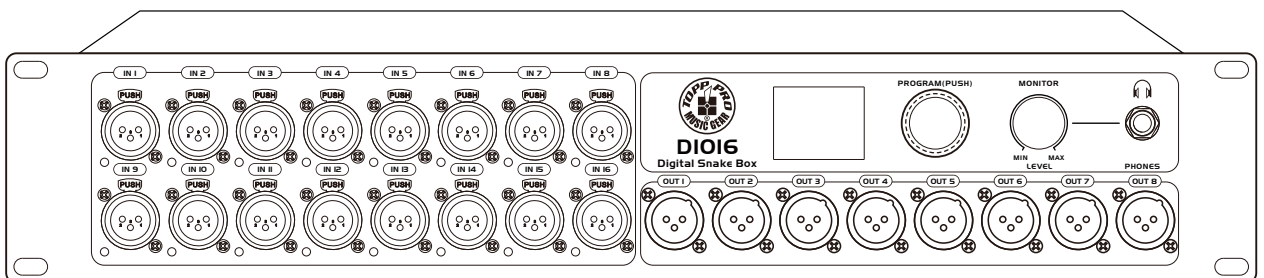




User's Manual

DIO16 Digital Audio Expansion System



Important Safety Instructions



ATTENTION: RISQUE DE CHOC ÉLECTRIQUE NE PAS OUVRIR.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE

AVERTISSEMENT: NE PAS EXPOSER CE MATERIEL À LA PLUIE OU L'HUMIDITÉ AFIN DE RÉDUIRE LE RISQUE D'INFLAMMATION OU DE CHOC ÉLECTRIQUE



This symbol, wherever used, alerts you to the presence of un-insulated and dangerous voltages in the product enclosure. These are voltages that may be sufficient to constitute the risk of electric shock or death.



This symbol, wherever used, alerts you to important operating and maintenance instructions. Please read.



Protective Ground Terminal



AC mains (Alternating Current)



Hazardous Live Terminal

ON: Denotes the product is turned on.

OFF: Denotes the product is turned off.

CAUTION

Describes precautions that should be observed to prevent damage to the product.



Warning! This symbol indicates a hot surface. Certain parts of the housing can become hot during operation. After use, wait for a cool-down period of at least 10 minutes before handling or transporting the device.



Warning! This device is designed for use below 2000 metres in altitude.



Warning! This product is not intended for use in tropical climates.

CAUTION : Risk of fire or explosion if the battery is replaced by an incorrect type

ATTENTION : Risque d'incendie ou d'explosion si la batterie est remplacée par un type incorrect

WARNING: Remove batteries if exhausted or if they will not be used again for a long period.

- The incorrect use of batteries can cause electrolyte leakage and will corrode the compartment or cause the batteries to burst, therefore:
- Do not mix battery types, e.g. alkaline with zinc carbonate.
- When inserting new batteries, replace all batteries at the same time.



Dispose of this product should not be placed in municipal waste and should be separate collection.

Service Instructions

- Refer all servicing to authorized service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- Disconnect power cord before servicing.
- Replace critical components only with factory parts or recommended equivalents.
- For AC line powered units: Before returning repaired unit to user, use an ohmmeter to measure from both AC plug blades to all exposed metal parts. The resistance should be more than 2,000,000 ohms.

1. Read and keep these instructions. Heed all warnings and follow all instructions.
2. **Warning** (if applicable): Please refer to any important information (e.g., electrical, safety, etc.) printed on the exterior bottom enclosure or rear panel before installing or operating the product.
3. Clean only with dry cloth.
4. Water and Moisture (if applicable): Do not use this apparatus near water. The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus. Electrical equipment should NEVER be kept or stored in damp environments.
5. (If applicable) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions. Do not install this equipment in a confined or "boxed-in" space such as a bookcase or similar unit, and maintain good ventilation conditions. The ventilation should not be impeded by covering the ventilation openings with items such as newspaper, tablecloths, curtains, etc.
6. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Do not place exposed flame sources such as lighted candles on the apparatus.
7. (If applicable) This product should be connected to a power supply only of the type described in these operating instructions, or as marked on the unit.
8. (if applicable) Be careful not to damage the power cord. When moving or not using the appliance, secure the power cord (e.g., wrap it with a cable tie). Before using it again, make sure the power cord has not been damaged. If the power cord has been damaged at all, bring the unit and cord to a qualified service technician for repair or replacement as specified by the manufacturer.

