used to select a range of inputs or outputs. Group assignments can be modified by double clicking the Group button for the Group (all Group buttons flash on and off), double clicking the Group buttons for the channels to be added or removed, then double clicking the Group button for the Group to confirm revised selection and complete the edit.

The group button for assigned groups is light green. Clicking on an assigned group button highlights it (bright green) as well as the group buttons in all input and output channels in that group in the mixer window

A channel may be assigned to more than one Group. To see what groups a channel is assigned to, click the Group button on the channel.

Groups are named by double clicking in the label field near the top of the group fader, and typing a name

Group channel assignments and Group names are stored in the Show file.



**NB Group *levels* are not stored in the Show File, but *are* stored and recalled when the unit is switched off and back on again**

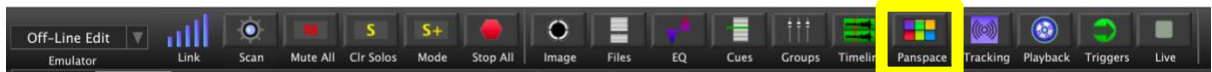
### TimeLine

Click this button to open or bring to the top the TimeLine programming interface. An S version license is required to open TimeLine while on-line to a TiMax unit.



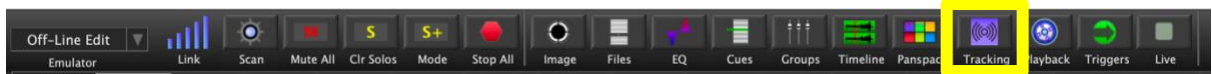
### PanSpace

Click this button to open or bring to the top the PanSpace programming interface. An S version license is required to open PanSpace while on-line to a TiMax unit.



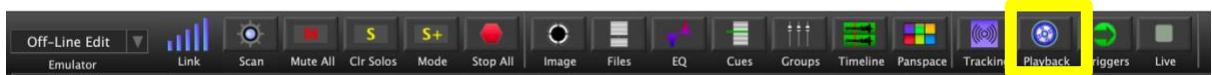
### Tracking

This button will enable or disable legacy Tracking interface.



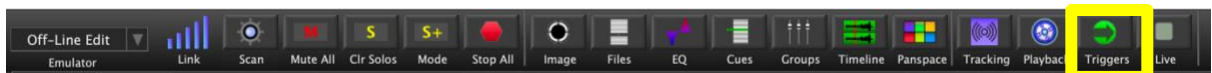
### Playback

Click to toggle between internal playback enable / disable



### Triggers

Click to toggle between external triggering of Cues enable / disable

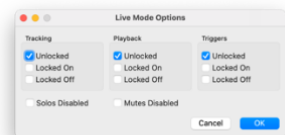


### Live

Click to enable / disable Live mode – live mode settings can be accessed with a right click on this button.



Live mode options to lock on or off mute and solo functions as well as forcing various other options on or off can be a useful way to ensure that the show will run with the intended functions enables or off as show in the Live Mode popup below.



### Docking and undocking

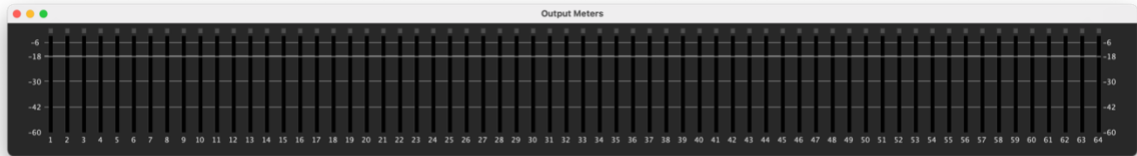




This small button in the top right hand corner of the Cue List, EQ and ImDef lbraries offers options to dock left or right of the mixer window, undock and set always on top status to these windows.

### **Output Meters**

From the View menu select Show Output Meters to get a useful overview of all 64 channel output level bargraph meters.



Hovering the cursor over a meter will pop up the output channel name.

Above each meter is a clip indicator that will show red if an output has clipped at any time during the current session.

Clip indicators can be reset by clicking on the clip indicator or selecting Clear Clip Indicators from the Mixer menu.

# The Mixer

The mixer page is arranged showing signal flow from top to bottom.

The input channels at the top, output channels at the bottom, and in between, an assignable collapsible matrix display showing how each input is routed to the outputs on a variable and collapsible number of crosspoint rows and faders.



Source Mixer faders can be hidden or displayed by clicking on the Source Mix button.

Crosspoint faders can be hidden or displayed by clicking on the Matrix Level Delay button.

The matrix number display can be expanded to show more channels or contracted with a click and drag down or up on the extremely small white blob (highlighted in yellow).

Clicking on an input channel strip selects that channel and highlights the corresponding crosspoint row.

Clicking on an output channel strip selects that channel and highlights the corresponding matrix column.

Output delays can be displayed or hidden by clicking on the Output Delay button.

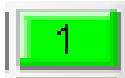
### Input and output control buttons

Control buttons that are common to both inputs and outputs



Links channels for temporary ganged control – use shift click or ctrl click to select ranges of channels. Setting EQ, gain, solo or mute on a linked channel also sets all of the channels to which it is linked. Links are set by clicking on the link button in the first channel (which clears all other links), then control-clicking the link button on channels to be added, or shift clicking to add a contiguous range of channels.

Inputs and output links are separate



Shows Group assignment, G is displayed if unassigned or shows group number if part of a Group and the first Group number and + symbol (i.e. 1+) if a member of more than one Group.

A Group may control any combination of input or output channels, or both.

Solo, Soloing an input or output channel mutes all other input or output channels that are not also soloed. Input Solo's will not mute outputs and output Solo's will not mute inputs.



If any channel is Solo is pressed, the toolbar Clr Solo button will flash, clicking on it will clear all solos

Mute. Muting an input or output channel does just that !



Channel mute status is independent of automation control

### Channel Names

Double-click to edit the label text. The channel labels are stored in the Show file.

Channel names can be exported and imported in CSV format for quick and convenient spreadsheet manipulation and show file setup using the File / Export IO labels to CSV file

**NB Channel Names can also be stored and recalled on a per-Cue basis by storing/adding/entering them in a tab in the Cue's Snapshot.**

### Input Channel controls

Use the upper horizontal scroll bar to view hidden channels.

Description from top to bottom:

Input EQ thumbnail – see EQ section for details. An EQ setting can be copied from one channel to another with a click-drag and drop.

Input Channel Label can be set for the show and per cue – see the per cue input names section for details.

Playback display area shows any active or loaded playback. For quick and dirty playback, an audio clip can be dragged here, once loaded right click for playback controls.

Input Bargraph metering shows pre-fader PPM response with a -2dB clip indicator, -18dB nominal operating level. Equivalent to +4dBu analogue input level.

The Phase reverse button reverses the phase of the input signal when lit. It is not automated however the state at power down is recalled when TiMax next starts up.

Input fader level in dB is displayed under the fader. Double-click in the number box to enter a level value from the keyboard. Shift-click on a fader scale number to set the fader to that level.

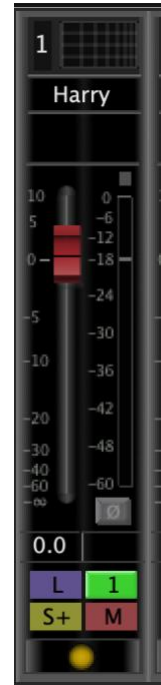
Group attenuation The Group offset in dB is displayed under the bargraph meter. The Group offset is the amount by which the level of the channel is affected by all groups to which it is assigned.

Link, Group, Solo and Mute. See above for detailed description.

The Input routing field at the bottom of the channel contains the Routing Assignment for the input channel.

A Routing Assignment can be applied to an input channel by right-clicking on this area and selecting it from the popup menu, or by dragging it from the Routing Library.

A Routing Assignment from one input channel can be dragged and dropped onto another input channel.



## Source Mix

Click on the Source Mix tab to the left of the input fader section to display input sub mixer, use the upper horizontal scroll bar to view hidden channels.

Click on the Input Levels tab to revert the display to show input faders

Source Mix levels can be stored in a Snapshot



## Input Equaliser



Double click on the input EQ thumbnail above the input fader to open the control window.

Each input has a 8 band parametric equaliser, the filter type of each band can be chosen from a drop down menu and parameters can be entered by dragging nodes to alter Gain or Frequency and shift + drag to change Bandwidth. Parameters can also be entered and edited numerically.

EQ changes made on an input that is Linked to others are automatically applied to the others

Control by mouse or trackpad as well as numerical entry are provided.

1. Boost/Cut & Frequency
2. Bandwidth
3. Frequency
4. Boost/Cut



EQ settings can be copied from one channel to another or to the EQ Library by dragging and dropping the thumbnail image from the source onto the destination.

To view other channels there is no need to close the EQ window, either click on the channel to be viewed or enter the channel number in the box or use the up down spinners.

Any EQ filters adjusted in previously linked or un-linked channels will not be affected if the linking is subsequently changed. This allows EQ offsets to be applied between linked channels.

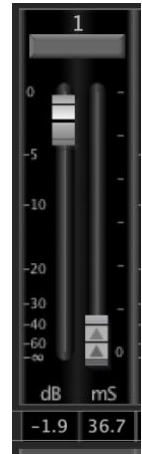
## Matrix

At the heart of TiMax is a Level/Delay matrix which allows the sound reinforcement system to support multiple simultaneous time alignments.

Matrix settings (or Image Definitions) can be named and saved to the Image Definition Library so routing patches that are frequently used can be easily pasted onto input channels.

Level/delay Routings (localisation Image Definitions) may be created by a process of measurement and calculation and imported into TiMax in CSV format. See Appendix 1 for further details.

The Input routing field at the bottom of the channel indicates how the Routing Assignment for the input channel is set. This can be applied old school by punching numbers into the matrix, or by applying Image Definitions, or by PanSpace placement (more later).



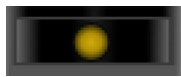
A different icon appears in the Routing box depending on which mode:



- Checkerboard indicates direct matrix programming, recalled by a Snapshot



- ImDef name by an Imdef dragged from the library, or recalled by a Snapshot or TimeLine programming.



- Coloured dot indicates placement in the PanSpace as part of its well clever static or dynamic spatialisation.

An Image Definition can be applied to an input channel by right-clicking on this area and selecting it from the popup menu, or by dragging it from the Image Definition Library. An Image Definition from one input channel can be dragged and dropped onto another input channel.

Matrix crosspoint level and delay values can be entered via numerical matrix grid or by using a row of matrix level/delay faders. Input numbers are show down the left hand-side of the matrix

The matrix faders are placed between the input mixer and the crosspoint matrix display. The crosspoint faders always act on the uppermost highlighted matrix row. Clicking the button again hides the crosspoint faders.

The number of matrix rows visible can be altered by dragging the window open or closed by clicking on the drag handle situated just below the matrix row input numbers on the left-hand side. The mouse scroll-wheel allows you to see other rows.

The matrix level and delay faders route the selected input to the output directly below the matrix fader.

Values may be set numerically in the number box below the fader.

To select an input, click on an input or to the left of a matrix row. The selected input and the corresponding matrix row will highlight to indicate it is selected

To view hidden outputs use the lower horizontal scroll bar

A range of matrix input/output cells can be selected using shift click and ctrl click and adjusted in one operation.

### Output Channel controls

Use the upper horizontal scroll bar to view hidden channels.

Output EQ thumbnail – see EQ section for details

Output Channel Label can be set for the show by double clicking in this region

Output Bargraph metering shows post fader PPM response with a -2dB clip indicator, -18dB nominal operating level. Equivalent to +4dBu analogue output level.

The Phase reverse button reverses the phase of the output signal when lit. It is not automated however the state at power down is recalled when TiMax next starts up.

Output fader level in dB is displayed under the fader. Double click in the number box to enter a level value from the keyboard.

Group attenuation The Group offset in dB is displayed under the bargraph meter. The Group offset is the amount by which the level of the channel is affected by all groups to which it is assigned.

Link, Group, Solo and Mute – see above for detailed description.



### Output Equaliser

Double-click on the input EQ thumbnail to open the control window.

To change Frequency, Bandwidth or Gain, either click on the filter node and drag, change values numerically, or use the slider controls to the right and under the EQ window.

The output equaliser is almost identical to the input EQ, the window has an additional fader to set output delay.







# The Cue List

The Cue List is perhaps the best place to get an overview of the show progression. Cues can be created and fired, internal and external triggers can be set, cue clocks, show clocks and MTC clocks can be viewed.



As detailed above, the Cue List can be docked or undocked from the Mixer page.

The Cue List from top to bottom:

The current show file name is displayed at the top of the Cue List.

The date and time set in the TiMax onboard real time clock are displayed to the right of the show name.

To create a New Cue, click the New Cue button to open the New Cue dialogue.

To edit an existing cue, click the Edit Cue button.

To Store or Recall the System Preset, click on the button with that name.

The 5 clocks within TiMax can be displayed or hidden by clicking on the appropriate button. After a Cue is triggered, its Cue Clock starts running. It can be paused and re-started by pressing the the space bar or the Cue play-pause button in the upper left corner of the TimeLine Editor.

The Stop symbol will stop all cues and playback.

