KRISTALLSTIMMEN

BY RAFAEL LOZANO-HEMMER

Version : 2025-02-10

TABLE OF CONTENTS

GENERAL IMPORTANT INFORMATION

KRISTALLSTIMMEN (2024)

BY RAFAEL LOZANO-HEMMER

Technique

3000 Custom-made speakers and electronics, LED lights, computer, micro-SD cards, cameras.

Description

Kristallstimmen is an interactive installation designed for Swarovski's "Crystal Worlds Museum" in Wattens, Austria. The piece features an array of 3,000 suspended loudspeakers, each clad in hundreds of small black crystals that get illuminated when the loudspeaker is playing back sound. As visitors traverse the space, a sensor detects their presence and activates the loudspeaker directly above them, which lights up and plays a voice recording of a person introducing themselves. Each loudspeaker contains a recording from a different company employee from around the world, speaking in their native language, with over 100 languages represented. When no visitor is present, the installation is silent.

The piece is intended as social sculpture, by both giving a Museum presence to the diverse workforce that the company

Many people visit the Alps. By giving voice to the diverse workforce behind Swarovski, the piece creates an interactive soundscape that highlights the people and skills integral to the company's success—designers, engineers, researchers, salespeople, and others. The installation serves as a social sculpture, shifting focus from the product to the individuals whose work brings it to life. In this way, the piece transforms the perception of Swarovski crystals, emphasizing the human effort and expertise behind their creation.

Operation

Please refer to Appendix I - Installation for detailed system information and wiring diagram.

1. Artwork will run automatically daily, the computer will reboot automatically every day at 5am.

2. If it is necessary to manually start the piece, turn **ON** the computer by pressing the power button all the way down for one second. The artwork will start up automatically after a couple of minutes.

General Artwork Behaviors

When no one is under the piece, Idle mode will be on. This looks like slow waves going through the LEDs on the speakers, there should be **NO SOUND**.

When someone is being tracked, one speaker should be lit up and playing sound in the centre of a circle of black speakers (black speakers = LEDs off and **NO SOUND**). The bright speaker in the centre of the circle should appear in the spot that the person is. It should not “trail” from a different location to reach you.

When the tracked participant moves the one speaker in the centre should then follow them. All other LEDs outside of this circle should be brightly lit with **NO SOUND**.

Maintenance

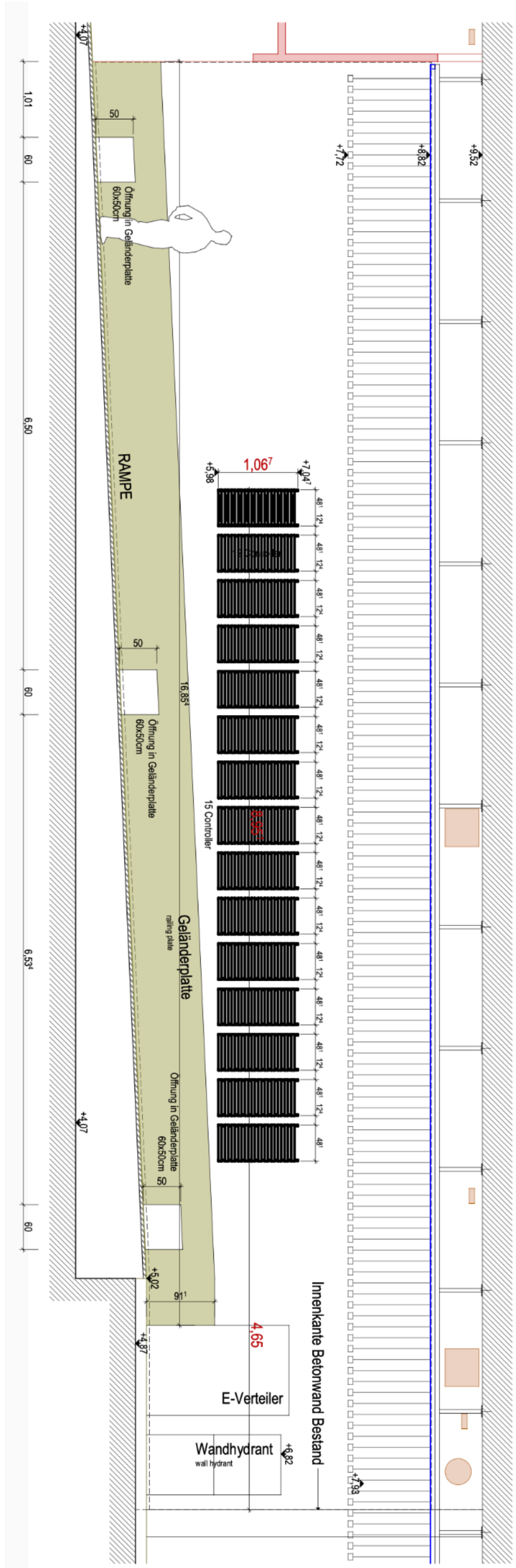
During the running of the piece, as often as possible, walk around and check:

- That all LED strips light up correctly and do not exhibit any extreme flickering or freezing.
- That none of the speakers produces any harsh distorted sounds.
- That the speakers are silent or producing sound when expected.
- That interactive tracking is still functional and well aligned.
- That idle mode turns on when no one is under the piece.

If one or more of the above conditions are not met please consult the Preliminary Troubleshooting Section. For shows of a longer duration or permanent installation, you will want to dust the speakers from time to time. Please use compressed air to dust them off. Alternatively, an antistatic duster could be used, however, it should be done with care around the ethernet cable connectors to prevent disconnecting the speaker.

Placement Instructions

There are a range of heights from speaker to floor. No speaker should be closer than 2.7m to the floor. The floor has a black PVC covering with semi-gloss. The image on the next page represents the profile view of the piece and various guidelines for hanging the speakers.


RAMPE
Öffnung in Geländerplatte
60x50cm
Geländerplatte
railing plate
15 Controller
E-Verteiler
Wandhydrant
wall hydrant
Innenkante Betonwand Bestand
1,06⁷
4.65
16.85⁴
6.50
6.53⁴
1.01
60
50
91¹

DETAILED TECHNICAL INFORMATION

Normal Software Operation

The computer tracking people, triggering light and sound is sitting in the rack, with the DMX controllers. It runs 24/7, with a scheduled reboot everyday, near 2AM, ensuring some breathing time for the electronic components.

Two software programs are in use:

- Orbbec.toe: Captures data, filters it, and sends a monochrome texture to SendingDMXBlack.toe.

- SendingDmxBlack.toe: Captures texture sent by Orbbec.toe and sends light and sound commands to speakers

At the time of writing this manual, the softwares are coded under TouchDesigner's platform, version 2023.11880. Such softwares were initially released and tested on a Windows 10 Pro computer, using an NVIDIA RTX 4060 Ti, 32 GB of RAM and 1 TB of storage.

Normal operation includes:

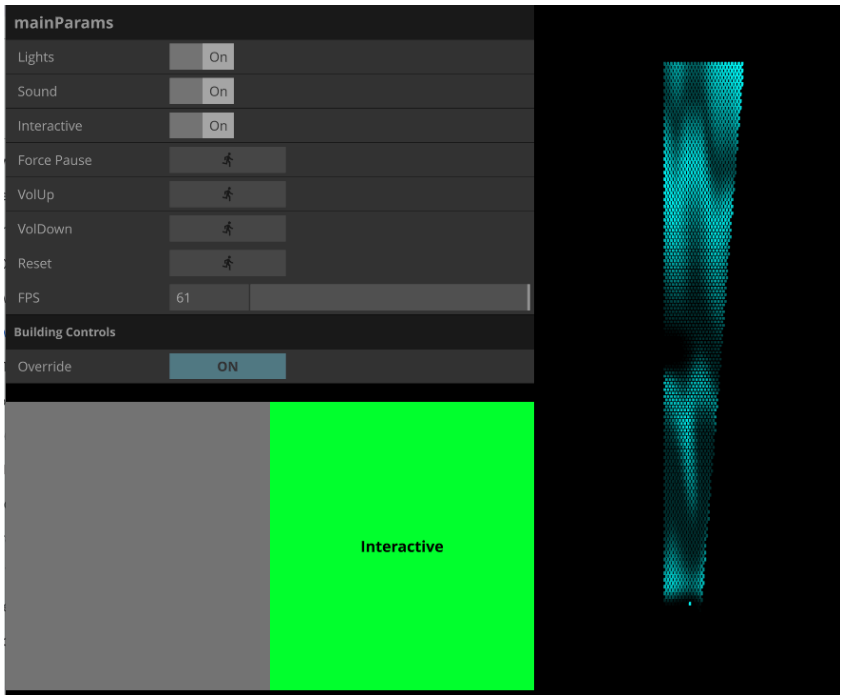
- Tracking everyone in space

- 1 speaker per interactor will turn **ON** as it moves in space.

- When no one is there, Idle mode is **ON**, no sound should be heard. A wave-like pattern should appear in the lights

Manual Software Calibration

Some variables for adjustments are available in the SendingDmxBlack.toe interface which is visible by default. The interface can be seen in the screenshot below. These variables should not normally need to be changed. However their functionality is detailed here for clarity.



The following table shows the variable names and a description of their functionality.

Setting	Description
Lights	Toggle lights on or off
Sound	Toggle sound on or off
Interactive	Toggle normal piece's interactivity vs idle mode. See GENERAL ARTWORK BEHAVIORS for explanation of idle mode.
Pause Button	**Should be used only for debug purposes.** Gets all speakers to pause their playback.
Vol+ Button	**Should be used only for debug purposes.** Increases all speakers' volume up to 10% louder.

Setting	Description
Vol- Button	**Should be used only for debug purposes.** Decreases all speakers' volume up to 10% quieter.
Reset Button	**Should be used only for debug purposes.** Sets all the speakers to their default volume (about 50%) and returns to the beginning of the first track. The speaker will be in PAUSE mode (ie. play command must be issued after reset).
FPS (next to Lights Viewport)	Framerate of the software, it should always be around 60 showing the app functions properly.
Override	Allows the user to bypass the building control signal received from Swarovski to avoid glitches. Should be **ON** by default.
Lights Viewport	The image on the far right in the screenshot above. Shows what goes to the lights, it should look mostly like a wave

Preliminary Troubleshooting Steps

A single speaker's LEDs are off/ A single speaker will not stop its audio

Set up the ladder under the speaker. Assure that you avoid standing in a way that pushes the speakers and only your head breaches the speaker level. Unclip the speaker's metal clip and unplug the speaker. Swap the speaker with one you know works, this could be a spare or a neighbouring speaker. If the working speaker's LEDs are not on, the affected speaker should be replaced with a functioning spare with an SD card. (If there's no SD card in the spare, you will need to remove the on from the affected speaker and place it into the spare)

If the speaker's LED does not turn on but sound plays when you plug it, trace the affected speaker to its controller. You can do this by exposing the label above the panel and finding where it is plugged in the dimmer bays.