9. Unplug this apparatus during lightning storms or when unused for long periods of time.
10. Only use attachment/accessories specified by the manufacturer.
11. (If applicable) Use only the cart, stand, tripod, bracket or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
12. Internal/External Voltage Selectors (if applicable): Internal or external voltage selector switches, if any, should only be reset and re-equipped with a proper plug for alternative voltage by a qualified service technician. Do not attempt to alter this yourself.
13. **Caution** (if applicable): Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type. Batteries (a battery pack or an installed battery) shall not be exposed to excessive heat such as sunshine, fire, etc.
14. (If applicable) Do not defeat the safety purpose of the polarized or grounding-type plug.
15. Protective earthing terminal (if applicable): The apparatus should be connected to a mains socket outlet with a protective earthing connection.
 - Denmark (*Danmark*): Apparatets stikprop skal tilsluttes en stikkontakt med jord, som giver forbindelse til stikproppens jord.
 - Finland (*Suomi*): Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan.
 - Norway (*Norge*): Apparatet må tilkoples jordet stikkontakt.
 - Sweden (*Sverige*): Apparaten skall anslutas till jordat uttag.
16. **For Class II apparatus only:** This symbol means the equipment is a Class II or double-insulated electrical appliance. It has been designed in such a way that it does not require a safety connection to electrical earth. When servicing use only identical replacement parts installed by an instructed person or with the use of ready-made leads or cords.
17. **Warning** (if applicable): Provide an earthing connection before the mains plug is connected to the mains. When disconnecting the earthing connection, be sure to disconnect it after pulling the mains plug out from the mains.
18. (If applicable) Where the mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.
19. **Warning** (if applicable): To prevent possible hearing damage, do not listen at high volume levels for long periods.
20. This apparatus is for professional use only. Intended operational climate: moderate.



FCC STATEMENT

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



General Note on the Declaration of Conformity: We hereby declare that this device is in accordance with the essential requirements of the European Directive 2014/53/EU or 2014/30/EU (LVD: 2014/35/EU; GPSD: 2001/95/EC).

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Introduction

1

Thank you for purchasing the Digital Snake system. Up to 100-meter or more than 1000-meter transmission distance can be reached when using the CAT5 cable or fiber cable separately. It delivers uncompressed digital audio in high quality, extra low noise and real time through a standard Ethernet network. The audio transmission function can be set with professional software and stored in the device for independent usage so that it makes usage more flexible and affordable. All of signals will be transmitted through digital Ethernet network so that it can avoid the distortion issue caused by sending analog signal. It can help to save the cost for installation and maintenance as the unit is suitable for any situation and transmits signal through Ethernet network. Also the unit also can be controlled remotely through discovering software.

It is recommended that you read the manual of this machine carefully before use in order to familiarize yourself with the features applications and operation procedures and avoid some problems during future installation and operations.

Features

2

- 16 MIC analog inputs / 8 XLR analog outputs.
- Left/right channel headphone output
- 48V phantom power control and power indicator.
- 0dB~50dB input digital gain control.
- 128RGBx160 Resolution and 65K color
- 100~240V wide voltage switching power.
- Network port, used to update firmware.
- Up to 16 inputs for AES67 / 8 output network real-time transmission of digital signals & multiple expansions.

Useful Data

3

Please write your serial number here for future reference.

Serial Number:

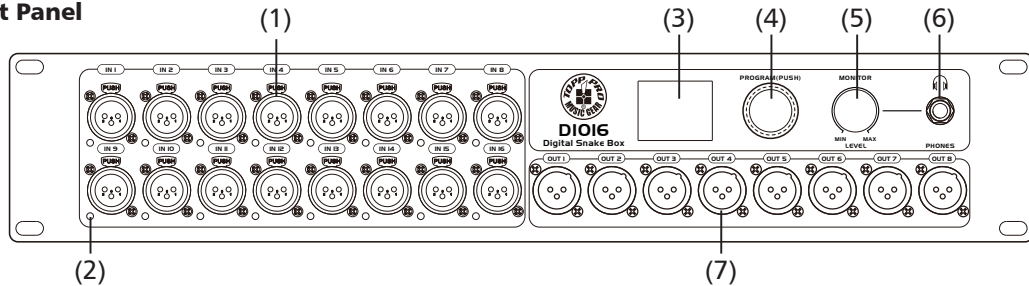
Date of Purchase:

Purchased at:

4

Function Introduction

Front Panel



1. MIC Input Jack

Equipped with 16 MIC input channels.