All the Cues in the current show are listed in number sequence.

Symbols to the right of each cue name indicate useful information about each cue.

### New / Edit Cue dialogue

To create a New Cue, click the New Cue or Edit Cue button to open the Cue dialogue. The Cue dialogue has 4 tabs where cue parameters and actions can be set.

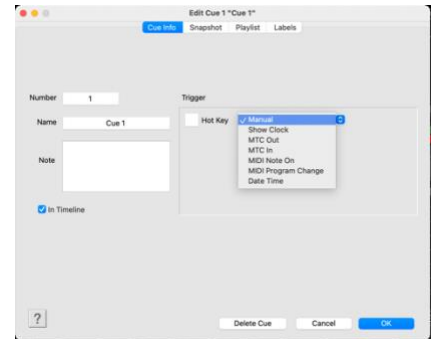
Creating a New Cue only creates a Cue entry in the Cue List, adding a snapshot, or playback or dynamic event sequence requires subsequent programming.

### Cue Info

Set the cue number, name and write notes about the cue. Determine whether the cue is shown in the TimeLine by checking or un-checking the check box.

A keyboard cue trigger Hot Key can be defined, this can be any single keyboard key and is case sensitive.

The Cue Trigger dropdown offers a selection of means to trigger the cue.



### MTC Cue Triggers

The MTC receive frame rate is auto-detected when MTC input is seen at the Midi 1 in port.

Cues can be triggered from MTC in by setting this as a cue trigger option in the cue create or edit dialogue. Using a simple SMPTE to MTC convertor such as MOTU MicroExpress allows Cues to triggered from SMPTE/EBU timecode at any frame rate including drop-frame.

### Midi Cue Triggers

To trigger a Cue from a MIDI message, send MIDI Timecode, a MIDI Note or Program Change to MIDI in 1 or 2 port found on the TiMax unit rear panel. In the Edit Cue dialogue box Triggers pulldown menu select the message type, set the MIDI channel number and value to trigger the cue.

### Show Clock Cue Triggers

The show clock is be started as an automation event by dragging the Show Clock Start icon onto the Event Bar in the TimeLine window. Once started the Show Clock can be used to trigger subsequent Cues.

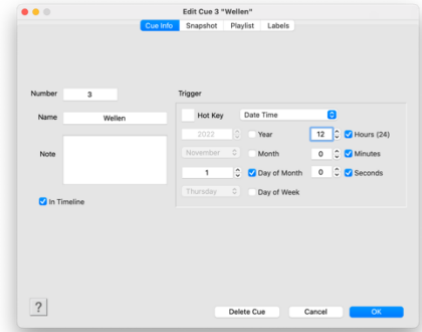
**NB The Edit Cue button will flash on/off when any changes are made to mixer settings cinbtained in that Cue's Snapshot. Recalling the Cue to eliminate the changes, or Updateing the Snapshot will stop it flashing.**

### Time of Day Cue Triggers

Presets may be triggered from user defined Hot Keys or from a specific Time of Day or a particular date defined the Triggers command screen. To use Time of Day triggers it is necessary that the system clock is set.

Note that the system clock has no knowledge of daylight saving changes to local time.

The example illustrated will trigger this cue at midday on the first day of every month.



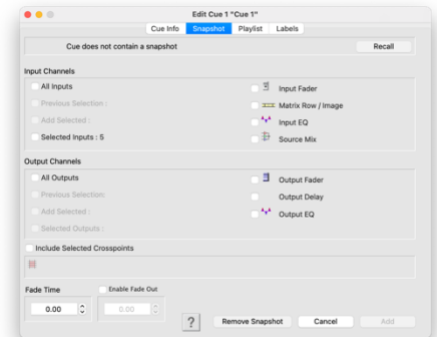
### Setting Real Time Clock

Under the "Unit" menu, select the Set Unit Clock option. The unit clock is set to the same value as the computer connected to it.

### Cue Snapshot

To capture a snapshot, select the parameters (faders, matrix, EQ etc.) to be captured and the channels to be included in the Snapshot.

Input and output channel selection can be determined by clicking on channels in the Mixer window. Shift Ctrl / Cmd click do the usual.



The fade time will set fade in and out to the same rate unless the Enable Fade Out box is checked and a different fade time is entered for the fade out.

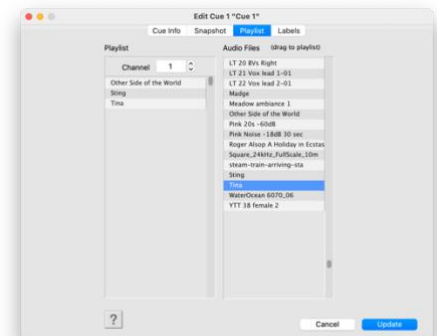
When a valid selection of options is made, the Add button will become active and when clicked the Snapshot will be added to the Cue.

### Cue Playlist

A playlist can be added to a cue, the audio files to be played must first be loaded to the TiMax disk.

Files on the TiMax disk are displayed in the window on the left and can be dragged to the window on the right.

The audio files will play in Isitorder on the designated channel if mono and also on the designated channel + 1 if stereo.



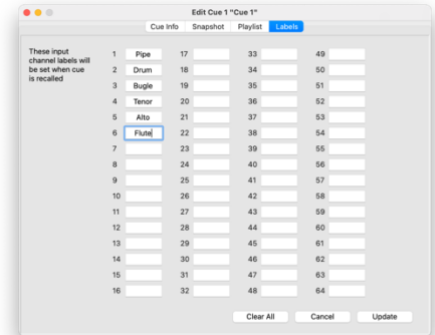
## On Cue Labels

Input channel names can be set to change when a cue is fired.

The On Cue Labels will overwrite Show file channel names when the cue is executed and will remain on the channel strip until overwritten by a new On-Cue Label.

On Cue Labels can be exported and imported in CSV file format using the On Cue export and import commands under the File menu.

Cue names left blank will remain un-changed on those channel strips. Tip: If you want certain channel names to be removed for subsequent Cues, just add a – dash into the box



# Image Definitions

This subject gets a whole section of its own because it is fundamental to understanding how TiMax works.

An Image Definition (ImDef for short) is a level and delay relationship, an imaging / routing object that has been saved as an entry in the ImDef library which determines how an input is routed to the the outputs.

ImDefs can be applied as a static routing an input in the Mixer page, or as a static or dynamic routing object in the TimeLine and PanSpace.

ImDefs can be manually created, calculated, imported from another show file or spreadsheet. They can contain any and all or none of the outputs with any level and any time delay.

ImDefs can be set to only effect some and not all of the outputs when recalled to an input.

## Create / Edit Image Definitions on the Matrix

ImDefs can be created and Edited on the matrix, open the matrix faders, set the desired levels and delays.

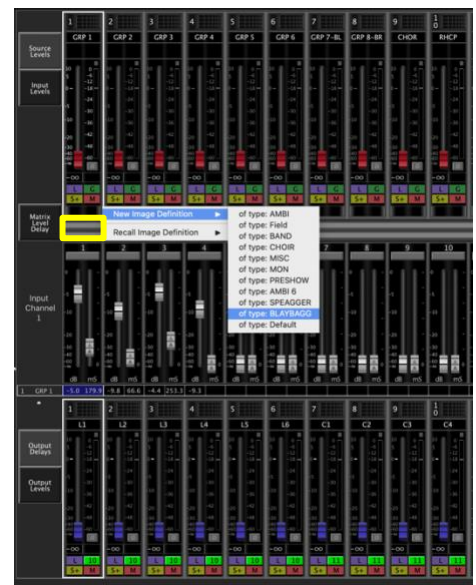
To create a new ImDef, right click on the routing label box (highlighted) just below the Solo and Mute buttons and choose the option to create a new Image Definition as illustrated.

To edit an existing ImDef, right click on the routing label box and choose the option to recall an Image Definition. Make the desired modification, note that as soon as any change is made the boarder around the routing label box will flash orange to indicate that a change to a libaried entry has been modified.

To save the change, right click on the box and select the option to Update the ImDef.

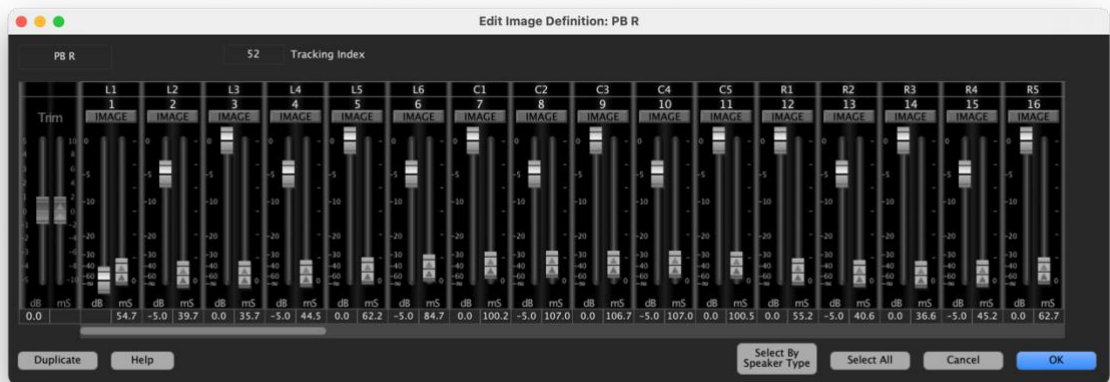
If several ImDefs have been modified and all the changes are to be saved then select the option to Update All.

Once an ImDef has been Updated, all channels that have that ImDef applied will be updated with the new version.



## Create and Edit Image Definitions using the Image Definition Editor

To create a new ImDef from within the ImDef library, open the ImDef library and choose New to create a new Image Definition. Set the level and delay faders and click OK.



To edit an existing ImDef, double click on the library entry to open the library entry. Make the desired modification and click OK.

Once an ImDef has been Updated, all channels that have that ImDef applied will be updated with the new version.

There are some useful features within the ImDef editor that are worth exploring:

- Duplicate, does what it says on the button.
- Help gives some useful tips
- Select By Speaker Type will allow you to quickly grasp all the speakers of a particular type and trim levels and delays with the Trim faders on the left of the Editor
- Select all, does what it says on the button.
- This is also the place where the ImDef name can be set.

### The Image button



You will see a button above each matrix fader which illuminates with the word Image when an ImDef is created or edited.



If the button is clicked, the word Image vanishes which indicates that the associated output is excluded from the ImDef and when that ImDef is subsequently applied to an input channel, the matrix setting on that channel will not be effected. Uses for this feature include:

- The ability to set up a mix that is independent of ImDef recall, eg. Show relay, foldback, announcer or DJ mix.
- The ability to turn up and down selected outputs without altering creating multiple versions of the same ImDef with eg. Subs up and Subs down.

Most users will never use this feature but it is nevertheless useful to know what it does just in case it's needed.



# S Version features

## **Introduction**

The S version software provides unparalleled sophistication and functionality to the playback and show control capabilities of the TiMax system.

The S version software must be licensed to the TiMax hardware on which it is run. An S-Key unlock code is generated uniquely for the TiMax unit's, serial number. This is entered in the "Set S-Version Key" dialogue accessed from the Unit pull-down menu list.

## **Overview**

The S Version software includes the additional control interface of a TimeLine and PanSpace editor.

The TimeLine allows temporal control and manipulation of sound file playback, dynamic volume profiles, dynamic panning using library Routings (Image Definitions), nondestructive editing of audio files in Cues.

The PanSpace provides a spatial setup and control interface in which the sound system can be visualized and controlled. Sound objects can be placed and moved in real time, either by graphical freehand and vector programming or real time location tracking.

# The TimeLine

Click this button to open or bring to the top the TimeLine programming interface. An S version license is required to open TimeLine while on-line to a TiMax unit.



The Timeline Editor allows events and commands (i.e. volume profiles, start playback, recall Image Definition, etc.) to be executed anywhere on a Cue's internal timeline.

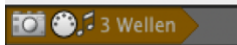


The TimeLine screen is a graphical editor that lays out the cues in the show in a horizontal progression. The elements within each cue on the TimeLine are clearly displayed for easy and accurate manipulation of all of the timings of all of the elements.

The TimeLine is presented a bit like digital audio workstation software, audio track waveforms are displayed with gain

contour lines, pan objects etc.

It is optimized for cue recall in live sound performances. The TimeLine editor provides an intuitive user interface for complex, accurate and editable sound manipulation. The system is quarter frame accurate in time, one tenth dB accurate in gain (varies over the range) and one tenth millisecond accurate in delay setting.



To build a Cue in the Timeline Editor, create an empty New Cue either from the Cue list or, right-click anywhere in the grey Cue Flag bar, just below the timeline scale at the top of the Timeline Editor. The usual New Cue dialogue will appear allowing you to number and title the Cue.

The Cue name flag also displays various icons to indicate the presence of a snapshot within the cue and any trigger mode assigned.

Spatial manipulation of sound can be achieved by placing one or more Image Definitions on a channel in the cue. They can be dragged from the Image Library or with the ImDef tool selected a double-click on a channel will bring up options to select from the library and place.

When several ImDefs are placed along a TimeLine track, sound clips or external sources are dynamically panned as the Cue playhead passes between the ImDef objects.