When you have traced the speaker back to its dimmer, check the port it is plugged in. If there is a green and orange LED on, check the cable. If the cable is a grey jumper cable that is plugged into an extender, replace the extender (especially if it is a metal one). If this does not fix the issue you will need to re-crimp the RJ45 head on both ends of the cable. (Note: To recrimp all power must be off and it must be done by a professional, a miss wire crimping could cause major damage to the board or speaker)

If the green LED is off, the port is dead. You will need to replace the dimmer. To do so, power off the unit and unplug all the wires from the ports. Note the port order that is on the current dimmer, it will need to match exactly. Print a replacement label that matches the affected dimmer and apply it before swapping. Swap the units by unscrewing them from the rack and screwing in the next unit. Before replugging the yellow RJ45 or the two wire light cables, you must now program the unit. Refer to the REPAIRS: Reprogramming a Controller

If a light is out or dim and it is NOT the speaker itself causing the issue, the Murmurator is the issue and needs to be replaced. Turn off the power to do so and replace the Murmurator with another that shares the same DMX address label.

A single speaker plays no audio/repeatedly clicks with no other sound

Set up the ladder under the speaker. Assure that you avoid standing in a way that pushes the speakers and only your head breaches the speaker level. Unclip the speaker's metal clip and unplug the speaker. The speaker SD's card is corrupted and must be changed.

If an SD card fails, try to plug it into your computer, if it's too corrupted to open, then replace it with a random track. If the card is readable, replace it with the track that matches the name of the SD card

If a speaker has lights on and no sound

The problem is likely the SD card. Follow the instructions in the response above to fix the issue.

A whole section is off

If there is a whole section of the piece off (LED or Sound), 15-16 speakers, then a control box is not receiving power or data. The power of the boxes are received by cables that run on the outside of the control boxes then plugs into it from there.

The data is also received from ethernet connections made between control boxes from outside plugging ethernet connections, confirming the proper function and plugging of these cables and if they need to be replaced. They will be pulled into ports noted as DMX IN and DMX OUT respectively.

A section is playing sounds with no lights

The controller needs to be power-cycled to ensure that old commands can be cleared and allow for the controller to newly receive commands. This can be achieved by either pressing the switch of the plug located next to the power plug or physically unplugging the cable that runs from the back of the box. In either case, let the unit be without power for 3 - 5 seconds before returning power.

A section of lights are mirrored or out of line

The controller might share a DMX starting address with another in the Universe, replace the controller with one of the spares with the proper address. If this resolves the issue you will need to properly re-address the DMX controller.

A portion of or the whole room is in a frozen state: no reaction happens in any light or speaker

This potential situation may happen when the data isn't flowing properly between the computer and the rest of the components. We recommend looking at the main connections between the computer, the DMX controller, and the speaker controllers, securing them if needs be. Ensure the computer is running properly and all the components are well powered.

Troubleshooting Assistance

Prior to contacting the Antimodular Studio with a problem about your artwork, please ensure that you went through the preliminary troubleshooting steps outlined in the previous section.

The troubleshooting process will vary depending on the problem. In order to make the process easier, it is recommended that you collect and send the following information to the studio:

- Date and time when the problem first happened;
- Description of the problem;
- Actions taken so far and conclusions;
- Detailed photographs (or videos) displaying the problem;
- Detailed photographs (or videos) of the suspected faulty component;
- Detailed photographs (or videos) of the whole artwork and its surroundings;
- Personnel involved.

Support (Contact Us)

If you would like support for the piece, please feel free to call Lozano-Hemmer's studio in Canada:

Antimodular Research
4462 rue Saint-Denis
Montréal, Québec, Canada
H2J 2L1
Tel 1-514-597-0917
info@antimodular.com
www.antimodular.com

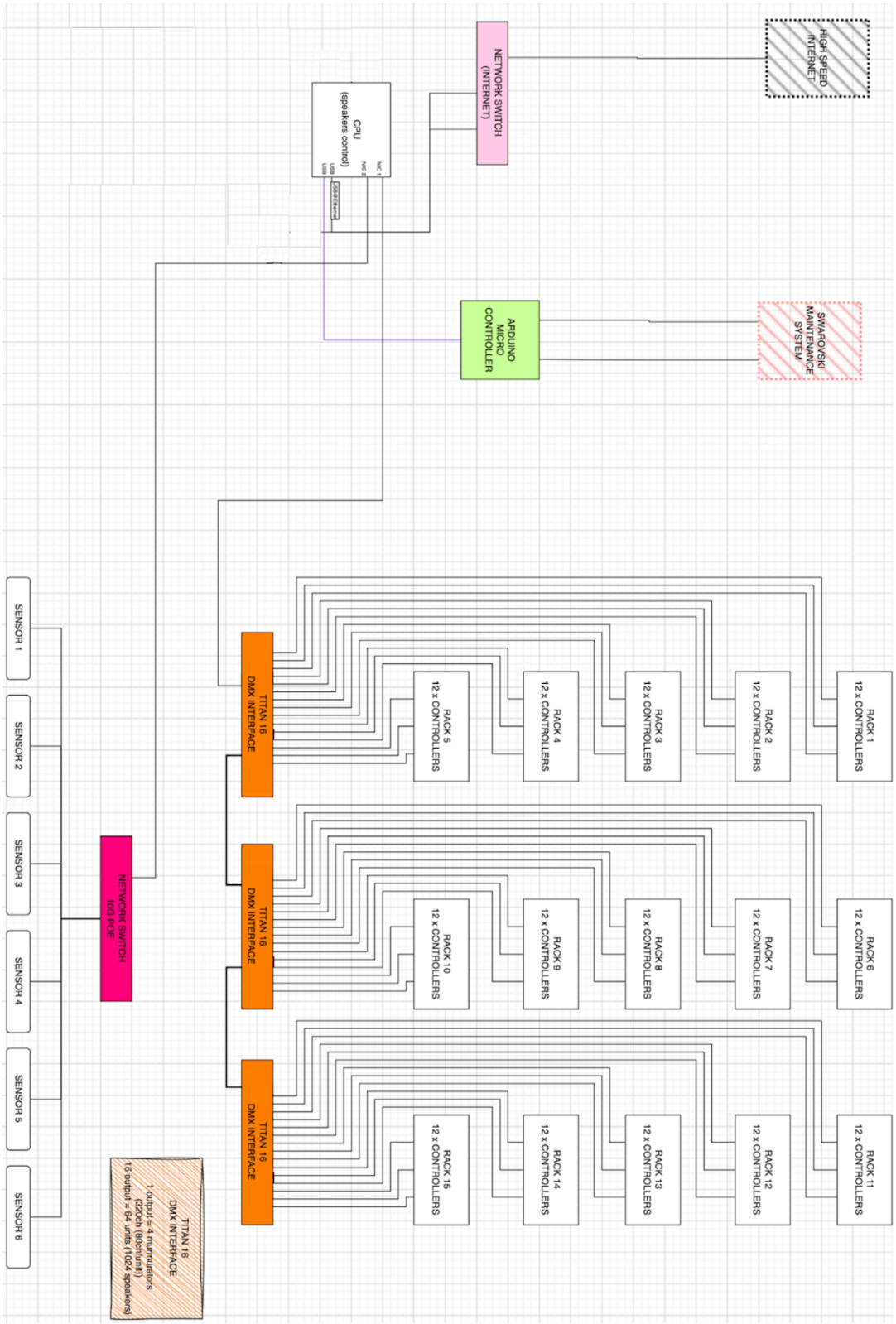
APPENDIX I - INSTALLATION

Description of Components

This artwork requires the following components:

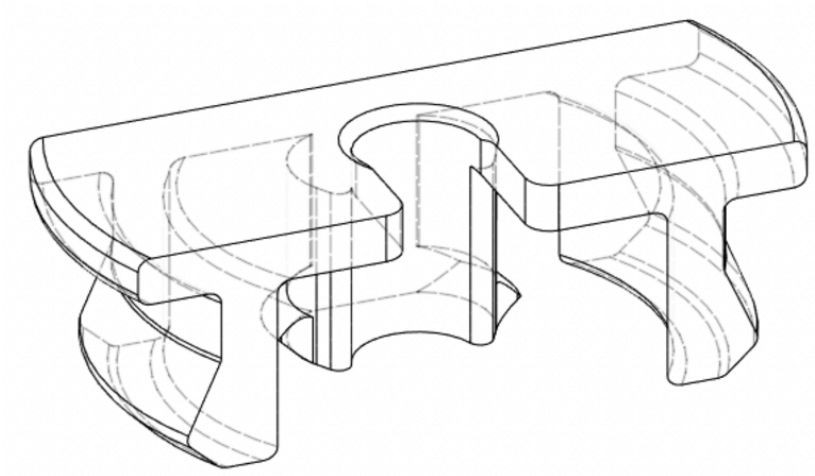
Component	Description
Ceiling Cable Clip	Allows the speakers to be hung securely without straining the cable.
Speakers with onboard flexible board LED strip	Custom-made speakers that play back a few compositions. Track selection and play state depends on the software commands.
Plastic “crystal” cover	Custom-made enclosure to contain the crystal elements.
microSD card	Storing the different compositions specifically picked for a specific speaker.
Ethernet Cables	Connect to the speakers and provide power and DMX signals.
Speaker DMX controller	Sends over the power and playback signals to the speakers.
Computer	Runs the software that controls the whole artwork rendition and sends signals to the Artnet to DMX controller. Requires 4060 Ti Graphics card.
Network Switch	Provides an internet connection to the computers in the piece.
Camera(s)	Used to detect movement in the exhibition space.
Camera Mount(s)	Designed to support and secure the cameras properly in place.
Camera(s) POE Switch	Provides power to all of the camera and sends the camera feeds to the computer.
Camera Cabling	Connects the camera(s) to the computer. In this case we use PoE ethernet cables to connect to the PoE switch.
DMX Interface	Carries the ARTNET signal to the speaker DMX controllers. Each port is numbered and that number corresponds to the universe number.
Monitor	(Optional) Used to control and display the software. Monitor can be shown or hidden.
Video cabling	Connects the main computer to the display, when exhibited. Typically using an HDMI cable.