2. 48V Phantom Power Indicator

It will light up when the 48V phantom power activates.

3. LCD Screen

Those current information (ID, PRE Gain, 48V phantom power, mute, volume.....) will be displayed on it.

4. PROGRAM Encoder

It can be used to setup some parameters such as ID, PRE Gain, 48V phantom power, mute, volume and so on.

5. Monitor Level Control

Used to adjust the size of monitor signals.

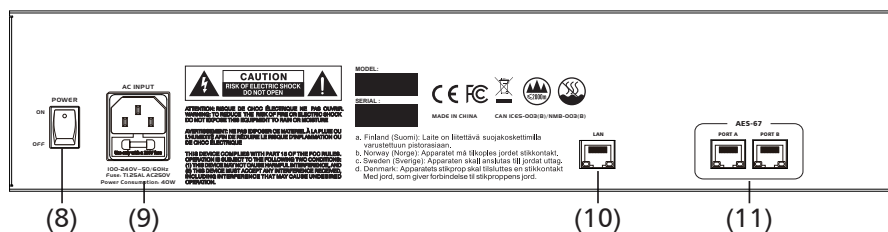
6. Headphone Port

Used to adjust the output monitor signals.

7. XLR Output Channel

Used as XLR jack to output analog signals.

REAR PANEL



8. Power Switch

9. AC Input

The provided power cable can be inserted into it. Note: 100~240V 50/60Hz; Fuse: T1.25AL AC 250V; Power consumption: 40W

10. LAN Port

The firmware can be updated through the LAN port.

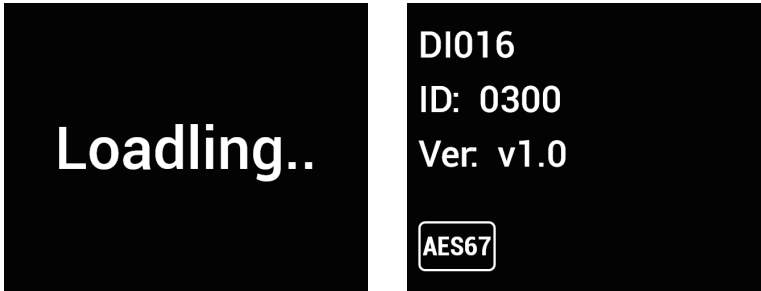
11. AES-67 Port

Total two AES -67 ports A and B, They work as switch ports, Any one (port A or B) can be plugged in to be linked. Each port is equipped with two LED indicators, It means the device is powered when the yellow lights up, The green will blink when transmitting datas via corresponding port.

DSP Setting

5

5.1 Enters loading status after your unit powered, Then related informations such as device's name, ID, software version, etc will be displayed on LCD screen after it powers on.



5.2 Press the "PROGRAM" knob to enter parameter settings interface, Then rotate the "PROGRAM" knob to select function items such as "Channel", "Monitor", "System", "Lock" and so on to take further parameter settings. Touch "Exit" to exit current interface once parameters setting completed.



5.3 Select one as current channel and then press "PROGRAM" knob to enter channel's parameters settings interface as below. Firstly select the parameters needed to be adjusted and then rotate the "PROGRAM" knob to adjust its value. Under this interface user can adjust the PRE Gain, volume, mute status or 48V phantom power applied on CH1~16.



5.4 Select "monitor" and then press the "PROGRAM" knob to enter following monitor setting interface. During setting monitor, firstly select channels needed to be monitored and then press "PROGRAM" knob to activate the monitor function.