All Cue edits made in the TimeLine Editor are automatically saved when the cursor is clicked off the edited object or when the Done button is clicked on the popup attribute editor.

#### **Snapshot and TimeLine event Co-Existence**

A snapshot will set up routing, fader level, EQ, or source mix at the start of a Cue. If the Cue includes TimeLine programmed control of overlapped parameters then care must be exercised to make sure that the snapshot events and TimeLine events are not competing with one another.

To edit the Snapshot element of the cue, run the cue and either stop it or let it run to the end, open the Snapshot editor and click the Recall Snapshot button to recall the snapshot, make the edit and then Update the Snapshot.

#### **Loading Audio Files to the TimeLine**

Audio files can be loaded onto a cue either from the TiMax internal disk drive by dragging from the Files Panel or from any accessible disk drive on the network using Mac Finder or Windows File Manager. In the latter case, the audio clip is also loaded to the TiMax internal disk.

Once loaded, an audio region appears showing the audio clip's waveform. If there is already an audio clip on that channel in the Cue, the new audio clip can be added to the end of the previous clip on the same track and will play after the first clip or, it can be loaded to a different track to play concurrently with the first clip.

This way you can build a multi-track montage by dropping audio files onto a Cue in the order they should be played. Audio regions can be slipped forward and back in time. To lock the track in cue time, click on the audio region and check the Position Locked check box.

Whenever an audio file is dropped anywhere over top of another one already on the TimeLine with the same starting channel, the dropped file will automatically be placed so that it starts exactly where the first one ends. In other words, the TimeLine automatically moves audio files so that they do not overlap.

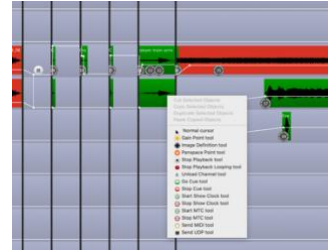
When you drag a sound file into the file window (or onto a track on the TimeLine), the file is converted to the format required for the TiMax. This file is sent to the TiMax and a copy is kept in the local TiMax Files Directory on your computer. This directory is located in different places on different operating systems, but can always be found by selecting Open TiMax Files Directory in the Files menu.

## TimeLine Toolbar

On the left hand side of the TimeLine window are a number of tools and select icons used for creating and editing TimeLine events.

The general pick tool will select what ever object is clicked on and if selected and double clicked on a track will place a mono volume node.

Double-click to place and single-click to select and edit either by using the popup edit tools or drag. A quick hack is to right-click in the TimeLine to bring up the same selection as a popup on your mouse cursor.



Rubber band select to copy and past single and multiple objects.



General pick tool

Mono volume node – place and select on channel only

Stereo volume node – place and select on channel only

Image Definition – place and select on channel only

PanSpace object – select on channel channel

Stop playback place – place and select on channel and automation track

Stop loop – place and select on channel only

Unload audio – place and select on channel only

Stop all – place and select in automation track only

Go cue – place and select in automation track only

Stop cue – place and select in automation track only

Start Show Clock – place and select in automation track only

Stop Show Clock – place and select in automation track only

Start MTC clock – place and select in automation track only

Stop MTC clock – place and select in automation track only

MIDI event – place and select in automation track only






UDP event – place and select in automation track only

### Transport controls



The TimeLine transport controls are in the top left of the TimeLine page.




Top row from left to right:

-  - Go back to where play was last started
-  - Go back to the start of the current cue, or if already there, go back to the start of the prior cue
-  - Start the cue from the current playhead position
-  - Stop
-  - Go to the beginning of the next cue.





Bottom row:

-  - Cue clock count up / count down
-  - Cue clock

### TimeLine display controls

 The TimeLine display controls are located in the bottom left corner of the TimeLine window.



- Open close audio files list to allow clips to be dragged to cues
-  - Set TimeLine colours
-  - Set scroll options; don't scroll, paged scroll, background scroll
-  - Show full show thumbnail, this allows quick navigation to any track in any cue when open by clicking on the area of interest.
-  - the slider magnifies all the audio clips in the show enabling detail in low level audio files to be seen.

### Popup tools

The Cue time edit tools appear when any automation item is selected on the TimeLine. Event times can be nudged up or down or set to the start of the cue, the red arrow will snap the event to the current playhead cursor position.

### Audio File top & tail

The Start and end points of an audio clip can be adjusted by clicking on the audio region to select it, then clicking bar at the beginning or end of the audio region and dragging right or left.

### Looping

Looping on individual waveform tracks can be activated by clicking on the



audio clip and checking the Enable Looping box. Options to set Loop Start and End points which can be edited numerically or graphically as well as the number of loops and crossfade time. Loops can be set to run a defined number of times or indefinitely until a cue with a loop end command is triggered.

The play controls in the bottom left of the loop editor are useful for setting up and previewing loops independently of the current playback status on other tracks. To enable these controls the playhead must be dropped into the looped region and the looped clip must be selected.

Gain and ImDefs associated with looped audio are not repeated when the audio loops. If this is required, leave looping off, trim the audio play zone to the desired length, put the gain and routing elements in that you want, then shift click to select the audio and the gain and image definitions that are within the audio zone, copy it and then paste it as many times as needed.

### Volume Profiling

Volume profile nodes can be added by double clicking on a track, to adjust the Node click on it and drag up or down or side to side. A group of nodes can be selected by dragging a box around them.

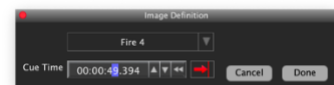


The volume profile lines illustrated in the TimeLine are followed when Cues are run sequentially, that is to say, when a cue is triggered the level on a channel will transition where it currently is (i.e. set in the prior cue) to the level set by the first gain point in the subsequent cue.

This means that if a fade in is required on a track in a cue, be sure to place a volume node on that track at the start of the cue and a second node at the desired faded in level at the point in cue time that the fade in should be completed.

### Panning with Image Definitions

A fundamental concept in the TiMax system is the Image definition which can be thought of as a routing or spatial pan object.



These image definitions are stored in the Image Library and then can be placed (using a drag and drop) into a Cue on the TimeLine. When the Cue is triggered, the gains and delays of all of the image definitions in the Cue are interpolated from one to the next, generating smooth diffusions between ImDefs.

Image Definitions can be added to a Cue in the TimeLine Editor by dragging from the Image Library and dropping onto a track in the TimeLine. Image Definitions can be moved in time a track by dragging the ImDef marker left or right in the TimeLine. Multiple Image Definitions can be selected and moved or copied as a group. An Image Definition can be deleted by selecting it and pressing the Delete key.

When there is more than one image definition on a track in a cue on the TimeLine, the gain and delay values crossfade automatically between values in the image definition as the Cue runs, e.g., to create a level/delay pan movement. This automatic crossfading between ImDefs is a truly powerful feature of the software.

A period of no crossfading is accomplished by repeating an image definition. The system will in fact crossfade as usual between the two image definitions, but because the two are identical there is no actual change to the level / delay of any of the crosspoints and therefore no consequent pan movement.

An instantaneous crossfade happens when two different image definitions are placed very close together. The shortest gain and delay change is 32 milliseconds.

#### **Dynamic Pans**

When the Cue is triggered, the level delay of the first Image Definition on a track is applied to the audio. The level/delay pan settings then begin to interpolate from the first to the second Image Definition as the cursor moves towards it. This continues for other Image Definitions placed on the waveform until the cursor passes the last Image Definition. The audio then stays panned to the last Image Definition until the end of the Cue.

#### **Changing Pan Law and Timing**

The timing of the pan between pairs of Image Definitions can be adjusted by dragging them closer together or further apart on the TimeLine. Their position can also be nudged by numerical entry in the floating dialogue boxes which appear when you select an Image Definition.

#### **Select an audio clip and associated automation**

To select an audio file and all gain points, image definitions and other elements that are within the audio region, hold down the shift key when clicking on the audio region.

Audio files can be moved along the TimeLine by dragging them with the mouse or by setting the time using the time control in the editor. If the audio file is locked (Position Locked checkbox is checked), the audio cannot be moved.

To move an audio file to a different track, cut it and then paste it to the new track. Individual or groups of Image object can be highlighted using the mouse then copy/pasted later onto the same track or different track(s). While highlighted, the group can be squeezed or stretched using the handle on the highlighting outline, to decrease or increase the speed of a simple or complex pan event.

### **Mono and Stereo and Multichannel audio**

An audio file can be mono, stereo or multichannel, when loaded to a cue it will occupy as many TiMax inputs in TimeLine as channels in the audio file.

Image Definitions loaded to a channel will only effect that track

### **MTC Generator Start & Stop**

The TiMax MIDI TimeCode generator can be started and subsequently stopped as a TimeLine event by dragging the MTC Start icon from the tool bar onto the TimeLine. Clicking on the start icon allows the start time to be set.



The MTC frame rate is set by opening the MTC clock display and right clicking on the frame rate number box.

Cues can be triggered from MTC out by setting this as a Cue trigger option in the New Cue or Update Cue dialogue.

### **Time Linked Cues with the Go Cue command**

A Go Cue follow-on command can be assigned to trigger a subsequent Cue while a current Cue is playing. Drop Go Cue icon from the TimeLine toolbar to the Evnt Bar at the bottom of the Timeline.

Single-click on the Go Cue icon to open a dialogue box to enter the Cue you wish to be triggered by this Go Cue. The timing of the Go Cue can be adjusted by dragging it along the TimeLine or entering a number in the dialogue box.



When the main Playhead passes over the Go Cue marker The Playhead jumps to the next Cue and starts playing it. A single Cue can hold and activate multiple Go Cue triggering multiple.

A series of cues can be set to run automatically by placing Go Cue markers at the end of each cue to trigger the next in sequence. To make an entire Cue sequence or Show repeat itself automatically, put a Go Cue at the end of the last Cue in the sequence to trigger the first Cue in the sequence.



To terminate a sequence, create a Cue with a Stop Cue command on the Event Bar, and it's also worth putting a Stop Playback and Unload Audio icon on any tracks that may be still running audio.

A cue can be set to retrigger itself by directing the Go cue command to the same cue. This self triggering cue can be stopped by programming a cue to with a Stop Cue command directed to stop the repeating cue.

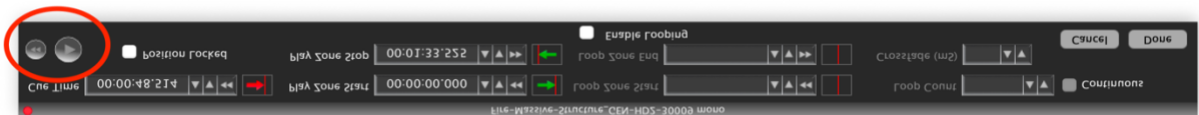
There is also a very useful Stop Cue function to Stop All Other Cues that can be used to stop multiple self repeating cues.

## Auditioning

A cue can be started from any point in the Cue by clicking in the Cue TimeLine time bar to drop the Playhead. The Playhead cursor will locate to this position, press the space bar or click > and audio will start and the pan will locate correctly as determined by ImDefs or PanSpace objects.

The play button in the audio editor is for auditioning purposes. The cue and associated audio will run from the dropped playhead position. It is enabled when the playhead is somewhere over top of the audio, giving it a starting playback position.

If you want to hear just the audio without invoking all of the gain and crosspoint moves,

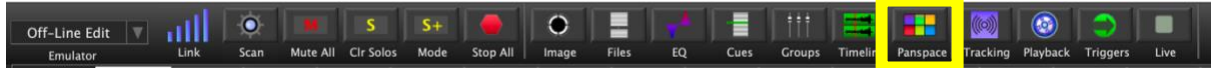


click on the clip and use the Play button in the popup audio editor.

When a sequence of audio files is placed into a cue, the TiMax is programmed to play these files back at the specified cue times starting from the time the cue is triggered. If another cue is triggered in the meantime, this overlapping cue behaviour allows complex soundscapes to be created where different elements of the soundscape are triggered randomly, eg to synchronise with action on stage.

# The PanSpace

Click this button to open or bring to the top the PanSpace programming interface. An S version license is required to open PanSpace while on-line to a TiMax unit.



## General

In the PanSpace environment, a venue drawing can be loaded and scaled, loudspeakers and Image Definitions can be placed in a virtual auditorium, levels and delays to speakers can be calculated and inputs can be placed, panned and tracked.

The workflow is intuitive, fast and flexible. The actual levels and delays from each input to the outputs are completely transparent and the operator / programmer has unlimited ability to intervene and edit.

The TiMax delay interpolation algorithm allows delays from input to output to be changed in real time without audible artifacts thanks to our extremely clever un-patented world beating warble free three gear delay interpolator.

## Venue layer

The first stage in setting up PanSpace is to import and scale a drawing of your venue. The image file can be inverted and the transparency can be varied for best visibility.

To scale the drawing, click on and drag the origin and reference points to places on the drawing that can be accurately measured, either off a CAD drawing or with a laser measuring device.

Best practice is to set the origin and reference point as far apart as practical to minimise scale errors.

Enter the distance between the Origin and Reference points in the highlighted box.

Coordinates can be switched between metric and imperial.