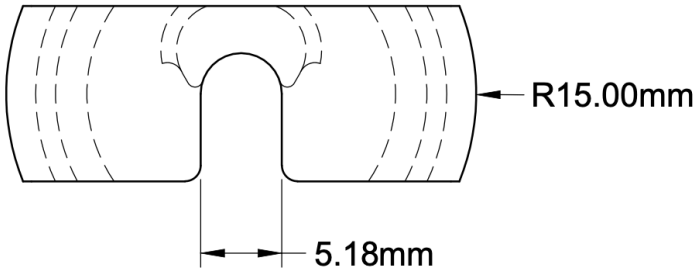
Wiring Diagrams and Connections

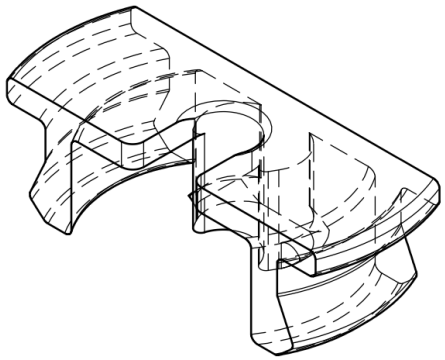


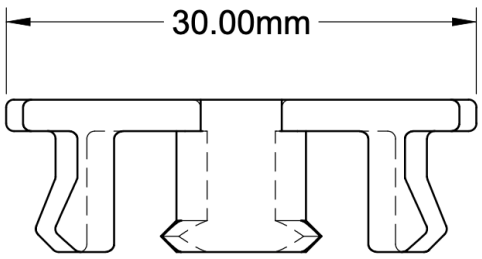
APPENDIX II - TECHNICAL DATA SHEETS

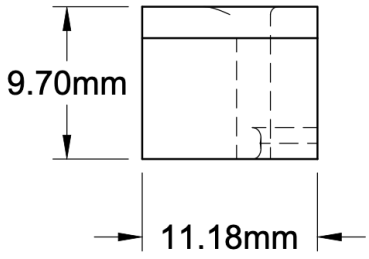
Ceiling Cable Clip







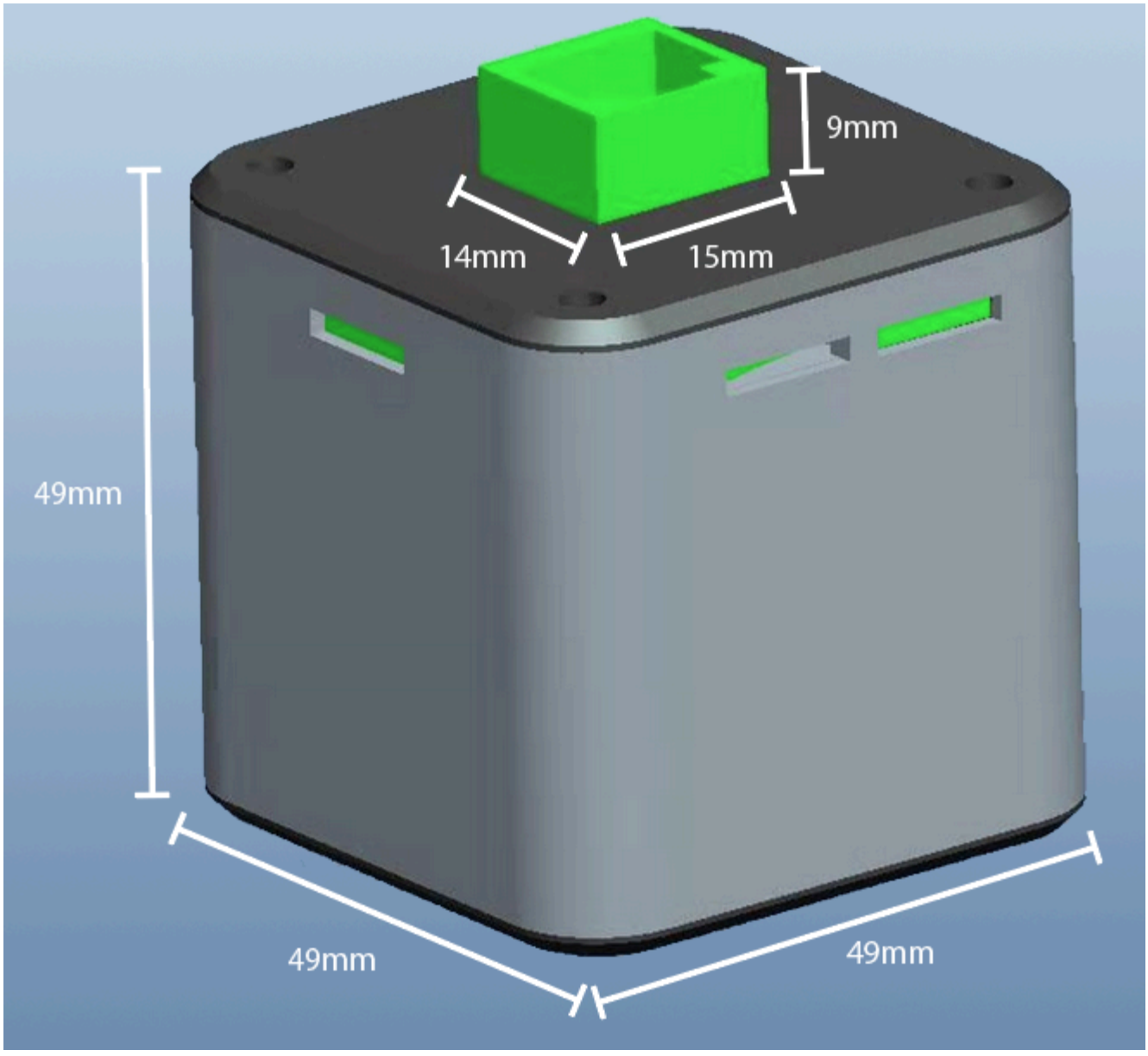


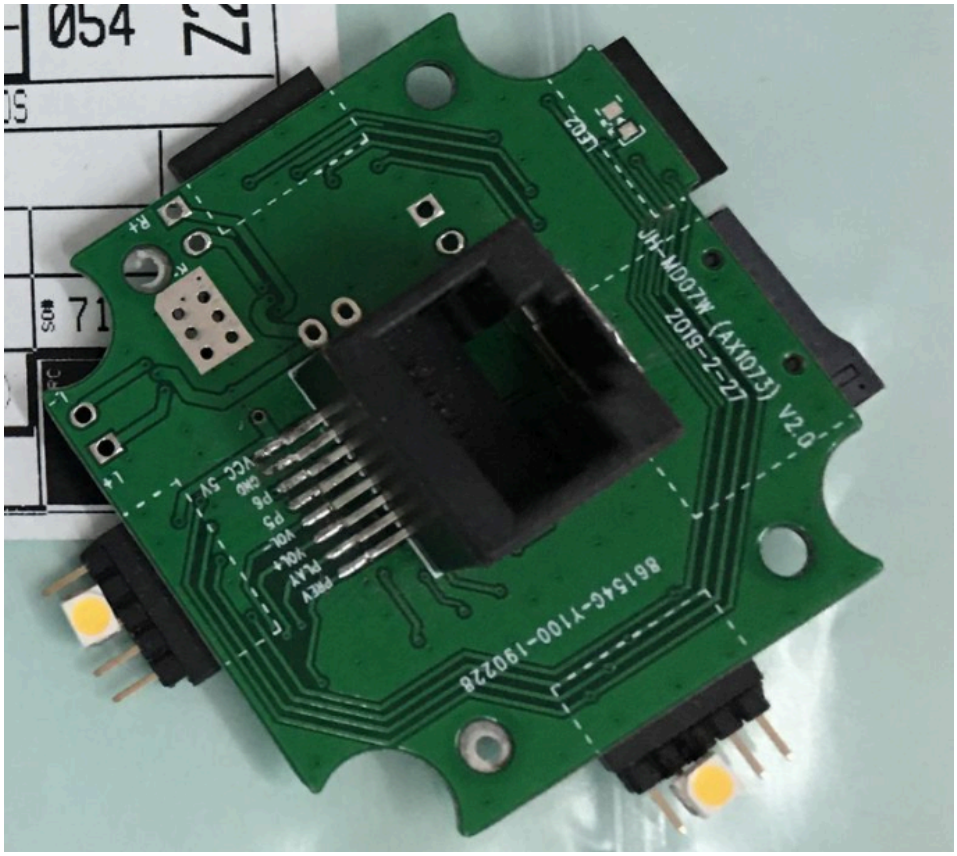


Speaker

The speaker is the most forward facing aspect of the artwork. The speakers have been custom built for the studio by Junjiahao Company Limited. The units used in this installation are Speakers version 2.

They receive 12V and DMX signals from the RJ45 connection and divert 5V (+ and - leads) on the side to control the LED strip. They read a microSD card to play audio files and can control volume up, volume down, play, pause, next, back, and reset.





The 5V (+ and -) leads of the LED strip should never cross or touch. If the pins are crossed or jumped, remove the speaker from its cable immediately. ***The positive and negative polarities are very important to respect.***

The LED strip gains power from the speaker but is controlled by a driver in the speaker controller.

The speakers are hung and gain power from 8 pin RJ45 cables. These 8 pins are each used for a different function on the speaker itself. These functions are:

1 - Button Prev : short press previous track, long press = next song
2 - Button Play/Pause : short press toggle PP, long press = force pause
3 - Button Vol+ : short press = vol up
4 - Button Vol- : short press = vol down, long press = reset to default
5 - LED strip + (12V current)
6 - LED strip - (12V current)
7 - GND (5V current, negative lead)
8 - internal LED (5V current)

Speaker Commands

Speakers are controlled by receiving data on their 3rd channels. The Value shown below is the time in milliseconds that a constant current (255 value in DMX) needs to be received to perform the Action.