5

DSP Setting

```
Monitor
CH 1 : OFF
CH 2 : OFF
CH 3 : OFF
CH 4 : OFF
CH 5 : OFF
```

```
Monitor
CH 1 : ON
CH 2 : OFF
CH 3 : OFF
CH 4 : OFF
CH 5 : OFF
```

5.5 Select "system" and then press the "PROGRAM" knob to enter system parameter setting interface. During setting firstly press the knob to select the parameter needed to be adjusted and then rotate the knob to adjust the parameter value. Under the system interface user can setup the device ID, restore default setting or set IP mode and so on.

```
System
MCU Version V1.0
Name: DIO16
DeviceID: 300
ScreenSaver: OFF
Default Reset
```

```
System
MCU Version V1.0
Name: DIO16
DeviceID: 300
ScreenSaver: OFF
Default Reset
```

```
System
MCU Version V1.0
Name: DIO16
DeviceID: 400
ScreenSaver: OFF
Default Reset
```

5.6 Select "LOCK" and then press the "PROGRAM" knob to enter "LOCK" setting interface. Set "ON" for Pin and then the current interface will return to the default interface automatically after 1 minute to be locked. User can press "PROGRAM" knob to unlock it by keying in passwords on pop-up page.

```
LOCK
Edit: ****
Pin : Off
EXIT
```

```
LOCK
Edit: ****
Pin : on
EXIT
```

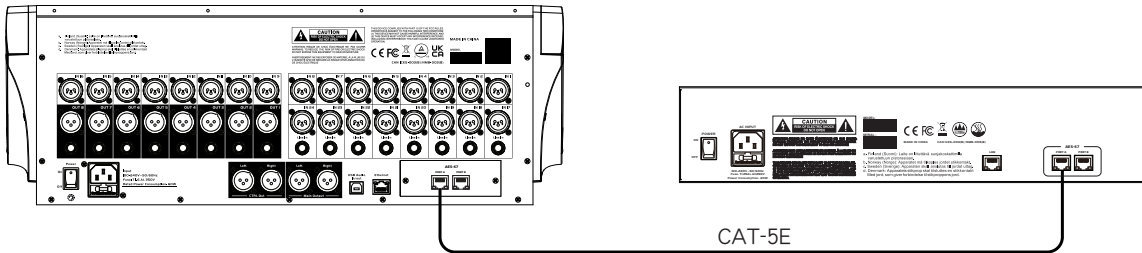
```
OLD PW
0000
[OK] [EXIT]
```

System Linkage Controls

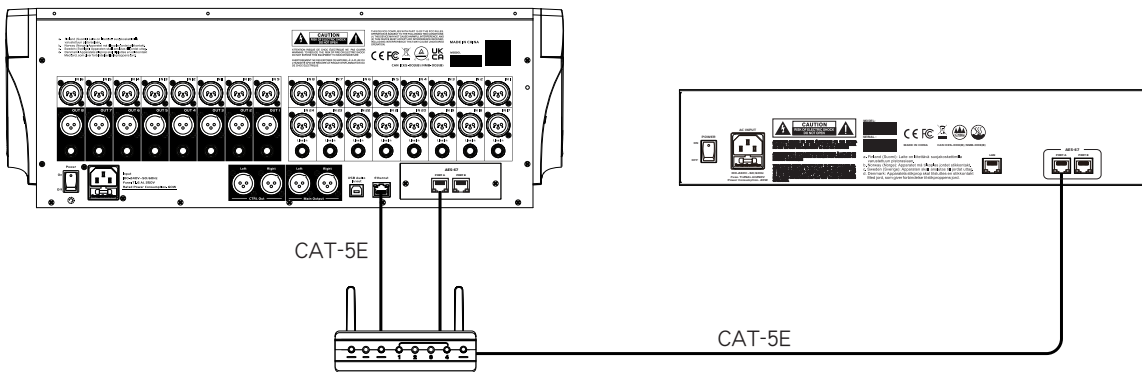
6

About system linkage

About the setting when the digital expansion system is used with DM series digital mixer together. Hookup diagram for system linkage.



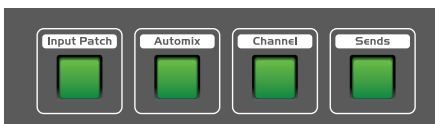
Indirect wiring diagram via router/switcher.



Setting steps based on the digital audio expander as receiver.

1. Select the channel to send AES67 signal source for the digital mixer.

1.1. Select the channel where signals inputs by pressing down the channel keys on front panel (example: CH01 selected), Then Press down the "sends" keys to enter "send" interface.