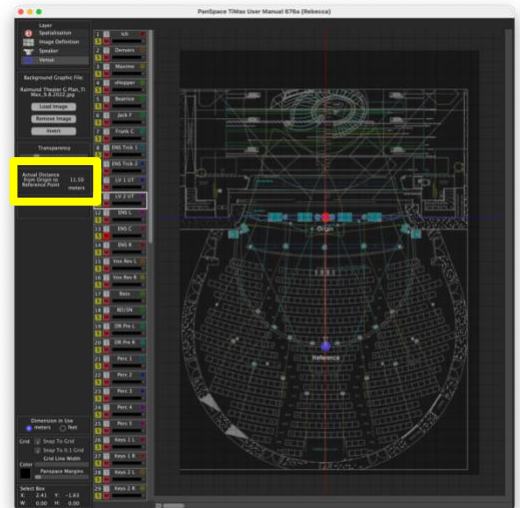
When choosing where to place the origin, be sure to consider that this point is also used as the origin for a real coordinate tracking. That is to say, if the tracking system origin and the TiMax PanSpace origin are not placed at the same point, then tracked inputs will be offset from one another.

Also, be aware that if the origin is moved after speakers and ImDefs are placed then the speakers and ImDefs will move relative to the drawing by the same amount.

Experiment with the Invert and Transparency controls to get the best visibility of the detail needed.

The Grid snap settings do not have any effect in the Venue layer.

In the bottom left corner of the page are the select box dimensions – these are useful as a means to measure distances off the scaled drawing.



## Speaker layer

Speakers are placed in the scaled virtual Venue space by double clicking on the drawing and selecting a speaker from the drop down list of available outputs.

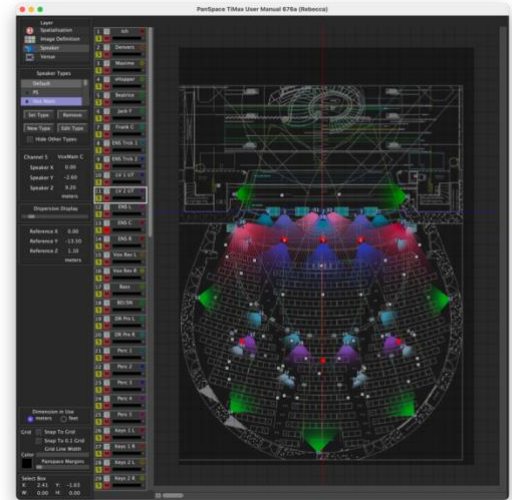
The  $x,y,z$  dimensions for the speaker positions and the  $x,y,z$  positions for the speaker target or reference point (represented by the small square box) are displayed on the left panel.

The speaker reference point would usually be chosen to be the closest seat on axis for near fills or the centre of the coverage area for flown speakers.

Loudspeakers can be grouped together by type for convenience. To create a new type, click the New Type button. To set a speaker type, click the Set Type button. Remove and Edit will remove and edit.

The graphical representation of the speakers dispersion angle can be set and assigned a colour.

The Grid snap settings are active in the Speaker window.



## New / Edit Speaker parameter

When creating a new speaker type or when double clicking on a speaker type in the Types list, an parameter edit box will pop up.

From top to bottom:

- Give the type a name, usually defining a functional group of loudspeakers, e.g. Front Fill or Vocal Main
- Choose an Icon and size for the type
- Set parameters for level and delay calculation when calculating ImDefs (more in the next section)
- Set the width of dispersion angle for visualisation of coverage.
- Set the colour of the dispersion lines.

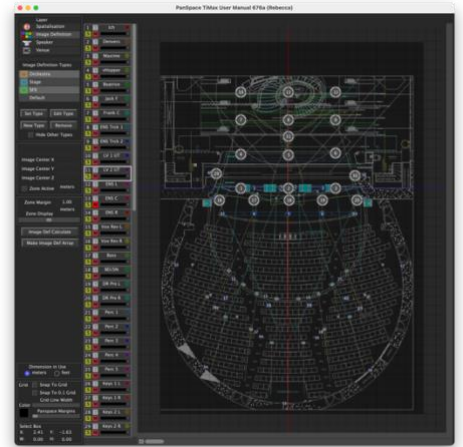


## Image Definition layer

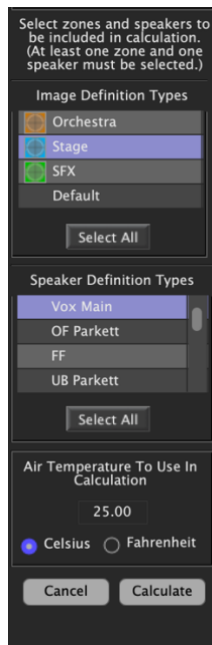
ImDefs are placed in the scaled virtual Venue space by double clicking on the drawing, options offered are New or select from the available existing ImDefs in the ImDef library.

ImDefs can be grouped together by type for convenience. To create a new type, click the New Type button. To set an ImDef type, click the Set Type button. Remove and Edit will remove and edit.

Once placed, levels and delays for each ImDef or ImDef type can be calculated based on its position relative to the selected speaker or speaker types and their associated lucky seats.



To calculate ImDef level and delay values, click on the ImDef Calculate button.



The panel to the left of the venue window will change offering tools to allow selection of the speaker(s) to be calculated and the ImDefs either individually or a group by selecting a type.

Changing the Temperature setting will modify the formula used to calculate delays.

Once the Speakers and ImDefs have been chosen, this is indicated in the venue window, click the Calculate button.

This is where the speaker type parameters for level shading become important... if you have not set them yet, you can still get to them by double clicking in the Speaker Types list.

See below for a detailed discussion on how these parameters work.

The final dialogue popup allows the operator to choose override options for calculation.

### Image Definition Calculation

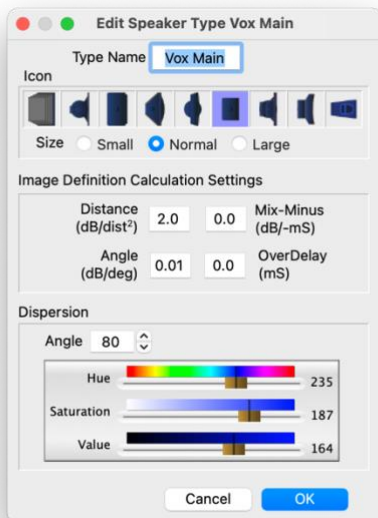
There are 4 settings that will effect the Image Definition calculation, three of which will alter the level calculate for each ImDef and one that will effect the delay.

The Distance parameter is best suited to situations where all of the loudspeakers need to work all the time in order to amplify sound from a stage to an audience, i.e. where the speaker are pointing outwards from action area to stage.

The Angle parameters are best suited to situations where it is desired to create an immersive surround sound field, i.e. where the speakers are pointing inwards towards the audience, or for front-fills where more variable attenuation helps.

It is quite common to use a combination of settings of angle and distance.

They work as follows:



**Distance:** the loudspeaker is supporting the source so as to maintain the attenuated level based on the square of the distance from the ImDef to speaker reference point.

**Angle:** this attenuation is dependent on how far off axis the loudspeaker is from the ImDef as viewed from the speaker reference point (lucky seat). With the setting as shown at 0.01, the angular attenuation will be -10dB if the speaker is 100deg off axis.

**Mix-Minus:** in situations where ImDefs are required to be in front of some loudspeakers this attenuation if set to 1 will attenuate the speaker 1dB for every calculated mS of negative delay. Obviously negative delay will involve messing with the space time continuum which is beyond the capabilities of our audio engine but we can turn the

speaker down to prevent feedback when the performer steps in front of a loudspeaker.

Overdelay: this setting will simply apply additional time to the calculated delay for that speaker type, this can be advantageous for better imaging, particularly for underbalcony or delay speakers.

**NB For best results there is important that the speaker system has been EQ'd and levelled to deliver the same level (eg 90dBA) using the speaker reference points (lucky seats) for the measurement position and nominal level (-18dB FS) on the TiMax outputs.**

### Spatialisation layer

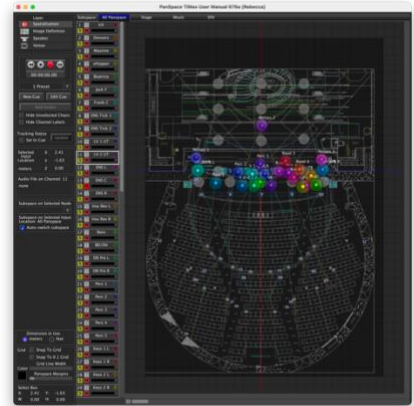
Inputs can be given static positions or trajectories for each cue.

### Working with Subspaces

Subspaces offer an unlimited number of layers of control with each layer containing different sets of ImDefs.

### Subspaces setup

To create a subspace, right click on the area just above the main Spatialisation window and an edit / create dialogue will appear in the left pane.



The Subspace can be named and ImDefs selected to for inclusion in the Subspace. To edit a Subspace, right click on its tab.

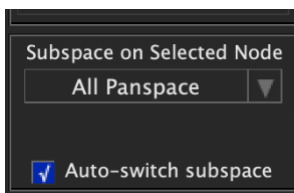
### Programming cues

To program a cue, first create or select an empty cue as indicated in the current cue dropdown. Select an input from the list on the left and double click in the spatilisation window to drop a node or series of nodes to create a trajectory.

If an input node or trajectory are placed in All PanSpace, as the node is moved around the Spatialisation page, the input will interpolate between all of the ImDefs that have been created and placed in PanSpace.

If an input node is placed in a subspace, it will only interpolate between the ImDefs included in that Subspace. To do this, either enter the desired subspace and then place the node, or if you have already placed the node or trajectory path, select the desired subspace by clicking on the node.

A node with a subspace instruction has a square within the circle of the node. Nodes without a subspace instruction do not have the small square so the subspace instruction is to remain in the previously set subspace.



Trajectories can be programmed to move from one subspace to another by setting a subspace instruction on a node within a trajectory. To do this select a node and use the **Subspace on Selected Node** dropdown to define this transition.



**Setting Tracking Status in a Cue**

The T button next to each input in the list on the left will toggle OSC tracking on and off for each input. The status can then be recalled when the cue is fired by clicking the Set in Cue check box.

The tracking status will then remain active until is deactivated in a later cue by toggeling the T button off and clicking the Set in Cue check box.

If the tracking status is changed within a cue in which it is set, the change can be saved to the cue using the Update button.

# OSC Control

## OSC Implementation

To control TiMax by OSC, the OSC controller must be mapped to the control computer IP address and (default) port 7000.

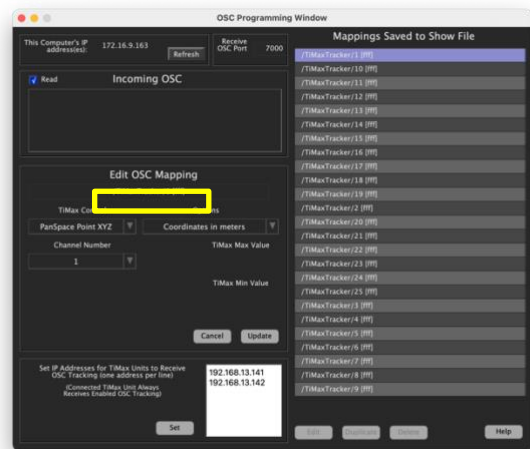
The control computer receives the OSC datastream and converts it into control messages for up to 4 TiMax frames connected on the same network.

## Mapping OSC messages to TiMax functions

From the View menu, select Show OSC Window. Incoming OSC messages will be displayed in the Incoming OSC window if the Read checkbox is checked.

Click on an incoming message and it will show up in the box (highlighted) below the Incoming OSC message window from where it can be mapped to the desired TiMax function.

Once a mapping has been created it will show up in the Mappings saved to show file window on the right hand side of the OSC window.



## OSC Control of faders, mutes and cue recall

Incoming OSC messages can be mapped to these functions.

The simplest way to map a switch or fader message is to connect the external OSC controller, send the message. If the controller is connected, the message string will appear in the Incoming OSC window. Click on it so it is seen in the Edit OSC Message, then select the TiMax parameter to be controlled.

## **NB: Cue Triggers from QLab need a space and integer, eg 1, after the string**

### Tracking in PanSpace - Absolute coordinates

PanSpace control from a tracking system could be either 2d or 3d depending on the tracking system output. Usually the tracking system will be outputting absolute dimensions, for example in meters relative to an origin.

The TiMax PanSpace origin must be the same as that used by the tracking system.

### Tracking in PanSpace - Normalised coordinates

Most tablet OSC controllers will output normalised 2d coordinates, usually from 0,0 for the bottom left corner, to 1,1 for the top right corner.

Enter 0 and 1 as OSC Max and Min values, then in PanSpace draw a highlight box to define the tracked area, then hit Set in the OSC window. Also hit the Tracking Enable (Blue T) button on the PanSpace input channel to be panned by the OSC message.

# It's about Time ...

## An introduction to Source Oriented Reinforcement

Put simply, Source Oriented Reinforcement (SOR) is the technique of amplifying sound while preserving the natural acoustic image (position on stage) of the acoustic source.