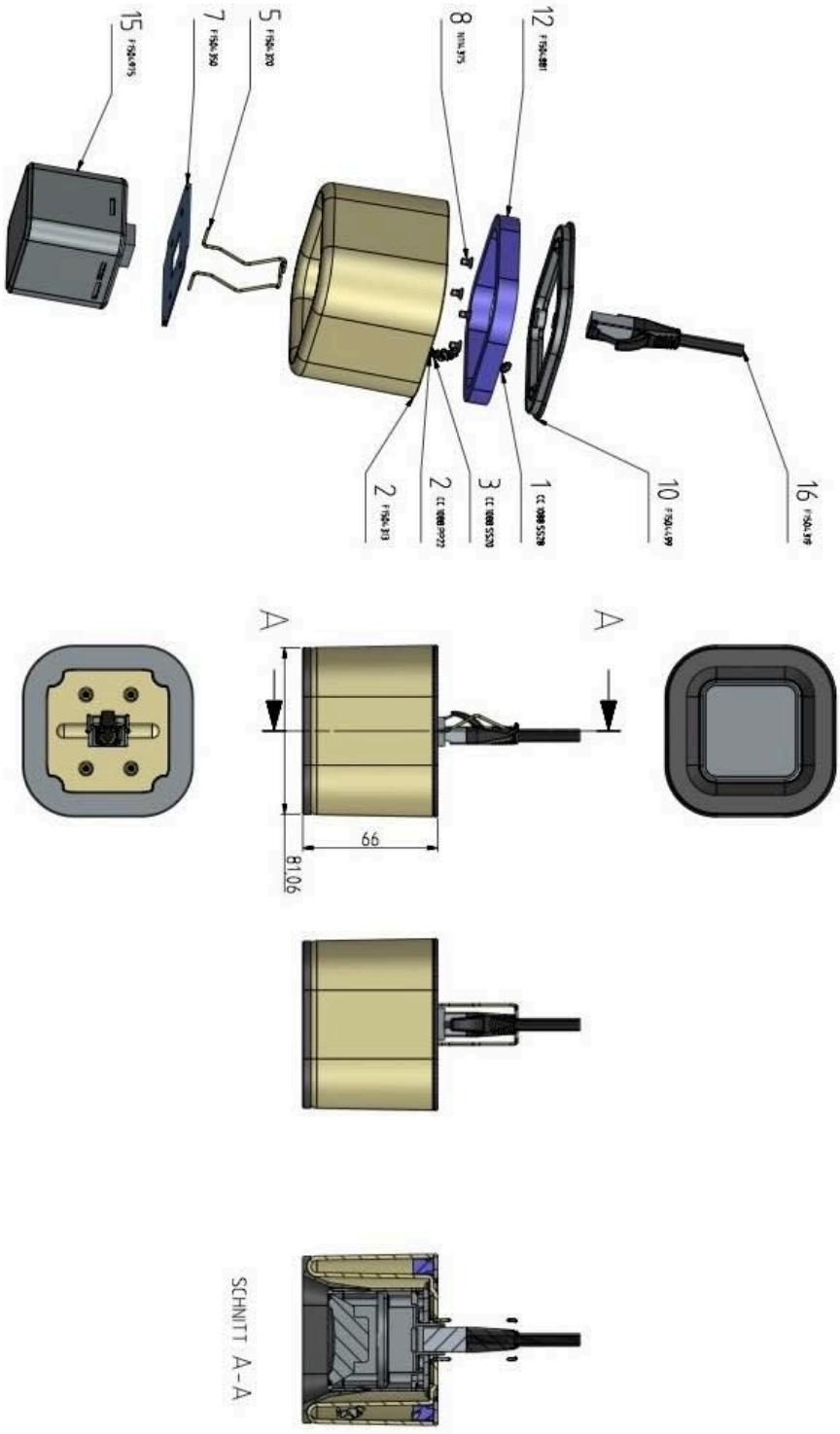
For example, to send the action *Reset* to the speaker, the value 255 is sent on the 3rd channel of the specific speaker for a length of 0,66 seconds (660 milliseconds).

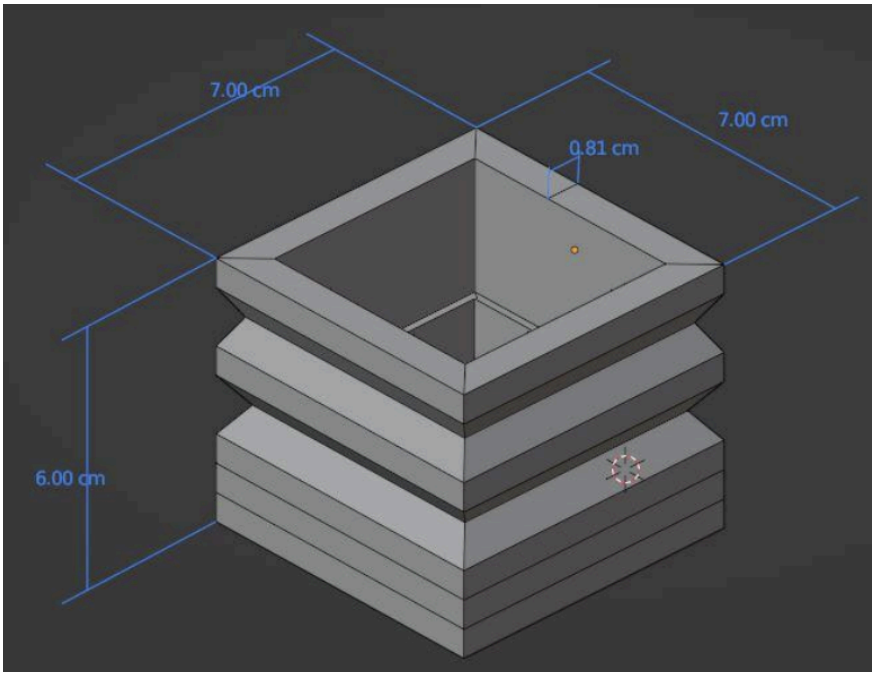
Action	**Value (time in milliseconds)**
Play / Pause	109
Pause	500
Volume Down	308
Volume Up	396
Reset	660

If the cable is tested and certain cores are broken, you may see a malfunction in one of the speaker's abilities to retrieve commands. The functions linked to pins 1, 2, 5, 6 are necessary for the good functionality of the artwork and would require an immediate cabling replacement. The functions linked to pins 3, 4, 7 and 8 are less critical, but you will eventually want to replace such cable.

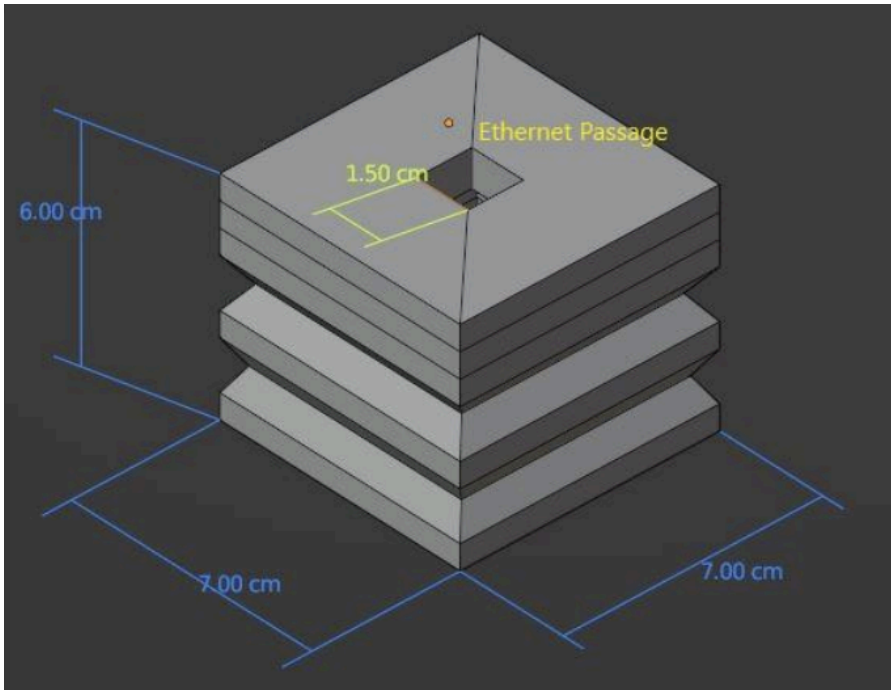
Speakers' Custom Enclosure

The speakers are protected by a custom enclosure represented in the diagram below and an additional custom enclosure made of Swarovski crystals overtop shown on the page after that.





View from below of crystal enclosure



View from the top of crystal enclosure

Speaker’s LED Strip

The LED strip on the speaker has been added by the studio staff. The strips have been cut at a specific length of 20cm to fit the speaker size and the product in use has been selected for the following properties:

Specification	Details
LED Strip PCB	Black colored
LED Color	White light, with a 4000K color temperature
Voltage	12V
Number of LED	There is 120 leds per meter
Average Life	50,000 hours
LED Standard	LM-80
CRI level	80

The product used in this version is from Cinelite, model 2835.

On the strip, two 18mm black AWG24 cables have been soldered to the positive and negative leads and to a single row 5 pins 90 degrees connector header, with a pitch of 2mm. The model used is 2PH1R-05-UA from Adam Tech.

microSD Card

Each speaker contains a microSD card. The cards used are industrial grade SLC microSD cards: they better protect the files from getting corrupted. Each microSD card contains a specific and unique sound track.

These microSD cards (512 MB to 1GB, SLC flash memory) need to be formatted in FAT16. While formatting with an OSX computer, ensure to keep the card's partition map schemes as Master Boot Record, not GUID or Apple Partition Map.

If reconstructing a microSD card is required, the specific sound file needs to be reloaded.

Ethernet Cables

For the assembly of the artwork, straight-thru CAT5E ethernet cables have been used. The cables have a black jacket with printing on them and they have black connectors. They run through a plastic enclosure to provide stability against wind and to allow the speakers to have straight. Speaker IDs go from 0 to 2874. They are next to the connector on the controller end and above the ceiling plate/clip holder on the speaker end.

The cable length will vary, depending on the exhibition’s space dimension and artwork’s final layout.

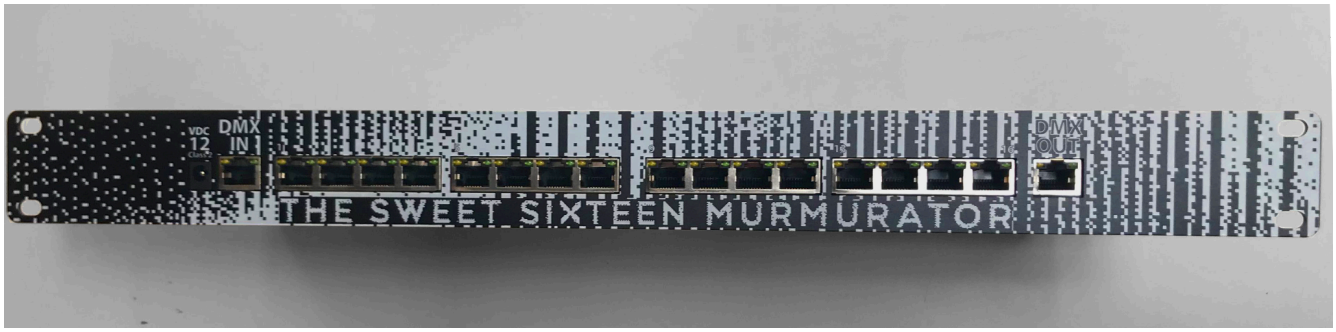
Labeling of cabling

The speaker ethernet cables all have a unique label on two parts of the installation: one label will be placed just past the attachment point of the speaker on the aircraft cable, while a second will be placed near the plugging point of the speaker controllers. The cable snakes are also labeled with information about the mapping. Please refer to the Cable ID list provided.