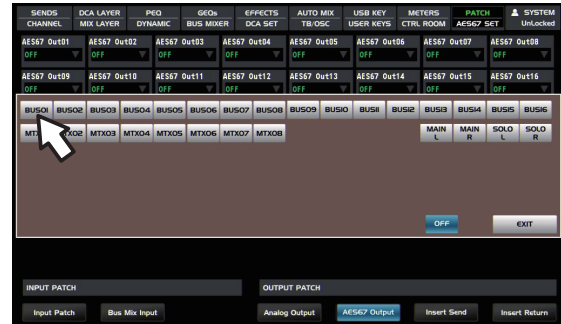
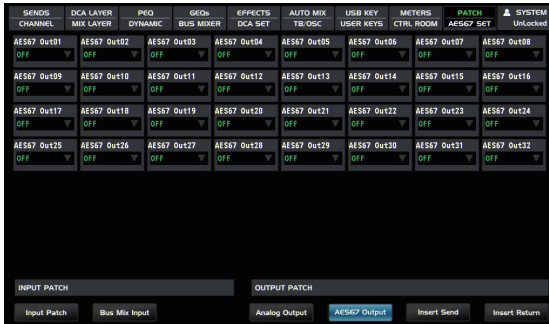
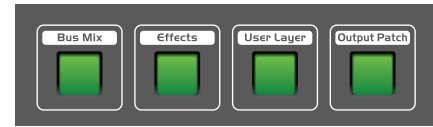
1.2 Touch the "fader send" icon on "send" interface to light it, And then press the "select+solo" key of CH01-16 on the front panel to adjust the level to 0dB, Or click corresponding paramter box of Bus01-16 on LCD screen to adjust the level to 0dB.



6

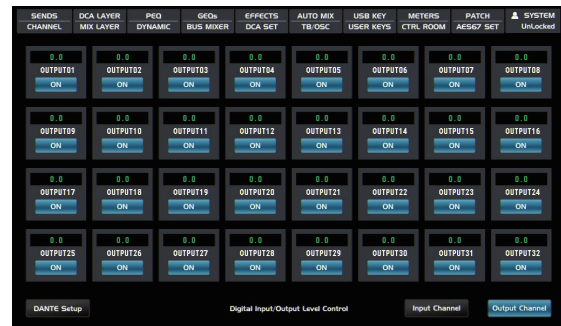
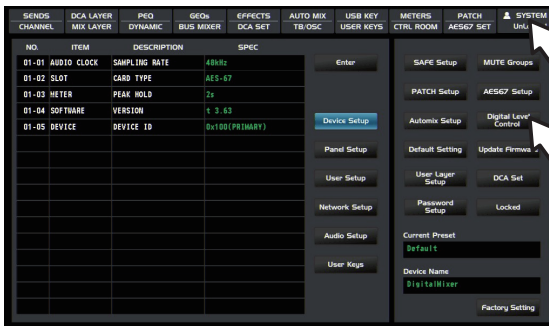
System Linkage Controls

1.3. Press the "Output Patch" key on the front panel to enter below interface. Then touch "AES67 Output" box on LCD screen and select the signal sources of AES67 output, and then slide corresponding volume fader of "Bus Mix" channel into appropriate position.



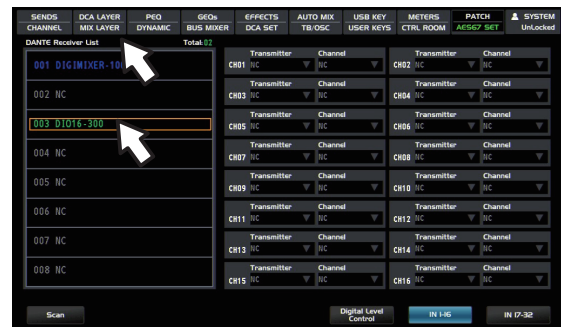
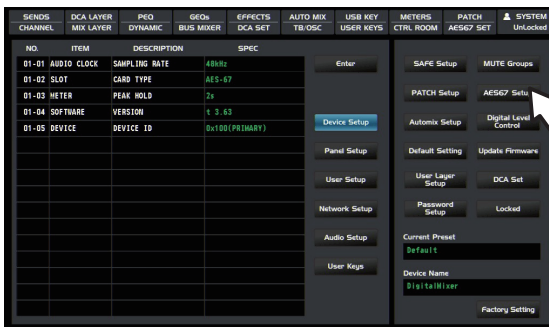
2. Setting steps when local signal sent to AES67 channel

Press the "system" key on the front panel or touch the "system" icon on LCD screen to enter below interface. And then touch "digital level control" box on LCD screen to open the digital output channels by clicking "ON" icon.