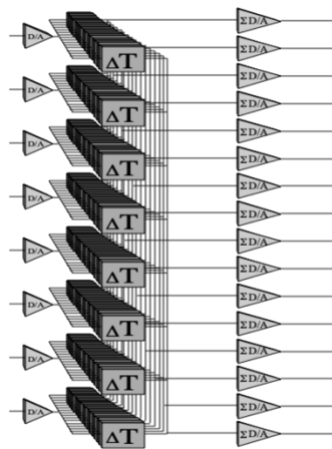
The technique relies on using a psychoacoustic phenomenon to trick the ear to not hear the loudspeakers and therefore achieve transparent amplification.

This requires intelligent control of level and time delay to each loudspeaker to manipulate the direction of sound for multiple sources over a large listening area.

The result is greatly improved coherence amplified signals and the original acoustic source as well as preserving directional cues so the listener's ears guide their eyes, so audiences don't have to play audio detective, they hear the actors and not the amplification.

Additional benefits of using these techniques are spatial un-masking and improved intelligibility and in a theatrical or dramatic environment this is important to maintain the audience's willing state of suspension of disbelief.

Or to put it another way, make it louder without hearing the loudspeakers.



At the heart of a Source Oriented Reinforcement system is a Delay Matrix.

Each input can have a unique level and delay to each output

Levels and delays can be dynamically varied without zipper noise or frequency modulation (doppler effects).

TiMax systems also include processing for input and output equalisation, snapshot and dynamic automation, random access multitrack playback.

**These techniques are equally useful for achieving excellent immersive audio implementations by removing focus from loudspeakers, putting more energy into a space using smaller distributed loudspeaker deployments.**

### Image Definitions – what are they and how are they set up

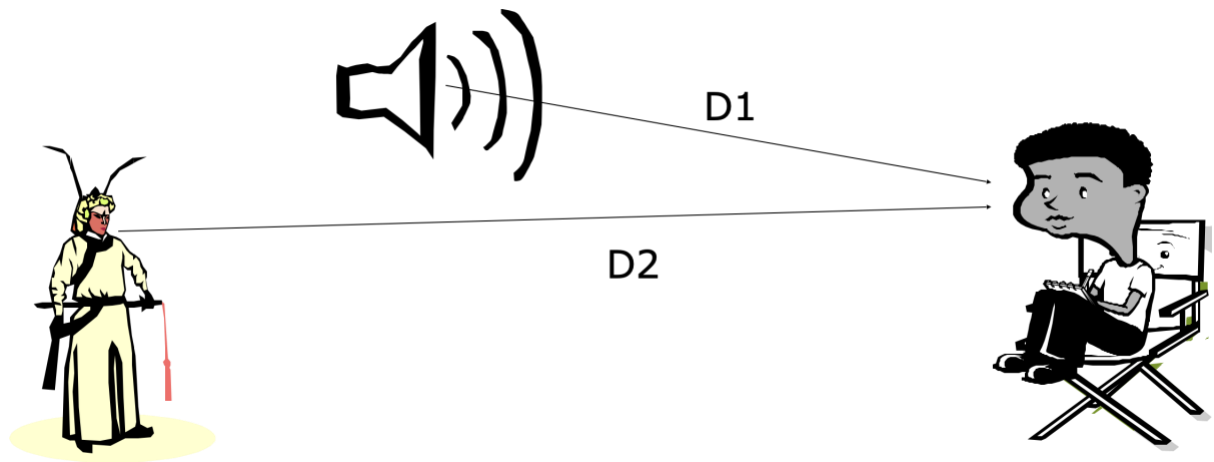
An Image Definition is a level and delay relationship that is stored in a library in TiMax software. Essentially a very advanced routing library.

Typically an Image Definition is exactly the right level and delay to the outputs required to give an input signal a direction that is heard by the entire audience.

However, an Image Definition can be much more than that. It can be a mute, it can be an echo, it can be a routing to a single loudspeaker, or to all the loudspeakers, or anything inbetween.

For accurate localisation and best intelligibility, the sketch below shows how the delay from the microphone on an actor can be calculated to compensate for the difference in distance between the actor and a loudspeaker covering an audience area.

In practice it can be advantageous to slightly overdelay the loudspeaker so that the first wavefront, or precedent wavefront come from the voice of the actor or singer. This can be particularly important to achieve a natural un-amplified result for spoken word and musical theatre.



Distance Actor to Listener – D1

Distance from Loudspeaker to Listener – D2

Velocity of Sound – V (approximately 340m/S)

Delay =  $(D2-D1)/V$  to match distances

For example if the lucky seat is 20 meters from a particular stage location and the speaker is 10 meters from the seat, then the delay to the speaker should be set to be  $(20-10)/340 = 0.0294$  seconds or 29.4mS.

**The Image Definition Calculate function in TiMax takes care of this without you having to do the measurements or math, it even takes the elevation of the speaker and Image Definition into account.**

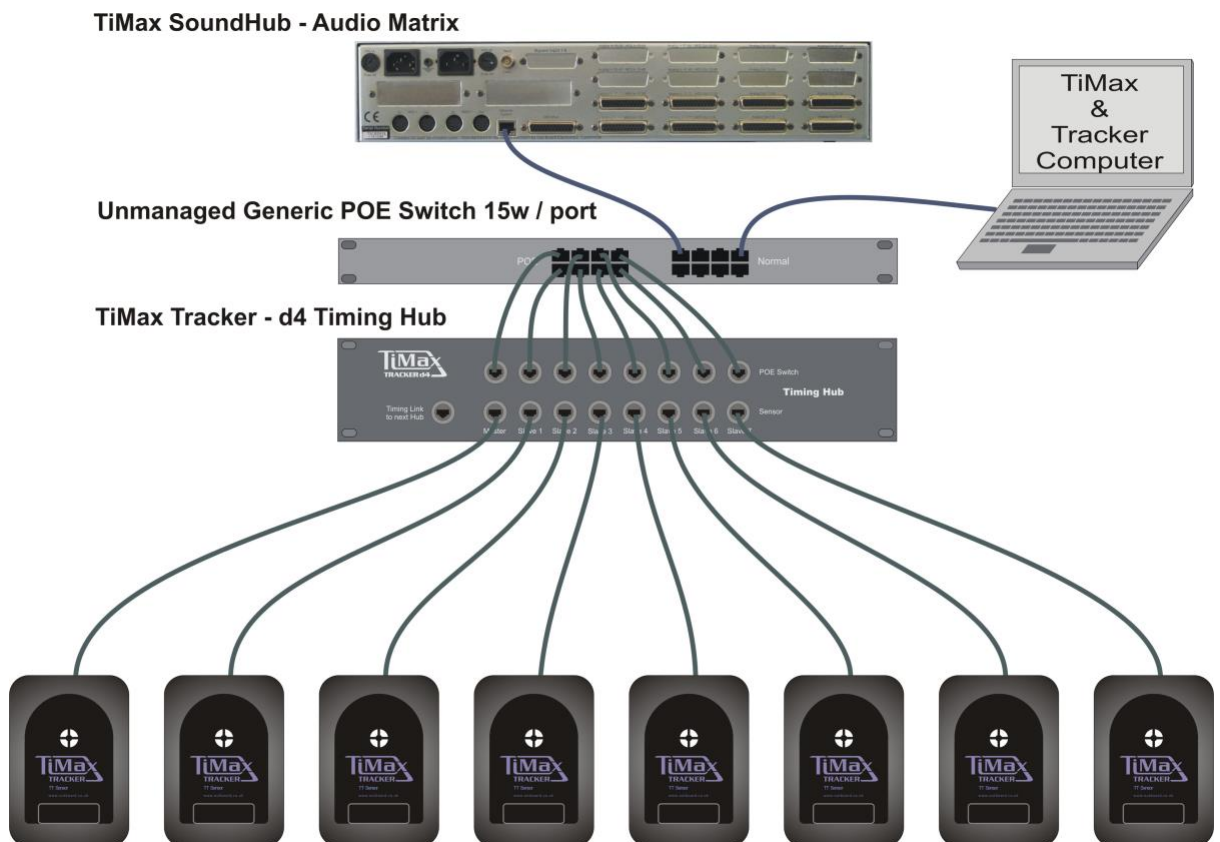
### Using performer tracking

To give the actors freedom to strut and fret their way around the stage while keeping the amplification system in time with them and therefore unobtrusive, they can be tracked with a Real Time Location System.

The TiMax TrackerD4 is a radio frequency RTLS system designed exactly for that purpose. The actors carry a small transmitter on their person which bleeps out a very low power high frequency location pulse. A set of antenna positioned around the stage pick up the signal and the software triangulates the positions of the actors.

An Open Sound Control (OSC) data stream is generated from the RTLS which is in turn fed to TiMax.

TiMax seamlessly manipulates levels and delays from the actors microphone input to the loudspeaker system to deliver accurate directional amplification.





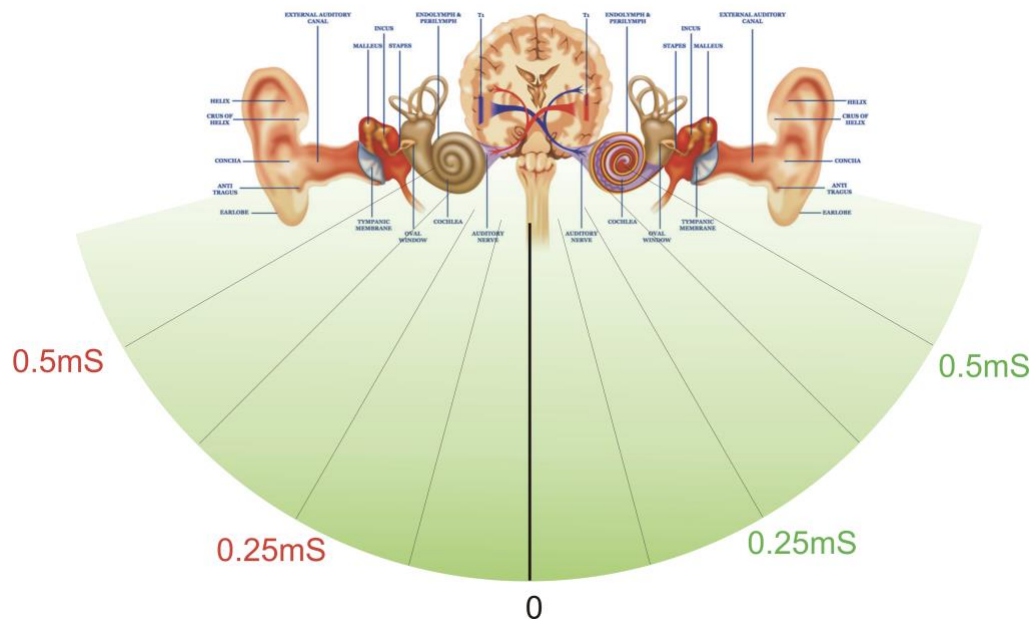
## Principles and practice

In SOR implementation here are a number of common themes that are worthy of discussion; firstly and most importantly these techniques are focused on achieving the most natural sounding "un-amplified" results in situations where amplification is necessary due to the scale or environment of the production.

This can only be achieved by using a distributed loudspeaker system with loudspeakers located and targeted at the audience such that there is minimum angular difference between that being amplified and the speaker amplifying it. In other words **you cannot maintain localisation and amplify an acoustic source in front of the listener using a loudspeaker to one side or behind.**

Humans hear binaurally. We hear sounds via two separate aural receptors (ears) and draw conclusions about the positions of the sources of the sound.

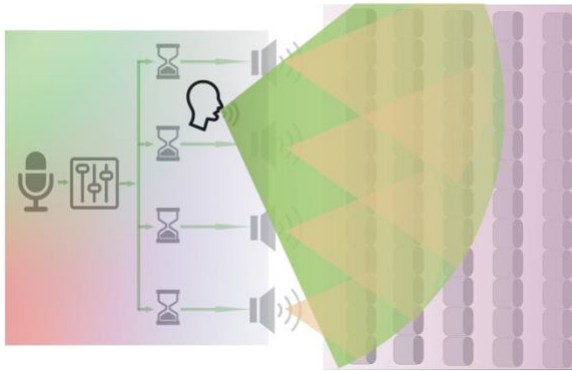
The main clues to localisation of sound are provided by differences in sound levels and arrival times between our ears. These differences allow people to "focus" their hearing onto what is of interest to them and to filter out what is not (this has been aptly named the Cocktail-Party Effect).



Delivering sound in an auditorium from a stereo loudspeaker system prevents the audience in most listening positions (i.e. anywhere off-centre) from accurately localising anything other than extreme panoramic information in the sound mix. This is because the sound from the closer loudspeaker will arrive at a listener's ears before the sound from the more distant loudspeaker.



The psychoacoustic law of Precedence, sometimes known as "Haas-effect" dictates that for a sound coming from two or more speakers the listener will perceive the sound as coming from the closer loudspeaker due to its earlier arrival time even if the more distant sound is louder. Thus audience's perception of stereo panning will only be as good as their proximity to the center line of the room.