Network Switch

Specification	Details
Manufacturer	NetGear
Model	MS510TXPP
Min-Max Power Consumption	19.39-234.31 W
Power Supply	AC 100 to 240 V
CPU	800MHz Dual-Core, 512MB RAM,256MB NAND
Latency	10GBASE-T: <2.34 µs 10GBASE-X SFP+: <2.61 µs
Bandwidth	78Gbps
Static Routes	IPv4: 32 IPv6: 32
MAC Address database size (48-bit MAC addresses	16K

Speaker DMX Controllers

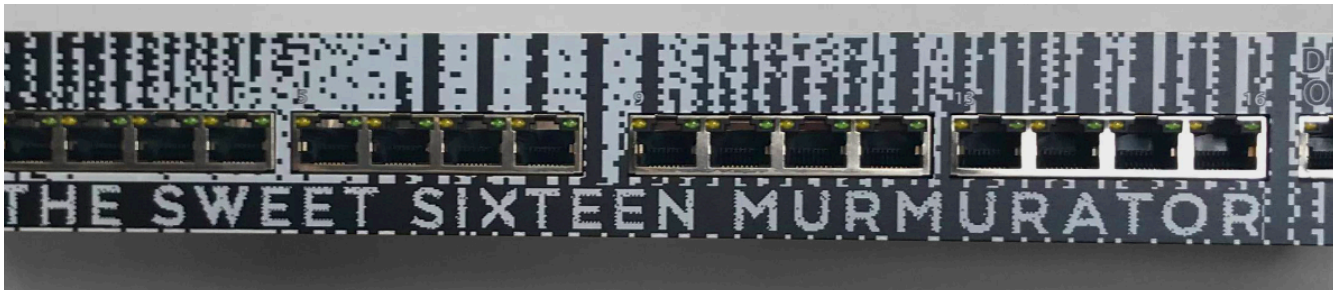


This component controls the connected speakers by sending them power and data over CAT5e cabling. These are connectable in a daisy chain to send data to extend DMX signals to other controllers on the same universe.

Component	Description
1x RJ45 DMX512 input and 1x RJ45 DMX512 output	Receives and daisy chain the DMX signal to the next Speaker controller on the same universe.
12VDC power input	Power inlet for speaker controller.
16x RJ45 output to speaker	Connect to speakers and carry over data and 12V signals.
Main PCB	Hosting all components: the whole being referred to as speaker controller.

Each controller is controlling 16 speakers each with 5 addresses per speaker. A single controller gives out 80 addresses. The maximal number of controllers linked to a universe should be 4, for a maximal number of 320 addresses (64 speakers), even if an universe could contain a maximum of 512 addresses. That limitation has been decided for safety reasons. Even if you are not using every port of a controller it will react as if using a total of 24 addresses.

The sequence of the ports of the controller is important and are as shown periodically on the faceplate. The correct port # for a specific cable/speaker is denoted on the ethernet cable label.



The data for the controllers will be received by the DMX512 IN port. The IN port is located next to the 12v power input, while the OUT port is on the far side of the controller. The first controller of a universe will always receive the data first, connected via the DMX controller's OUT port and speakers controller's IN port. Then, we daisy chain from the first speaker controller to the second one, connected via the first controller's OUT port and second controller's IN port. Then will then feed to the next controller in the order from its output.

The power then is plugged in by way of an IEC plug on the back of the controller, and can be toggled by a powerswitch.

NEVER COVER UP THE VENT AT THE BACK OF THE METAL BOX

Labeling of speaker controllers

The speaker ethernet cables will all have a unique label on two parts of the installation: one label will be placed just past the attachment point of the speaker on the aircraft cable, while a second will be placed near the plugging point of the speaker controllers.

The labels read as such:

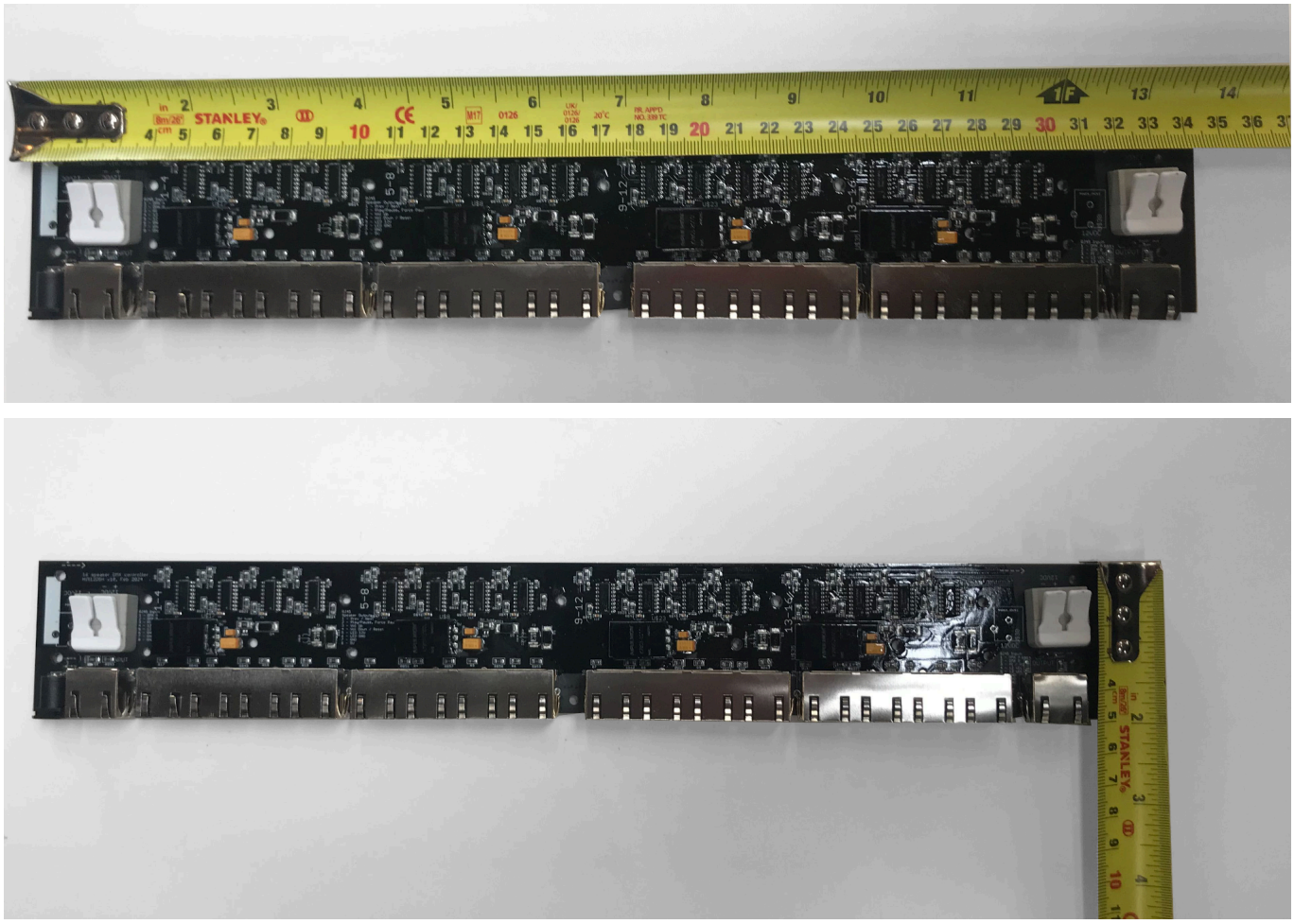
Controller ID# | Start DMX address Start ID - End ID

Eg: Box 001 | 01 001 - 016

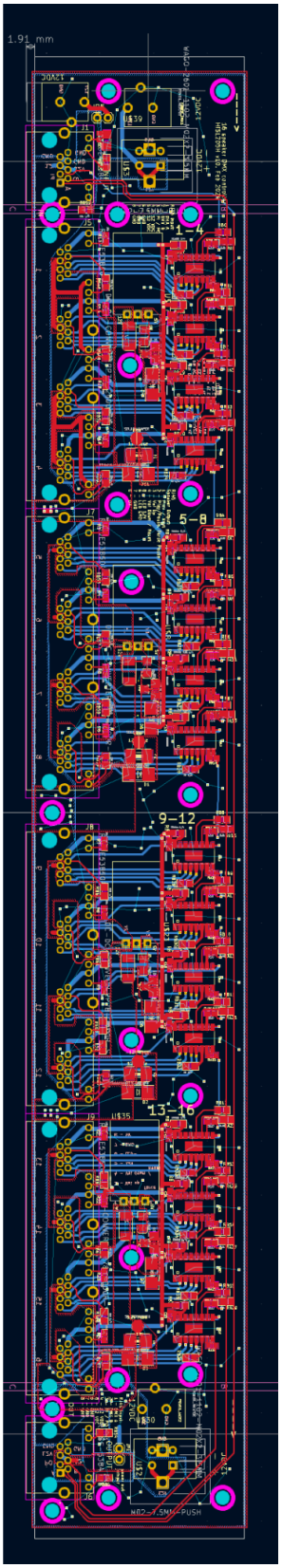
Component	Description
Controller ID#	Current Controller ID#. This is used to simplify the cabling connection between speakers and controllers. Each controller should have an unique ID. Values will range from 001 to 999.
Start ID	There are 3000 speakers with unique IDs starting with 0, this is the first ID in the controller
End ID	There are 3000 speakers with unique IDs starting with 0, this is the last ID in the controller
DMX start address	Refers to which RJ45 port of the Speaker controller ID the cable (speaker) should be connected. Values will range from 001 to 512.

Speaker Controller's Main PCB

The main PCB has been designed by the studio. The latest version of such PCB is labeled as Speaker Controller v10 - Feb 2024. The main PCB is controlling the power feed to the speaker's power line and, by extension, their on/off state. The board has 16 onboard chips, each controlling 5 outputs for a total of 80 channels.