3. The assignment of AES67 routing

3.1 Press the "system" key on the front panel or touch the "system" icon on LCD screen to enter below interface. And then touch "AES67 setup" icon on LCD screen to enter the interface on below right. The name & ID number of linked digital snake system will be displayed on "AES67 receiver list".



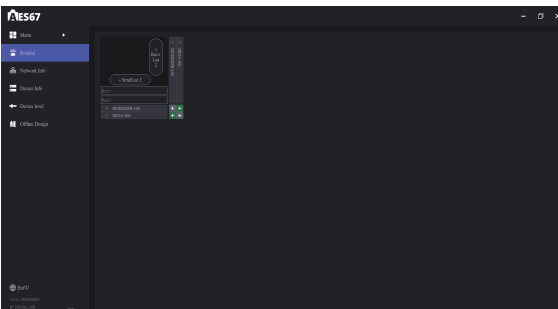
System Linkage Controls

3.2 Selecting receiver and transmitter from AES67 receiver list

Select "DIO-300" shown on "AES67 receiver list" as receiver and the touch any transmitter channel on the right to select "DigiMixer-100" as transmitter from pop-up submenu.

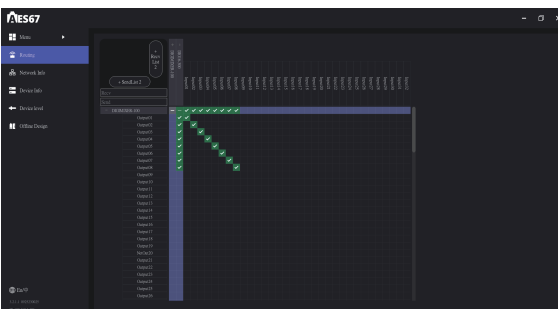


3.3 Connect the AES67 card to your PC, Then open the "AES67Link" software installed in your PC and click "fresh" button to recognize related devices and then enter below interface. Also it is available to proceed MATRIX setting for AES67 card.

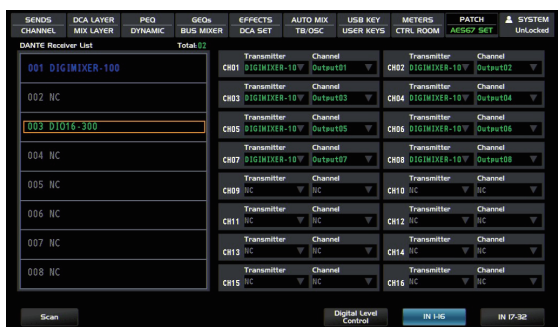


3.4 The MATRIX system divided into two parts (receiver and transmitter)

Select "DIO-300" shown on "AES67 receiver list" as receiver and the touch any transmitter channel on the right to select "DigiMixer-100" as transmitter from pop-up submenu. then click related channels for future setting.



3.5. It is available to proceed audio transmission after all above settings completed.



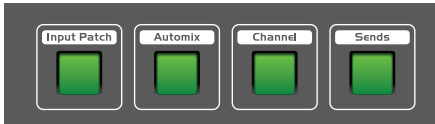
6

System Linkage Controls

How to set the digital mixer as receiver:

1. Select the channel to send AES67 signal source for your digital expander.

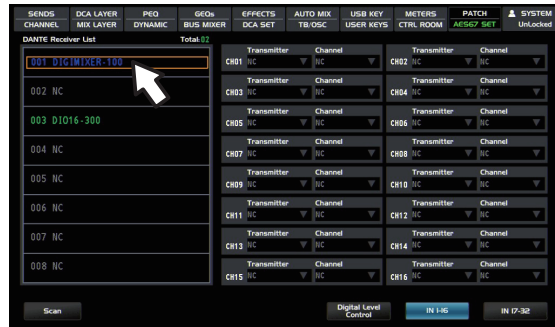
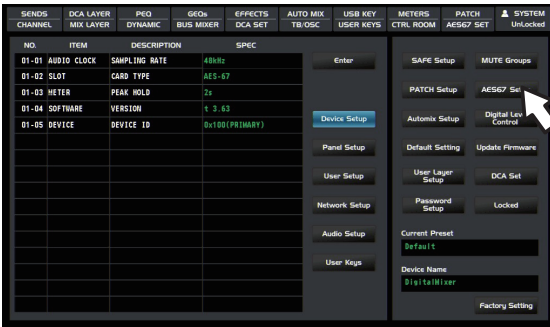
1.1 Press down the "input patch" key on the front panel to enter below interface. Then touch the pop-up page to select corresponding channels for setting. Available to select 1~24 digital signal sources.