The way to deal with this is to implement a Source-Oriented Reinforcement ("SOR") system, which, as well as achieving even distribution of sound level over a large listening area, will also maintain directional information from multiple sound sources, so that the "audio position" of a presenter, an actor, a musical instrument, recorded program or sound effect authentically matches the actual, or intended visual position.

The outcome reduces listener stress, improves intelligibility and with the attendant spatial unmasking dramatically increases message impact for all audience members. A well implemented SOR system widens the 'sweet spot' for creative panoramic or spatial information in the sound mix to over 90 per cent of the audience listening positions.

Such a system utilises a special type of multi-channel audio matrix which provides the possibility for every audio input to have its own unique level and time delay relationship to each loudspeaker, this allows every sound source to be independently localised for every audience member.

SOR techniques have been around for a long time and are finally rapidly gaining favour for top international productions of musicals, plays, arena operas, concerts, dance clubs and artists, special effects soundscapes, as well as major corporate promotional events.

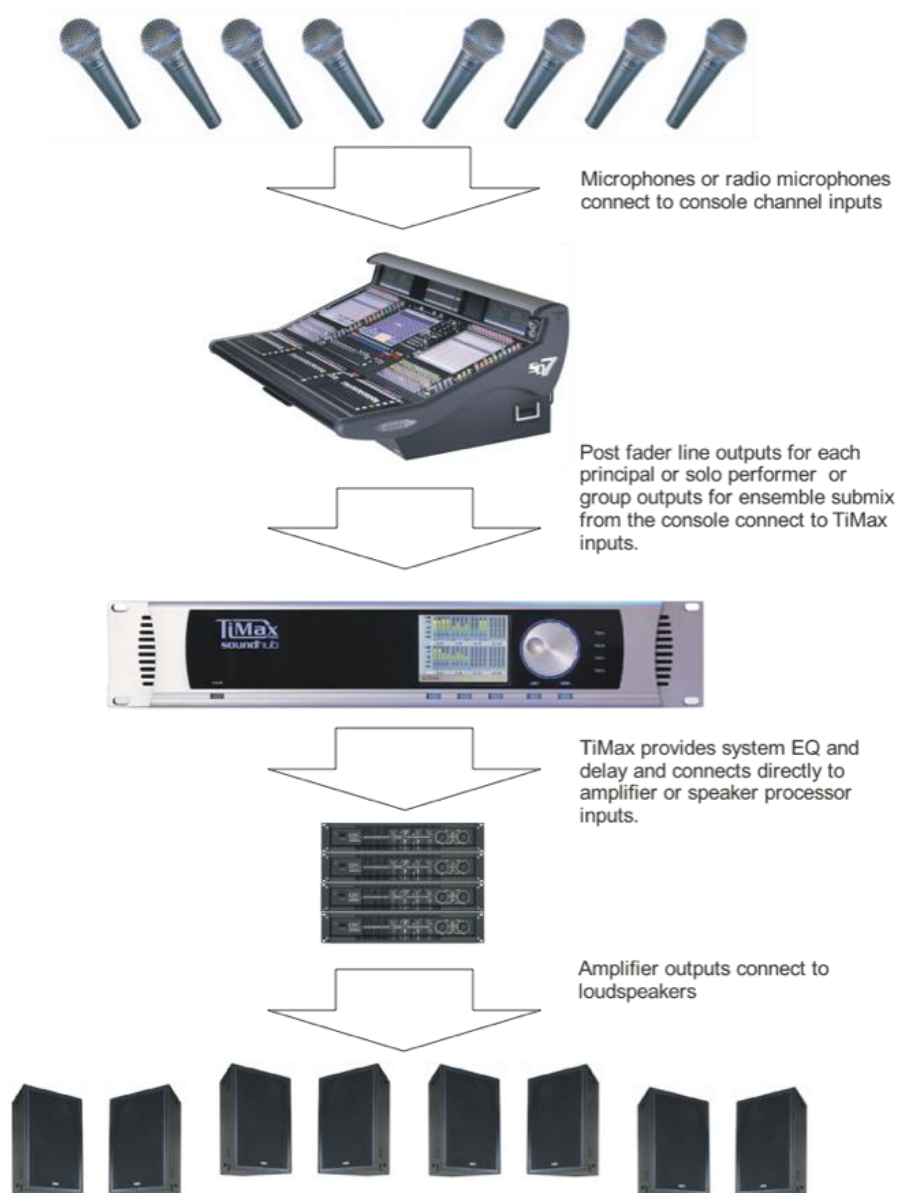
Although implementations can be very different in application and environment, typically their shared agenda is one of audience immersion and dramatic impact, often with the addition of enhanced panoramic, surround and animated audio effects.

### Typical Signal Flow

Microphones and other input sources are connected to the mixing console to provide microphone preamplification and give the operator the means to balance the various signals in the usual way.

Each signal is then routed to its own TiMax input if it is to be separately localised. In some instances, signals may be grouped for shared localisation to economise on TiMax input or console bus count.

The outputs from TiMax would then typically be connected directly to amplifier inputs so each speaker or array location is driven individually.



# Sound design examples

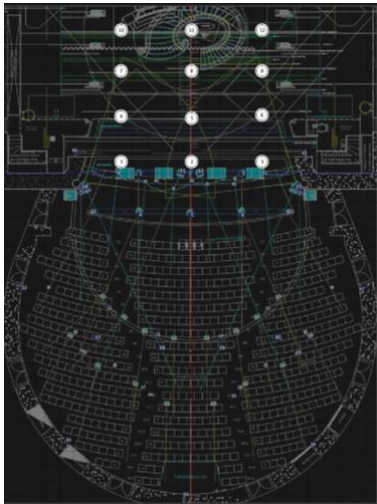
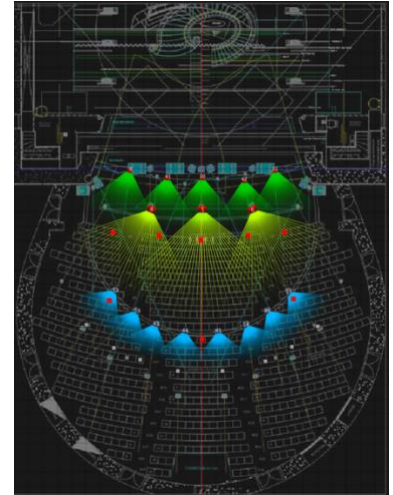
## End-on Proscenium Theatre

This example shows the implementation a vocal amplification system on a proscenium stage for musical theatre or spoken word performance. Front fills are shown in green, the flown main vocal system is shown in yellow and the under balcony speakers in blue.

Speaker placements are chosen to amplify on-stage action with speakers pointing at the audience to reinforce acoustic energy and direction from the stage with the minimum angle of deviation from the stage.

The second criterion is to minimise the areas of overlapped coverage and particularly to avoid any instances where speakers are cross firing from left to right to cover a central area as this will likely result in tonal colouration caused by phase cancellation.

The target objective is to get coverage of the entire seating area with speakers pointing at the audience from the stage.



Each loudspeaker is separately amplified and driven from its own TiMax output.

Loudspeakers for music reproduction and sound effects are not show for clarity.

The next step in the process is to subdivide the stage into zones by placing Image Definitions at each zone center.

This example shows ImDefs at 3 meter spacing. This about the same as the spacing of the main vocal system speakers and generally a good choice for zone width.

Use the facility in TiMax to calculate levels and delays for each Image and the system is ready for soundcheck in a matter of minutes.

Level shading and system balancing can be trimmed quickly and easily.

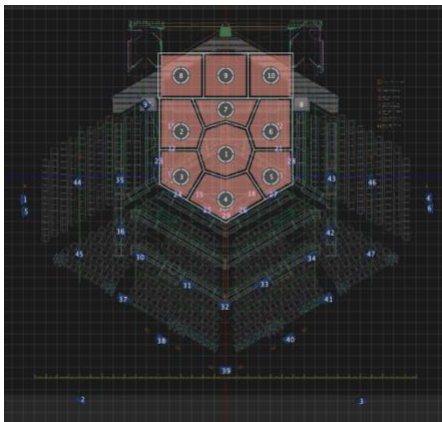
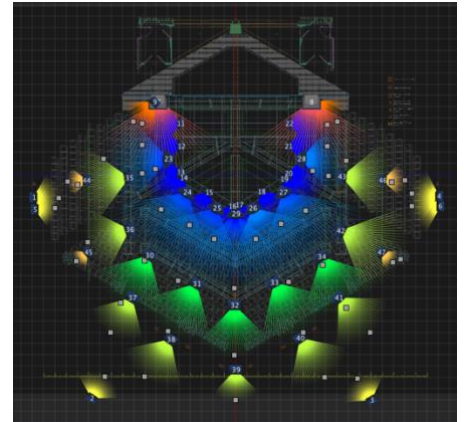


### Thrust Stage

In this example of spoken word theatre for an audience of around 1,200 on a thrust stage where it is vitally important for every word to be clearly heard, without SOR techniques and tracking effective sound reinforcement is extremely difficult.

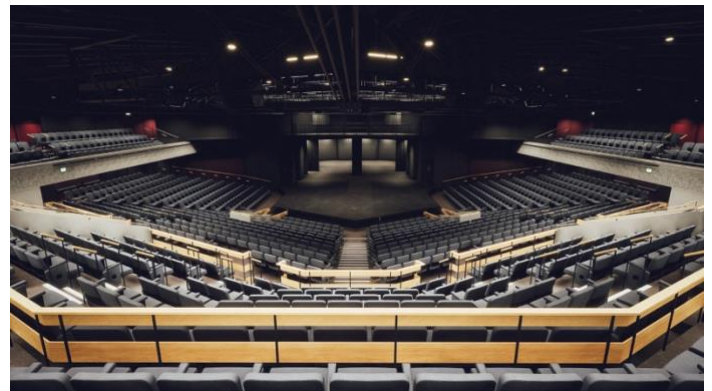
This is because the sound reinforcement can only be in time with the acoustic voice of the actors at one point on the stage.

Conversely, the application of SOR techniques on a thrust stage are extremely straightforward as the loudspeakers are almost always pointing in the ideal direction in order to achieve the aim of minimum angle of deviation between stage and speaker from the perspective of most of the auditorium seating positions.



In this instance a zoned approach was taken with ImDef placement as small shifts in delay to loudspeakers was causing some audible phasing artifacts in areas of overlapped coverage.

Choosing a zoned approach to implementation minimised this, bringing it down to an almost indistinguishable level.





## In The Round

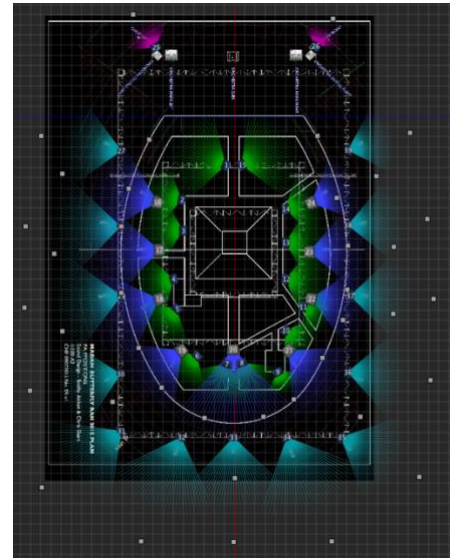
Main sound reinforcement speakers arranged as an exploded cluster arranged around the edge of the performance space. This allows each loudspeaker to have a unique delay from each microphone thus enabling TiMax to keep the amplified and acoustic signals in time and maintain precedence from the singer or front-fill if the singer is off axis or far away.

Front fills are built into the stage floor or disguised in scenery or props. These speakers fulfill the important task of keeping the sound on the floor while the singer is off axis the audience in that area.



In this example, Image Definitions were placed in and around the central stage area as well as along the walkways surrounding the main performance area.

Regions not mapped are in this case filled with water!

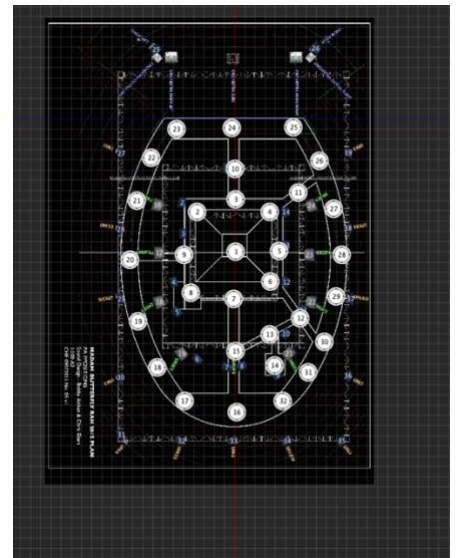


It is important to have an understanding of how the software interpolates between ImDefs.

There are two modes of interpolation offered in TiMax software. In this example we are using continuous interpolation because we want all the loudspeakers working to amplify the voices all the time.

There is a Zoned mode of operation described in the next section.

When an input is right on top of an ImDef the absolute value of that ImDef is applied to that input as the input moves away from that ImDef, the software morphs levels and delays between the closest 5 ImDefs and depending on the relative square of the difference in distance the closest are used and the furthest are progressively ignored.



### Outdoor Arena Opera

TiMax used in conjunction with TiMax tracker can be used effectively in large scale outdoor theatre to provide auditory cues to alert the audience where to look.