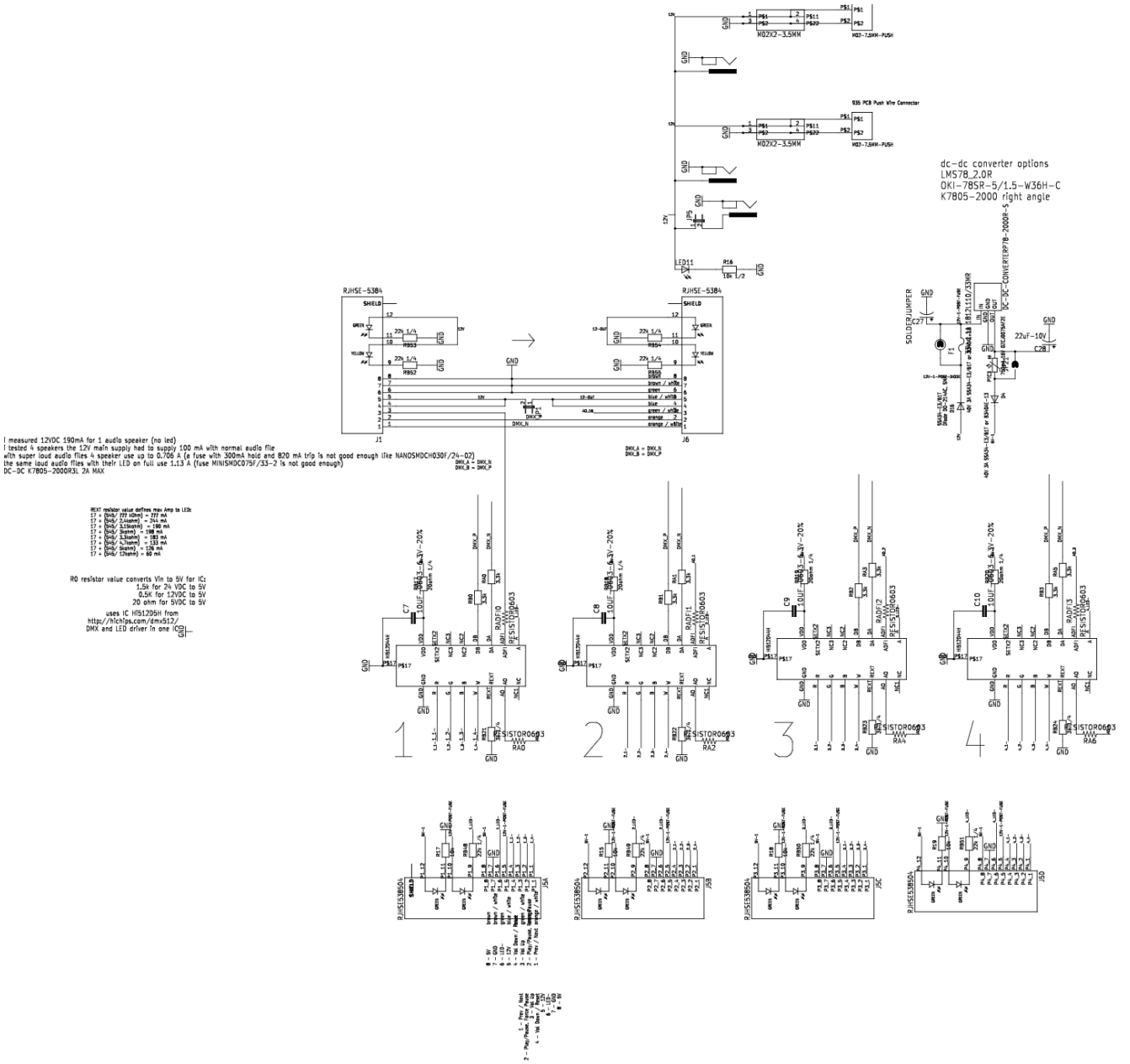
Main PCB

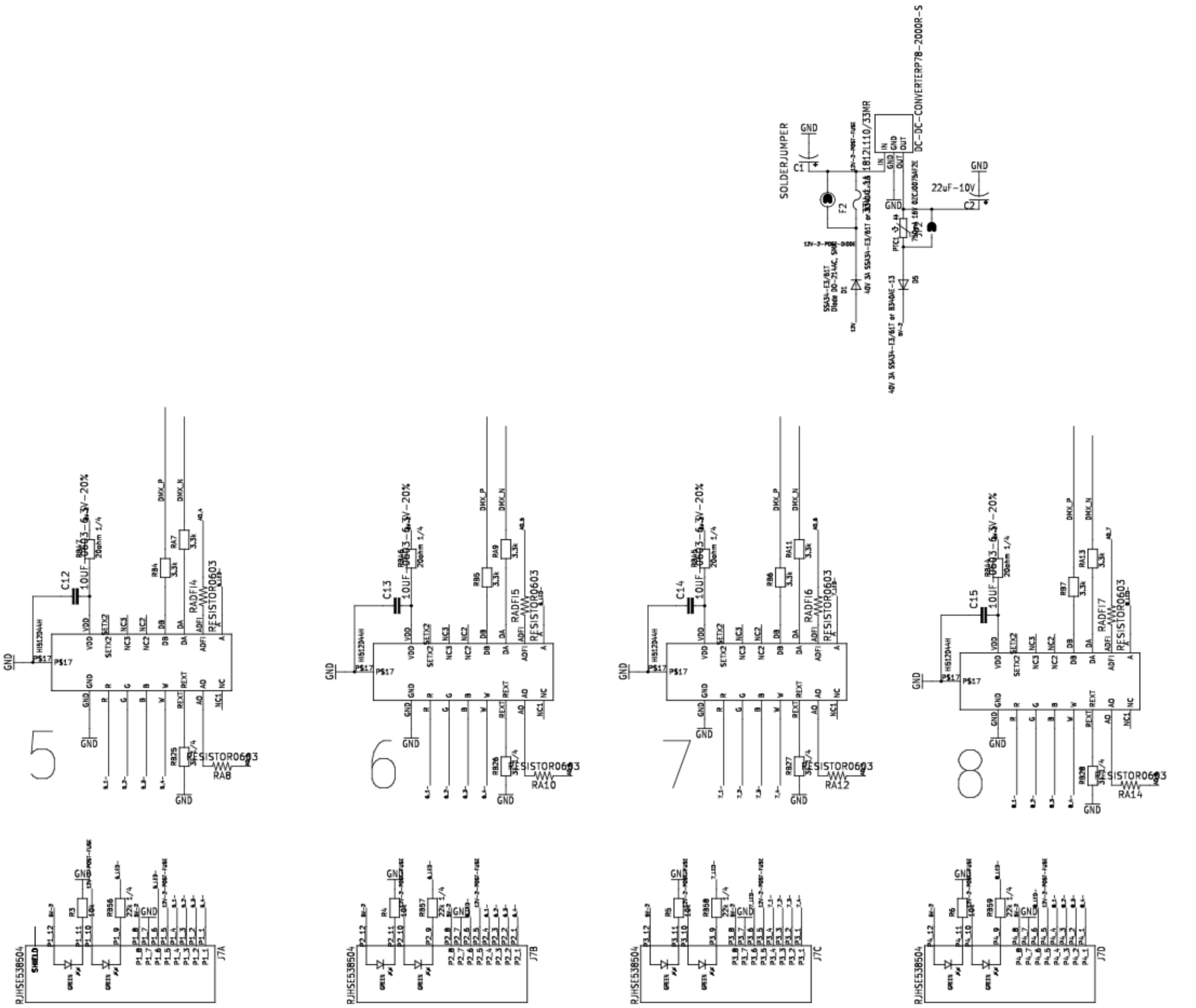


Board circuitry

Schematics

For ease of viewing the schematics have been broken up into sections of four.




DC-DC-CONVERTERP78-2000R-S
SOLDERJUMPER
22uF-10V
5
6
7
8
RESISTOR0603
RJHSE538504

SOLDERJUMPER
GND
C9
F3
DC-DC-CONVERTER78-2000R-5
22uF-10V
C8
C16
C17
C18
C19
10UF-6.3V-20%
RADIAL
RESISTOR0603
RA16
RA18
RA19
RA20
RA21
RA22
RJHSE538504
J8A
J8B
J8C
J8D
9
10
11
12w

SOLDERJUMPER
GND
C5
22uF-10V
C6
DC-DC-CONVERTER78-2000R-5
13
14
15
16
C20
C21
C22
C23
10UF-6.3V-20%
RADF12
RADF13
RADF14
RADF15
RESISTOR0603
RA24
RA26
RA28
RA30
RJHSE538504
J9A
J9B
J9C
J9D

Speaker Controller's Power supply

The power for the unit comes from a class 2 power supply. We can recommend the following unit for this artwork. That said, other units could be used, here are the most important specs for this unit:

Specification	Details
Manufacturer	Meanwell
Model Number	LPV-60-12
DC Voltage	12V
Rated Current	5A @ 12VDC / 1.2A @ 115VAC / 0.7A @ 230VAC
Rate Power	60W
Output plug	Barrel connector Inner diameter: 2.1mm Outer diameter: 5.5mm Barrel length: 11mm Polarization: Positive center, negative sleeve

Cameras

The piece uses six Femto Mega Orbec cameras.

Specification	Details
Manufacturer	Orbbec
Model Number	Femto Mega
Data Connection	USB 3.0 Type-C/Ethernet
Power input	USB 3.0 Type-C /PoE+/DC 12V/2A Power Adapter
Data Output	Point Cloud, Depth Map, IR & RGB
Dimensions	115 x 40 x 145 (mm)
Weight	560 Grams
Depth Resolution/FPS	1024x1024 @15 FPS (WFOV) 640x576@30 FPS (NFOV)
RGB Resolution/FPS	3840x2160 @ 25FPS
Power Input	DC 12V 2A or POE+/802.3at (24W) or Type-C 5V 3A

To be recognized by the system, the following IP assignment should be respected.

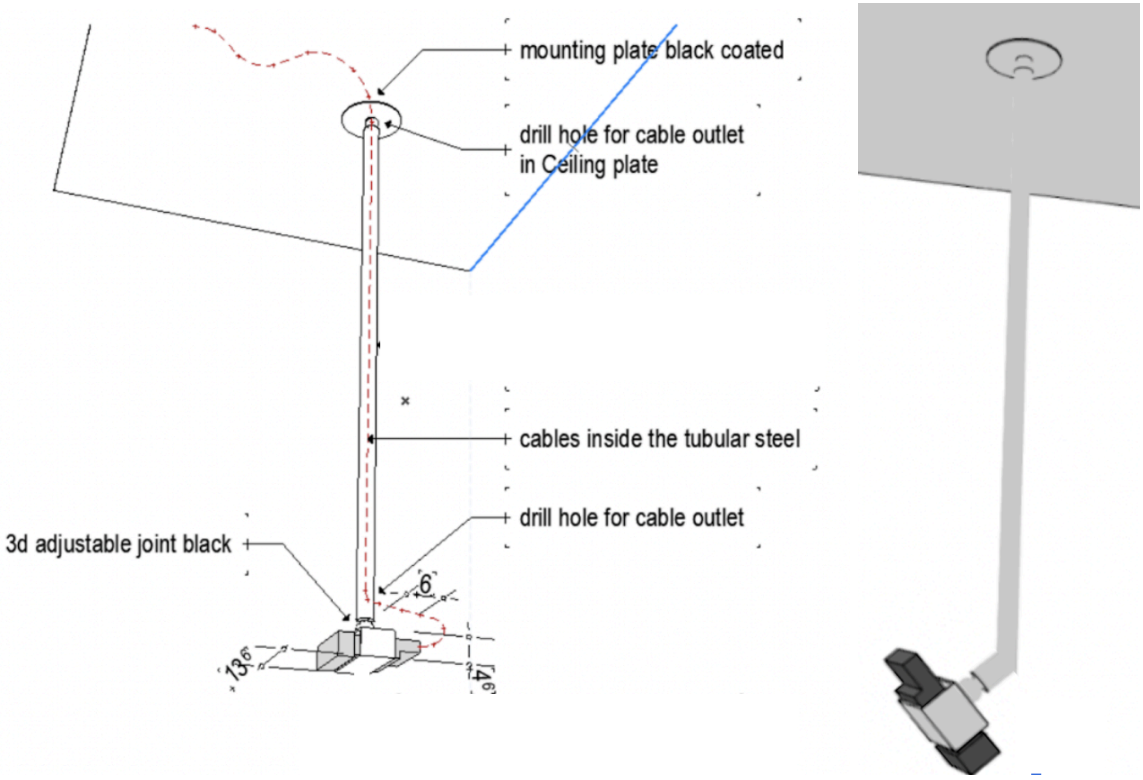
Orbec Camera	IP Address (Do not change)
Orbbec00	192.168.1.10
Orbbec01	192.168.1.11
Orbbec02	192.168.1.12
Orbbec03	192.168.1.13
Orbbec04	192.168.1.14
Orbbec05	192.168.1.15

Camera Mount

Allows the cameras to be mounted approximately 1.05 meters from the ceiling: the cameras are mounted in order to be flush with the speakers.