In this example the set was 50 meters wide and the audience area around 70 meters from the stage to the last row of seats.

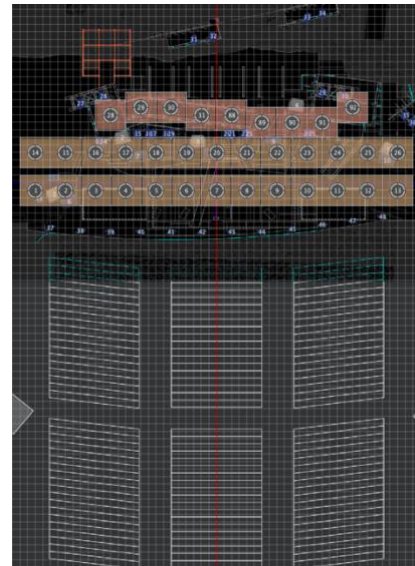
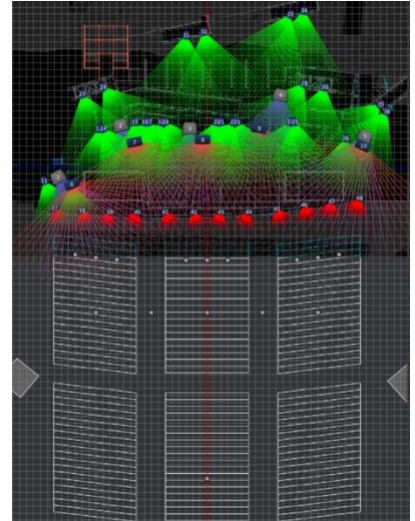
The loudspeaker system was required to cover the entire audience area from speakers built into the set.

The front fill speaker are working all the time and delay managed to keep the first wavefront in time with the singers voices while the other vocal reinforcement speakers are effectively switched on and off as the actors move around the stage. These are high power line source type speakers that are specified to cover the entire auditorium.

The Image definitions are set to be zoned which is indicated by the coloured area surrounding the ImDef. Performers are tracked using the TiMax d4 Tracker which drives the input positions via the OSC interface.

This mode means that while the performers are within the zone boundaries only the ImDef at the center of the zone is applied to the input, there is no gradual morph from one ImDef to the next closest one as the performers move around the stage. When the performers move across a

boundary from one ImDef zone to another the software crossfades between the two ImDefs at a rate defined in the System Preset



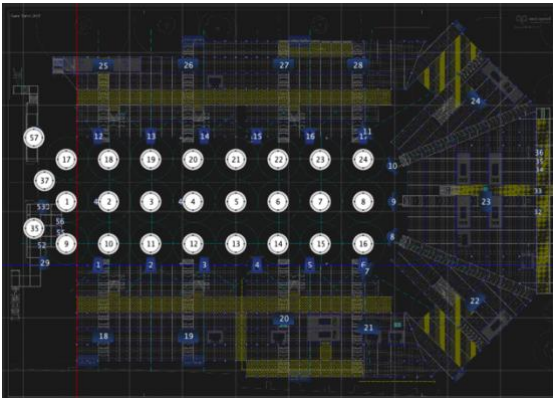
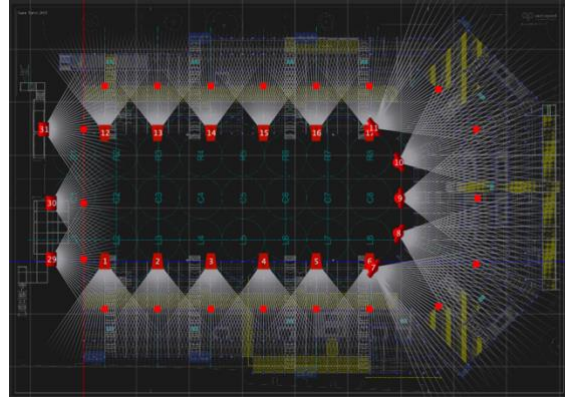


## Military Tattoo

Left and right seating stands are covered by six loudspeaker arrays mounted on poles down each side of the arena. Each array consisting of one long throw loudspeaker covering furthest seats and two near field loudspeakers covering seats near the front.

The end block of seats are covered by ground stacked line array systems with bottom boxes shooting just over the heads of the front rows and top boxes aimed to reach the back rows.

The primary consideration is to keep acoustic and amplified signals in time no matter where the source is located in the arena and from all listening positions in the arena.



The main performance area is mapped with ImDefs as in other examples. In this case only the ImDefs for microphones are shown, there are another set for esplanade monitoring and ambient microphone positions.

As the sound designer makes decisions during rehearsal which performers need reinforcement, TiMax picks up signals from the console which can then be placed in the virtual stage in the software corresponding to their position on the esplanade to ensure perfect timing of the acoustic with the amplified.

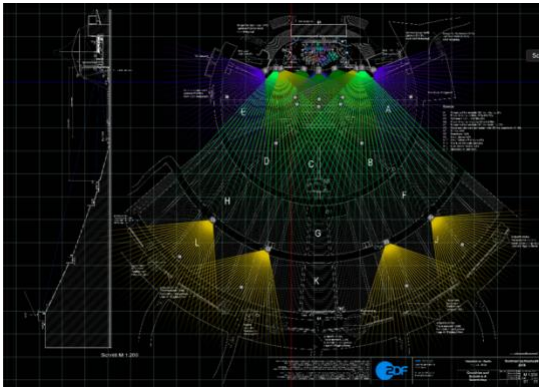


As the amplified performers move around the field of play, their trajectories can be programmed, tracked or followed manually.



## Orchestral Reinforcement

This huge outdoor stage setup is for full a full orchestral performance to a capacity crowd of 22,000 people.



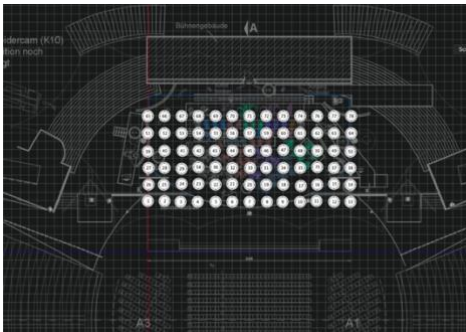
Speaker x,y,z positions are set in TiMax software. The timing calculation reference point for each speaker is also set.

The software uses this point to calculate time delays based on the difference in distance from the instrument microphone and the loudspeaker. That's why we call it the lucky seat.

The stage area is peppered with Image definitions by using the Make Image Definition Array feature to prepare in advance for all final microphone positions.

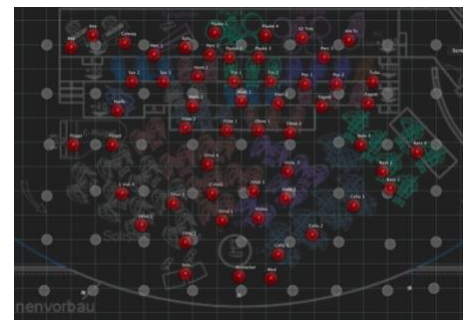


Levels and delays to all speakers are calculated with a few button clicks.



Delays and level shading can be recalculated live while audio is running during sound check to get the best level balance across the speakers for the most accurate natural reinforcement.

When the orchestra mics are set, place them in the PanSpace spatialisation layer to time each microphone perfectly to each loudspeaker coverage area.



## Immersive

This example is a high profile national celebration on a purpose built 100m long enclosed esplanade with seating along both sides.

Content is live orchestra, playback and sound design elements to support video mapping, lighting and actors, processions and floats.

Audio control is located around 100m from the FOP (Field Of Play) so it was necessary to setup a TiMax outputs for local monitoring that reflected movement and placement in the

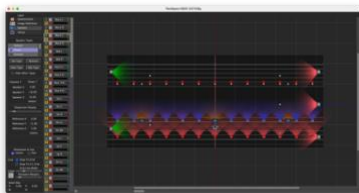
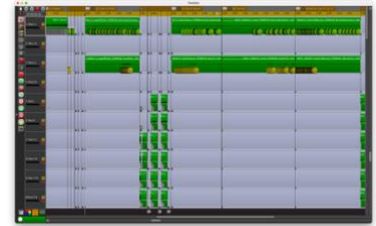


FOP

TiMax was deployed to spatialise the sound design element of the show, this falls into two categories; sound design as part of the musical score and sound design scenic linking.

In the first case playback source is from the main music playback server.

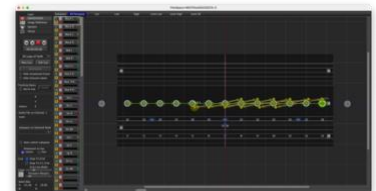
To program movement against the audio timeline, these stems are imported into TiMax so movement and spatialisation can be programmed against the audio waveform. In the second case the TiMax playback server is responsible for delivering audio to the speaker system.



In preparation, numerous layers of Image Definitions were created using various combinations of the 26 ground and 26 flown speakers, 4 end arrays and distributed subs. Once the speakers are placed in the software, levels and delays for multiple scenarios are calculated in a click to cater for all eventualities.

A networked control computer allowed these to be reviewed on the (then building site) FOP and the most effective chosen.

A set of pans were programmed in the PanSpace environment into template cues and copy pasted over the audio waveforms in the TimeLine environment. This workflow caters for final content arrival at the 11<sup>th</sup> hour.



TiMax cues were triggered by OSC messages from the main show playback server.



# GPIO Specification

The General Purpose IO port is a contact closure port for triggering cues and audio playback in a TiMax2 unit, and for controlling equipment external to the unit. The inputs and outputs are all electrically isolated for reliability and electrical safety. The GPIO connects to the outside world through a DB25 connector on the back panel of the unit. Within the connector, there are eight address inputs, two trigger inputs, two contact closure outputs and a isolated powersupply with a nominal 8v power output.

An input can be activated by placing a voltage on the signal line of 5 to 24 volts DC with respect to the current return line. An input can be deactivated by placing a voltage on the signal line of 0.8 volts DC or less with respect to the current return line, or by opening the current loop. The current loop has an impedance of approximately 4000 ohms. The trigger inputs are locked out following a valid trigger, preventing false retriggering due to contact bounce or noise. The default lockout time is 1 second.

There are two forms of playback GO. A simple GO, sometimes called a null GO, starts playback on all channels that have audio files already loaded on them. It is very fast <1mS. (If a channel is already playing audio, that channel is unaffected.)

A full GO specifies an audio file and a location to start playback in the file. It can take up to about 20 milliseconds from when the command is received to when playback starts.

The playback GPI trigger does two things: it recalls a preset (numbered 256..511) and at the same time it does a null playback GO.

The other GPI trigger, the cue trigger, just recalls a preset (numbered 0..255).

When the cue trigger input is activated, the number binary-encoded on the address lines (0..255) is read, and the cue with that number is activated.

When the playback trigger input is activated the cue at 256 + the number binary-encoded on the address lines (0..255) and a playback GO is generated on all enabled playback channels which will start playback within 1 millisecond for pre-loaded.

A show control GO which activates the next cue is also available by setting all zeros on the address lines and activating a cue trigger.

## Output Pins

The two general purpose outputs are isolated relay contacts.

These outputs can be turned on and off from within the TiMax2 software (see "GPO 1" and "GPO 2" buttons in the GPIO tab of the Information / Configuration window.

There is no current ability in software for the GPO lines to be programmed.

### **Input Pins**

Each general purpose input utilises a pair of pins, connected to a positive pin and a corresponding return pin of the diode in an opto isolator.

The input pins have an input impedance of about 5K ohms. Any input current above approximately 1 milliamp will register as a logic high. In terms of voltage, this means any voltage between a pin and its return pin of 5 volts or more will create enough current to register as high.

Input voltages up to 24 volts (between a pin and its return pin) are acceptable. Voltages above 28 volts may damage the GPIO port electronics.

### **Power Supply Output**

There is an isolated power supply that may be used to drive GPI inputs. This voltage is on pin 13. It is unregulated and may read between about 6 and 12 volts. Electrical contacts, such as pushbuttons and relays, may be wired between this voltage and input pins. The return side of this isolated power supply is hard-wired to the cue trigger return. If an input other than the cue trigger is to be activated from this isolated power supply, the return for that input must be tied to the cue trigger return. See the GPIO schematic later in this document.

## GPI Address

There are eight address inputs. The high / low state of these inputs at the time of a trigger determines the address of the cue that will be triggered. The states of the eight address inputs encode one of 256 cue numbers in the range of 0 to 255. The eight inputs form an 8-bit binary number, with address 7 as the most-significant bit and address 0 as the least-significant bit. As an example, if address inputs 0, 1, 2, and 3 are high and address inputs 4, 5, 6 and 7 are low, the address is 15 (1 + 2 + 4 + 8). In this case, a cue trigger will fire cue number 15.

GPI triggers can only fire cues with whole cue numbers. (e.g. "22", not "22.6").

PIN DB25 Connector Pinout	
1	Address 0
2	Address 1
3	Address 2
4	Cue Trigger
5	Address 3
6	Address 4
7	Address 5
8	Address 6
9	Playback Trigger
10	Address 7
11	Output 1
12	Output 2
13	Isolated Power
14	Address 0 Return
15	Address 1 Return
16	Address 2 Return
17	Cue Trigger Return
18	Address 3 Return
19	Address 4 Return
20	Address 5 Return
21	Address 6 Return
22	Playback Trigger Return
23	Address 7 Return
24	Output 1 Return
25	Output 2 Return

## GPI Triggers

There are two GPI triggers, called the cue trigger and the playback trigger.

The cue trigger fires the cue at the address in effect at the time of the trigger.

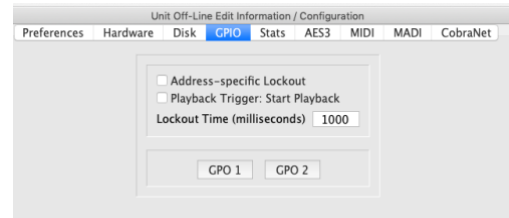
The playback trigger also fires a cue, but with two differences.

First, the cue that the playback trigger fires is in the range of 256 to 511. In other words, the playback trigger adds 256 to the address number value encoded on the address inputs. Therefore, using the two triggers, a total of 512 different cues can be triggered.

Second, the playback trigger also starts playback on any and all input channels that have an audio file loaded on a channel.

There is a lockout timer which should be used to de-bounce any mechanical contact closures used with the GPIO.

It is possible to make the lockout specific to an address (by checking "Address-specific Lockout"). This means that the lockout mechanism only applies when a trigger arrives on the same address as the previous trigger.



## Next Cue

The cue address 0 (all Address Lines low) has a special function. This address is used to trigger the next cue in the cue list.

This can be used for stepping through a show with a remote push button.

Note that only the cue trigger can generate a cue address "0"; the playback trigger with all inputs inactive generates a cue address of 256.

## Trigger Timing

When a GPI trigger input is activated, the address inputs are read and the cue number to be triggered is formed from the instantaneous state of the address inputs. If the address inputs are changing at that time, unpredictable and potentially unstable operation may result. For this reason, it is necessary to change the address inputs and then wait for at least 1mS for the inputs to settle before activating the trigger.

# MIDI Specification

The MIDI driver does the same thing for both ports with notable exceptions in how it deals with controller messages.

So, for example:

- Incoming MTC can be plugged into either port.
- Note-On message on either port will trigger a cue if one is so programmed.
- Program Change message on either port will trigger a cue if one is so programmed.

A continuous controller message can be sent to either port, but it does different things depending on the port:

On port 1: set group level

On port 2: recall image definition

MIDI message details, (the byte values are as sent on the MIDI cable, i.e. before the GUI "Japan vs. U.S." interpretations take place)

For set group level:

// Status byte is continuous controller byte, 0xBn, where n is MIDI channel

// 2nd byte (MIDI controller number) is group number 0..31

// 3rd byte (MIDI controller value byte) is level 0..127

For recall image definition:

// Status byte is continuous controller byte, 0xBn, where n is MIDI channel

// 2nd byte (MIDI controller number) is input channel number 0..63

// 3rd byte (MIDI controller value byte) is img def number 1..127

**NB TiMax does not respond to running status messages.**



# Hotkeys

TiMax Software Key Shortcuts

Order	Menu	Command	Shortcut (Qt)	HotKey Mac	HotKey PC	Mac Offline	Mac Online	PC Offline	PC Online
1	File	Save Show	Save	command S	control S	✓	✓	✓	✓
2	File	Save Show As	Shift+Ctrl+S	shift command S	shift control S	✓	✓	✓	✓
3	File	Save Show All Units	Shift+Alt+Ctrl+S	shift command option S	shift control alt S	na		na	
4	File	XML Show Viewer	Shift+Ctrl+X	shift command X	shift control X	✓	✓	✓	✓
5	File	Make Show Archive	Shift+Ctrl+A	shift command A	shift control A	✓	✓	✓	✓
6	File	Load Show Archive	Shift+Ctrl+L	shift command L	shift control L	✓	✓	✓	✓
7	File	Import from Show File	Alt+Ctrl+I	command option I	control alt I	✓	✓	✓	✓
8	File	Import Image Definitions from CSV File	Alt+Ctrl+V	command option V	control alt V	✓	✓	✓	✓
9	File	Export Image Definitions to CSV File	Shift+Ctrl+V	shift command V	shift control V	✓	✓	✓	✓
10	File	Import IO Labels from CSV File	Alt+Ctrl+L	command option L	control alt L	✓	✓	✓	✓
11	File	Export IO Labels to CSV File	Shift+Alt+Ctrl+L	shift command option L	shift control alt L	✓	✓	✓	✓
12	File	Import On-Cue Labels from CSV File	Alt+Ctrl+R	command option R	control alt R	✓	✓	✓	✓
13	File	Export On-Cue Labels to CSV File	Shift+Alt+Ctrl+R	shift command option R	shift control alt R	✓	✓	✓	✓
14	File	Print Cue List to File	Alt+Ctrl+P	command option P	control alt P	✓	✓	✓	✓
15	File	Print Audio List to File	none			na	na	na	na
16	File	Get Firmware Memory Log	Shift+Alt+Ctrl+F	shift command option F	shift control alt F	na	✓	na	✓
17	File	Get System Error Log	Shift+Alt+Ctrl+E	shift command option E	shift control alt E	na	✓	na	✓
18	File	Convert tma files to aiff	none			na	na	na	na
19	File	Open TiMax Files Directory	none			na	na	na	na
20	File	Clear Software Settings	none			na	na	na	na
21	File	Quit	Quit	command Q	control Q	✓	✓	✓	✓
22	Edit	Undo	Undo	command Z	control Z	✓	✓	✓	✓
23	Edit	Redo	Redo	shift command Z	control Y	✓	✓	✓	✓
24	Edit	Cut	Cut	command X	control X	✓	✓	✓	✓
25	Edit	Copy	Copy	command C	control C	✓	✓	✓	✓
26	Edit	Paste	Paste	command V	control V	✓	✓	✓	✓
27	Edit	Duplicate	Ctrl+D	command D	control D	✓	✓	✓	✓
28	Cue	New Cue	Shift+Ctrl+N	shift command N	shift control N	✓	✓	✓	✓
29	Cue	Go Next Cue	Shift+Return	shift return	shift return	✓	✓	✓	✓
30	Cue	Edit Current Cue	Shift+Ctrl+E	shift command E	shift control E	✓	✓	✓	✓
31	Cue	Edit Next Cue	Alt+Ctrl+E	command option E	control alt E	✓	✓	✓	✓
32	Cue	Update System Preset	none			na	na	na	na
33	Cue	Recall System Preset	none			na	na	na	na
34	Cue	Duplicate Current Cue	Shift+Ctrl+D	shift command D	shift control D	✓	✓	✓	✓
35	Cue	Duplicate Next Cue	Alt+Ctrl+D	command option D	control alt D	✓	✓	✓	✓
36	Cue	Delete Current Cue	none			na	na	na	na
37	Cue	Delete Next Cue	none			na	na	na	na
38	Cue	Renumber Cues	none			na	na	na	na
39	Unit	Scan / Go Online	none			na	na	na	na
40	Unit	Connect at IP	Alt+Ctrl+N	command option N	control alt N	na	✓	na	✓
41	Unit	Unit Information / Configuration	Ctrl+I	command I	control I	✓	✓	✓	✓
42	Unit	Transfer Audio To Unit	Shift+Ctrl+T	shift command T	shift control T	✓	✓	✓	✓
43	Unit	Clear Disk Drive	none			na	na	na	na
44	Unit	Delete All Audio Files	none			na	na	na	na
45	Unit	Delete All Show Files	none			na	na	na	na
46	Unit	Install New Firmware	Shift+Ctrl+I	shift command I	shift control I	na	✓	na	✓

# Conformance



**out board**

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## CERTIFICATE OF CE CONFORMANCE

This is to certify that the electrical equipment detailed below conforms to the conventions outlined in BS7671, Requirements for Electrical Installations - IEE Wiring Regulations Sixteenth Edition.

### Reference to Specifications under which CE conformity is declared.

EMC: EN50081 Part 1 & Part 2 Radiated and Conducted Emissions  
General Domestic, Commercial, Light Industrial & Industrial

EMC: EN50082 Part 1 & Part 2 Radiated and Conducted Emissions  
General Domestic, Commercial, Light Industrial & Industrial

LVD: EN6101  
Safety requirements for measurement, control and laboratory use.

### Description of apparatus

Equipment Name	TiMax2 SoundHub
Description of Equipment	DSP Audio Matrix Processor

### Signatory

Date: 20<sup>th</sup> February 2009

Name: D.P. Haydon

Signature:

# Technical Specifications

## CHASSIS & PSU

2U 19" Rack mount steel chassis, 450mm / 17.5" deep, 10kg / 22lbs approx weight.

Internal FPGA 48KHz (96KHz firmware upgrade coming soon), CPU, SSD, MADI or Dante 32x32 (32-Track); 64x64 (64-Track); OPTIONAL AES or Analogue 16x16 I/O modules

Forced air-cooled, low fan noise, OPTIONAL extra redundant fan.

EMC shielded to conform to CE / UKCA interference emission and susceptibility requirements

Power Supply: Fused Inlet EMC Filtered 130W universal voltage 80-265VAC at 50/60Hz. OPTIONAL Dual redundant Inlet on fused IEC connector(s). Conforms to European LVD, UL, CSA, Nemco safety requirements, filtered to conform to CE requirements. Conforms to UKCA requirements

OPTIONAL S-Version licence for PanSpace and TimeLine spatial rendering, showcontrol and tracking

OPTIONAL extra redundant PSU with additional IEC connector

OPTIONAL TiMax Portal bespoke touchscreens, custom GUI design service.

## CONNECTIONS

Dante64: 64-in & 64-out, 48KHz, (Dante64X: 64-in & 64-out, 96KHz / 48KHz coming soon)

OR

MADI64: 64-in & 64-out 48KHz on BNC and Optical, plus BNC Word Clock in/out

OPTIONAL AIO Analogue I/O card: 16-in & 16-out line-level in groups of 8 balanced signals on female DB25's (Yamaha analogue pinout)

OPTIONAL MIO AES Digital MIO I/O card: 16-in & 16-out AES3 on separate DB25's plus 16 analogue outs on two DB25's. (Yamaha analogue pinout for both Analogue and AES). Sync selectable from internal 48KHz or 96KHz clocks, external Word Clock source via BNC, or selected AES3 input(s). Input and output SRC's allow multiple sample-rates across different AES inputs and outputs.

Headroom: +22dBu; Dynamic Range:114dB; THD+Noise: <0.002%, 20-20KHz; Fixed latency: <2ms

Two MIDI in/out DIN socket pairs, MIDI Prog / Note / MTC on both; also on Port1-In: MIDI Controllers can control Group faders 1-32; also on Port2-In: MIDI Controllers can control PanSpace Zone input object changes.

RJ45 Ethernet (UDP) for PC/Mac control and XML/UDP remotes or showcontrollers. Up to four client computers, auto-config plug 'n play default with DHCP, static IP and forced IP modes.

## FACILITIES

Routing/level/delay-matrix FPGA spatial audio processor core in configurations 32x32 or 64x64. Field upgradeable from 32 to 64 with license key

8-band parametric EQ on inputs, 8-band parametric EQ on outputs, linkable

32 assignable input and output DCA Group level controls, also on front panel LCD

Input Source Submixer for Analogue (or AES) / Playback Track / Network on each input channel

Live cross-fadeable Cue Snapshots between Submix sources, I/O levels, level/delay matrix routings. Also EQ without crossfade.

Cue Snapshots assignable to selectable I/O channels and parameters

Dynamic delay-matrix spatialisation controllable by PanSpace, TiMaxTrackerD4 and external OSC

Advanced holistic FPGA smooth delay-panning algorithms for ultimate transparency

Image Definitions, EQ's, Groups, Channel Labels, System Preset exportable between shows.

Multi-channel random-access audio playback 32- or 64-track on (minimum) 250Gb SSD

Multiple units accessible from up to four Mac or PC control software clients

256 GPIO input trigger ports matrixed on DB25

OSC input control of PC/Mac software: levels, mutes, groups, cues, Panspace spatialisation, 3D stagetracking control

Front panel Menu: I/O Meters/Solo/Mute, Group Levels/Solo/Mute, Show select, Cue select, Utility, IP. Password protected.

AES Input SRC's allow different 44.1 / 48 / 96KHz incoming sample rates on any AES3 input pair.

AES Output SRC's allow different 48 / 96KHz sample rates and clock source on any AES3 output pair.

SoundHub-S licence:

PanSpace adaptive auto-rendering of Image Definition localisation and spatialisation objects.

Embedded TiMax TrackerD4 functionality, per-channel tracking Enable/Disable within Cues.

Integrated PanSpace and Time Line automated immersive spatial rendering on multiple SubSpace layers, scheduling and timing of input object panning across level/delay Image Definition objects.

TimeLine comprehensive audio playback editing, mix automation, advanced audio showcontrol, Cue input Triggers (FollowOn, MIDI/MTC, Show Clock, OSC) and output Events (MIDI/MTC, UDP, ShowClock) programming. Timing and scheduling of PanSpace programmed trajectories.