The camera is mounted on a Manfrotto micro ball head, an adjustable hardware allowing micro adjustment of the camera orientation. The ball head is mounted on a pipe attached to the ceiling.

The Manfrotto micro ball info is described on the next page.



Specification	Details
Manufacturer	Manfrotto
Model Number	MH492-BH

Camera POE Switch

Specification	Details
Manufacturer	NetGear
Model	GS316P
Max/Standby Power Consumption	127.9W/ 2.68W
Max Power Per Port	Up to 30W
Number of Ethernet Ports	16
Bandwidth	32Gbps
Packet Buffer Memory	1Mb
Latency	< 3.7 µsec
Mac Address Table Size	4k
Dimensions	286 x 102 x 27 mm (11.3 x 4 x 1.1 in)
Weight	0.88kg (1.94 lb)

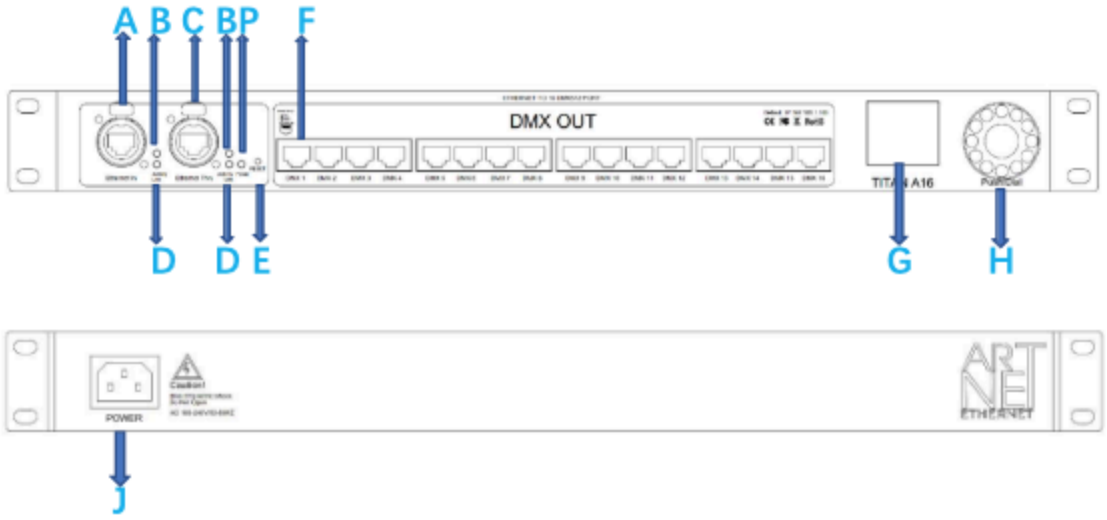
DMX Interface

The following table shows important characteristics of this converter, the images after give detailed explanations on its pinout and how to configure the device.

Specification	Details
Manufacturer	Colordreamer
Model	TITAN A16
Input Voltage	100-240VAC50/60Hz
Power Consumption	5W
Network Protocols	Art-Net via ethernet
DMX Outputs	16X512 DMX Channels
Ethernet	RJ45
Default IP	192.168.1.100
Default Subnet	255.255.255.0
Connector	RJ45
Dimensions(LXWxH) Body	440×136.6x44mm
Dimensions(LXWxH)Brackets	483×136.6x44mm(1U)

Connectivity

(Titan A16)



A: RJ45 Ethernet in Port
B: Status LED for Ethernet Activity
C: RJ45 Ethernet thru port
D: Status LED for Ethernet Link
E: Reset Button
F: DMX Outputs
G: Oled Screen
H: Push/Dial button
J: Power Socket
P:Status LED for Power

Description of Status LED:

E: Status LED for Power

Status	Description
Powered Off	Power cable not connected. The device has no power
Permanently Green:	Connected to Power. Power is on.

D: Status LED for Ethernet Link

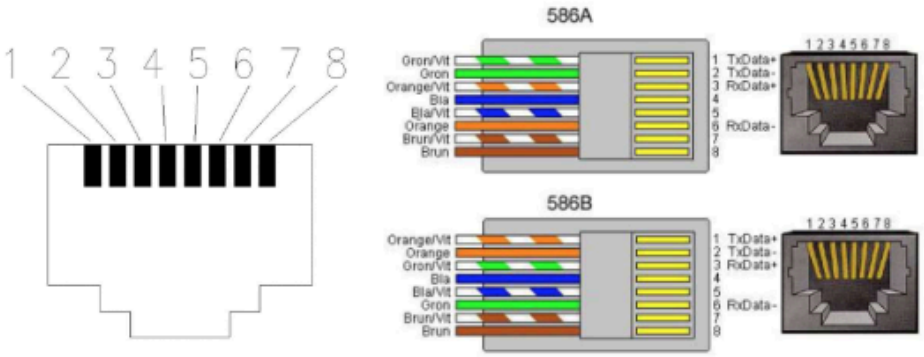
Status	Description
Powered Off	Ethernet not connected
Permanently Red:	Connected to ethernet

F: Status LED for Ethernet Activity

Status	Description
Powerer Off	No data received over ethernet
Permanently Green or Blinking Green	Communicating over Ethernet. Receiving data over ethernet

3-Pin And 5-Pin XLR Connector Layout

RJ45 Connector Layout

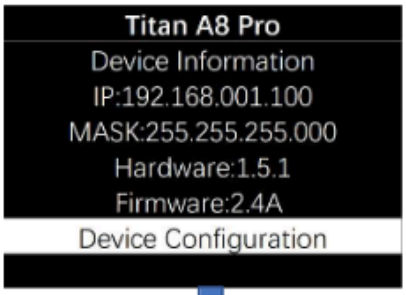


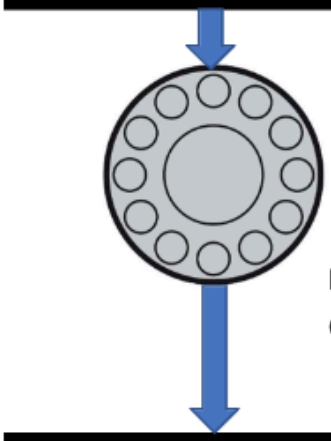
1: DMX+ 2: DMX- 7: Ground

Device Configuration Through onboard Screen and Push/Dial button

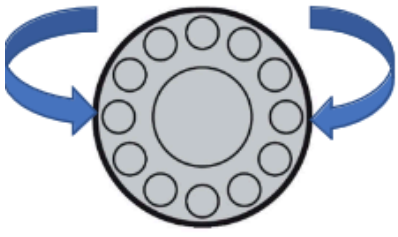
Standby Screen:

When you are not performing a task within a menu, Titan A8 or Titan A16 will display device information as below.

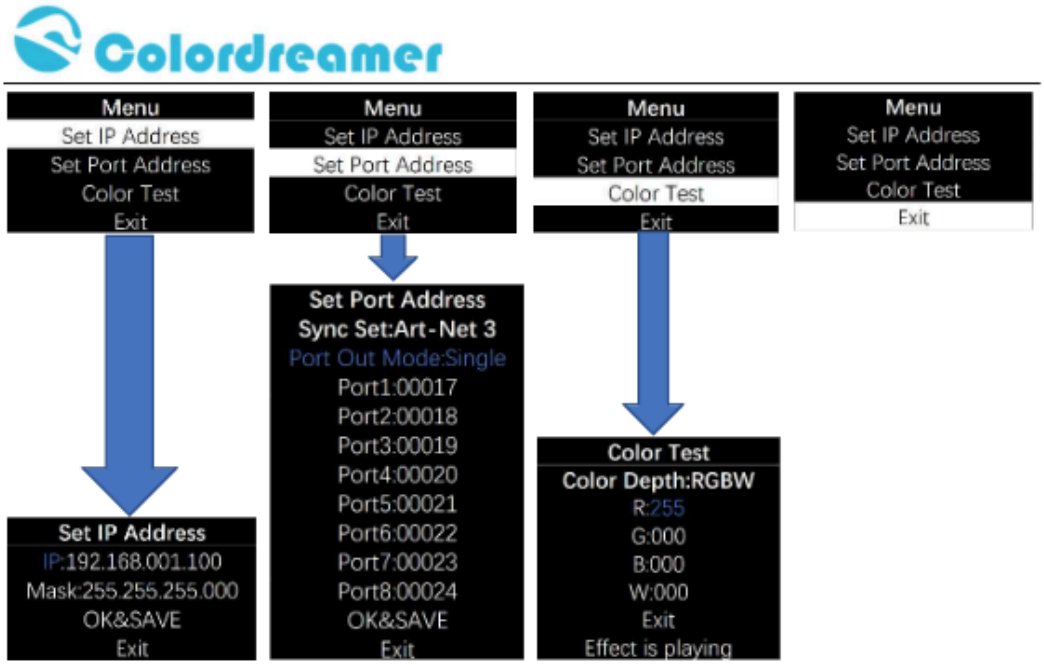




Press and release the rotary dial to enter the Device Configuration Menu.



Rotate the dial clockwise or counterclockwise to move between the highlights.
Press and release the dial to enter the page of highlight



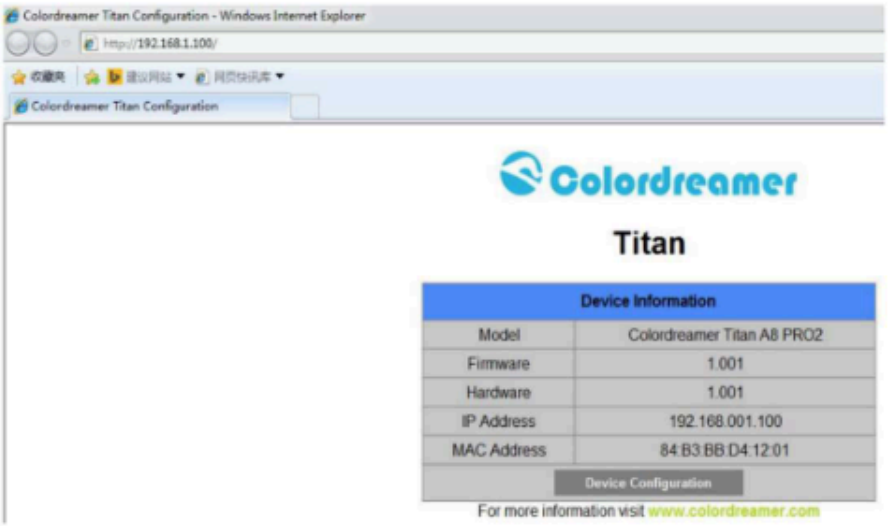
Rotate the dial to move the highlighted cursor between options within the page
When the highlighted cursor is over the required option, press and release the dial
Rotate the dial to change the value of the option.
Press and release the dial to fix the chosen value of the option.
Remember to press “OK&SAVE” to confirm your setting.
Press “Exit” to come back Main Menu.

Notes:

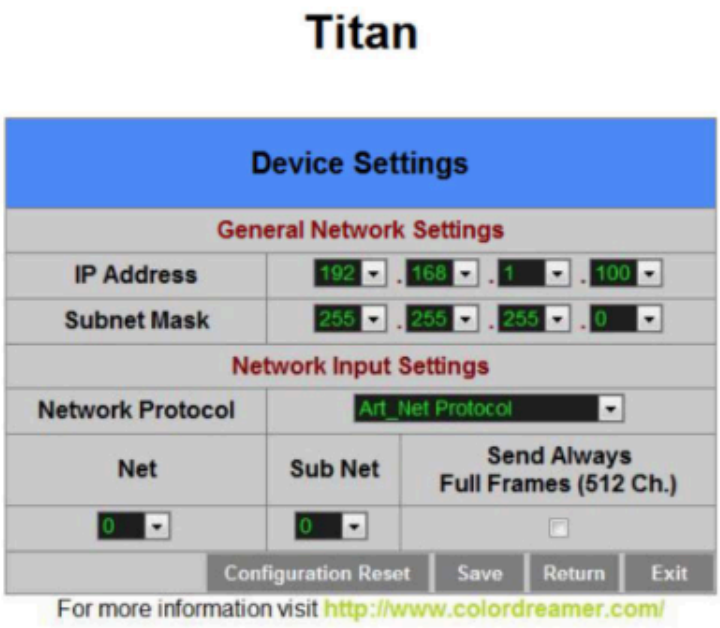
1: In the page “Set Port Address”, Sync Set can be Art-Net 3 or Art-Net 4
2: User can use Color Test Page to test your led fitting when software is not ready.
Color DepthW/RG/RGB/RGBW
R: a value between 0-255 G: a value between 0-255
B: a value between 0-255 W: a value between 0-255

Device Configuration Through a Web Browser

You can access all settings and information of Titan Artnet Controller by using the built-in web configuration tool.
Step 1) Connect Titan Artnet Controller and your computer to the same network.
Artnet Controller Default IP 192.168.1.100
Step 2) Assign correct network settings for your computer in the operating system. (Recommended default settings:
IP address 192.168.1.XXX/ Subnet mask 255.255.255.0)
Step 3) Open your web browser and enter the IP address of Artnet Controller 192.168.1.100
Step 4) The web configuration tool will be launched.



Step5)You can change IP address and save this configuration



Step6） After saving all setting,reboot the system to apply the new setting.after reboot,this window will be closely automatically.

Titan

For more information visit www.colordreamer.com

Reset to Factory Default Settings

Step 1) Disconnect the device from power.

Step 2) Use a suitable tool to press the reset button.

Step 3) Continue to press the reset button and connect to power again.

Step 4) Continue to press the reset button and wait until all status LEDs of the device flash repeatedly or wait 5 seconds.

APPENDIX III - SUSPENSION OF SPEAKERS IN THE EXHIBITION SPACE

Please refer to the few demonstration videos provided documenting the hanging method.

APPENDIX IV - REPAIR

Reprogramming a Controller

The Murmurators run on the Hi512D chip with 5 pinned outputs. These chips control the dimming of the LEDs in a clean and consistent manner that reacts to DMX 512 input.

If a controller ever needs to be replaced or reset, you will need to reprogram the Hi512D chip on the controller to match the settings and functionality of the piece as a whole. To do so you will need to use the BL-321, there are other controllers that can interface with the Hi512D chip but this unit is our recommendation.

First familiarize yourself with the BL-321 unit.

The left side of the unit has the power on switch, a SD card port for firmware updates, and a USB C port for charging the unit. Switch the power on.

The screen of the unit is backlit, it will open to a page titled “Addressing Device” with several options as seen in the screenshot below.

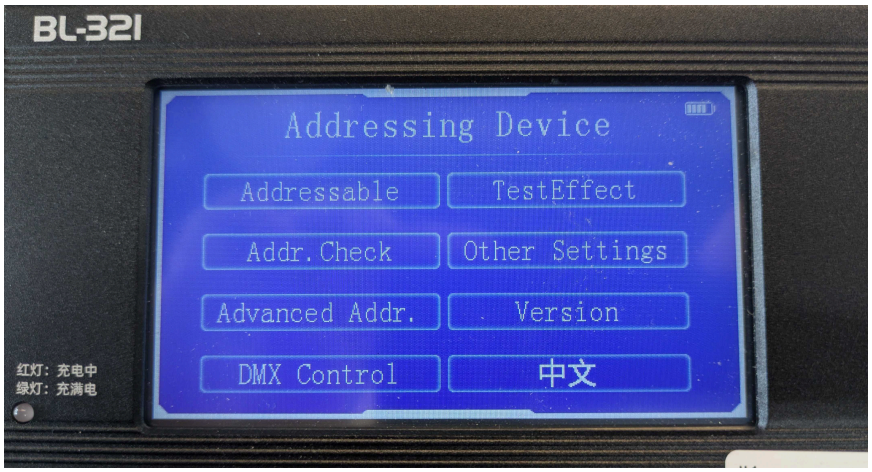


Photo of the initial screen on the BL-321.

The following table explains the functionality of each of these buttons.

Options	Details
Addressable	The basic addressing format, safest to use as it will only effect the DMX address
TestEffect	A testing interface to test the lights DMX functionality, not often used.
Addr. Check	A testing interface to test the lights DMX address, good to use to confirm from programming

Options	Details
Other Settings	Do not use, not applicable to our system
Advance Addr.	Advance programming, needed for reprogramming of a unit.
Version	Firmware version, note this if ever talking to a tech about an issue with the BL-321 or reprogramming
DMX Control	Do not use, not applicable to our system
Language	Only available options are Mandarin Chinese and English

In order to reprogram an entire unit you will need to use the Advanced Addr. option. First make sure that nothing is plugged into the BL-321. Then open the “Advanced Addr” option and apply exactly the settings seen in the following table.

Settings	Value
GAMMA	2.5
GAMMASmooth	Open
RefreshRate	16kHz
NoSignal	LastFrame
AutoAddress	Close
StepValue	1
FieldMode	5
PortDelay	Ons
ColorR	255
ColorG	255
ColorB	255
ColorW	255
ColorA	255

Settings	Value
CurrentR	11
CurrentG	11
CurrentB	11
CurrentW	11
CurrentA	11

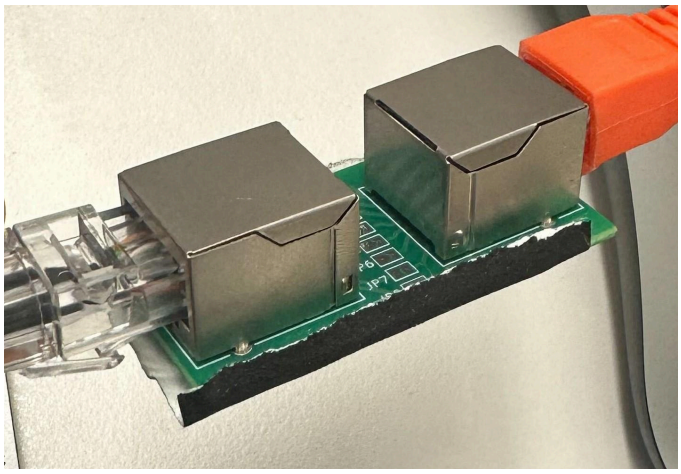
Once all these are set, press the Return icon at the top left corner of the screen and check the box next to Param. Set.

Next open Addr. Set You should see a screen that looks like the image below. Make sure that your settings in the top row are set to be the same as the ones in the image. The “Lights” and “Amount” setting will change automatically, do not touch either yourself. The “Start Add” number must be set to the address of the unit you are replacing or reprogramming. This address should be indicated on a label after the Box ID. Please match it exactly.

Once set, press the Return icon at the top left corner of the screen and check the box next to Addr. Set.

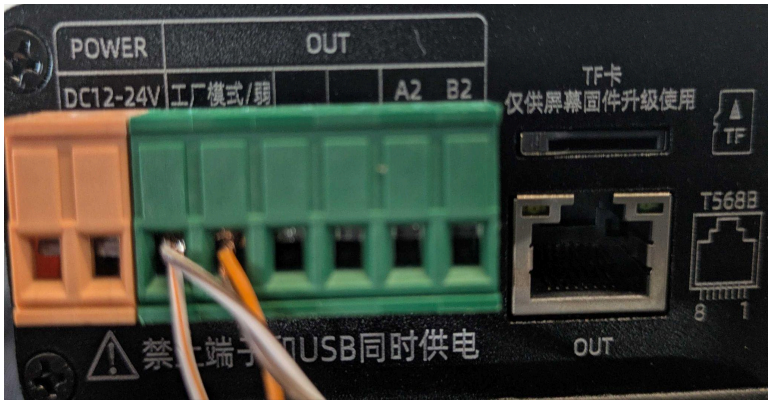
On the right side of the BL-321 is a port for an orange terminal block, green terminal block, and RJ45. You can plug the Cat6 RJ45 jumper into the RJ45 port. If you do this please put a power termination board at the other end of the RJ45 jumper to assure no POE from the controller enters the BL-321. This method can be seen in the image below

.



You may also use a cut RJ45 cable and plug the orange white and orange cables directly into the green terminal block's first and second port respectively. (First port denoted by A1, and closest to the orange terminal block)

This method does not require you to use the power termination board and can be seen in the image below.



After choosing one of the above methods you can now plug the RJ45 into the DMX in port of a controller while the controller is powered on. With both boxes checked, press SendData. The board of the buttons will disappear and all options will be unpressable during the reprogramming process. **DO NOT REMOVE POWER FROM THE CONTROLLER OR BL-321 AT THIS TIME**

Once this process is complete the dimmer has successfully been reprogrammed.