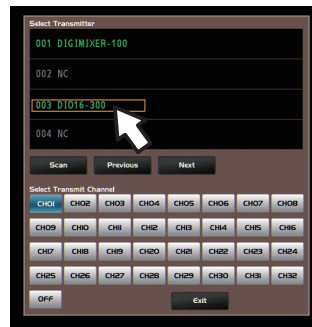
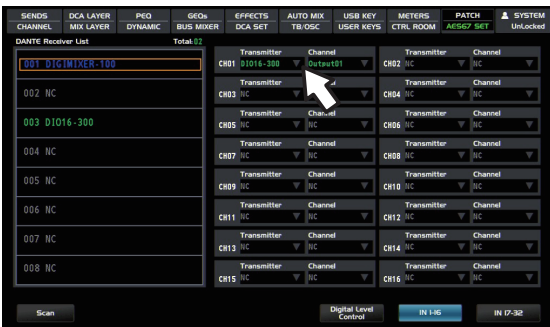
System Linkage Controls

3. AES67 Routing assignment

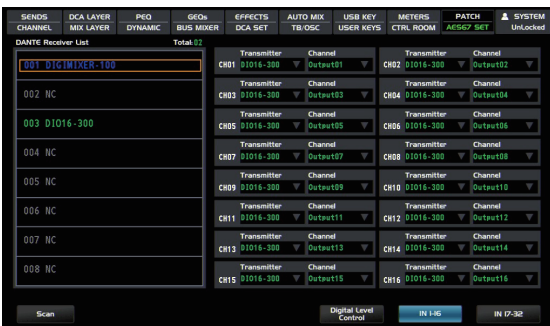
3.1 Press the "system" button on the front panel or touch the "system" icon on LCD screen to enter below interface. and then touch "AES67 setup" to enter "AES67 assignment" page. The name & ID number of linked digital expander will be displayed on "AES67 receiver list".



3.2 Select audio receiving device from the "AES67 receiver list". For example: select "DigiMixer-100" as audio receiver and select "DIO-300" from sending channels on the right as transmitter. Then touch corresponding channels for further setting.



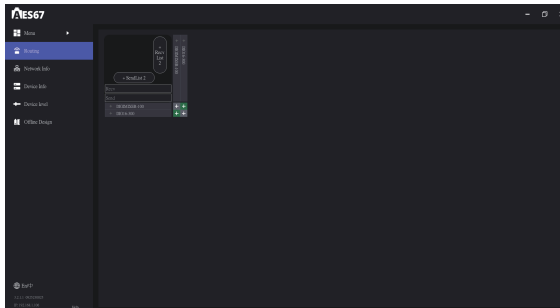
3.3. It is available to transmit audio signals after all above setting steps completed. At this time the digital signals received can be assigned into the Bus or main outputs.



3.4 Connect the AES67 card to your PC, Then open the "AES67Link" software installed in your PC and click "fresh" button to recognize related devices and then enter below interface. Also it is available to proceed MATRIX setting for AES67 card.

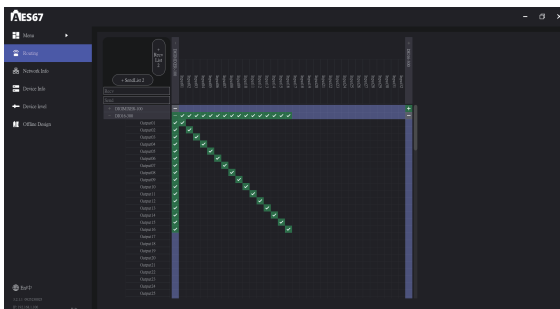
6

System Linkage Controls



3.5 The MATRIX divided into two parts (receiver and transmitter)

Select "DigiMixer-100" shown on "AES67 receiver list" as receiver and then touch any transmitter channel on the right to select DIO-300 as transmitter from pop-up submenu. then click related channels for future setting.



3.6 Since related channel has been selected to input signal sources from digital mixer. That adjust gain value of digital snake system or power on/off 48V phantom power can be operated on channel page after corresponding channels selected.



PC Firmware Update

AES67 Protocol

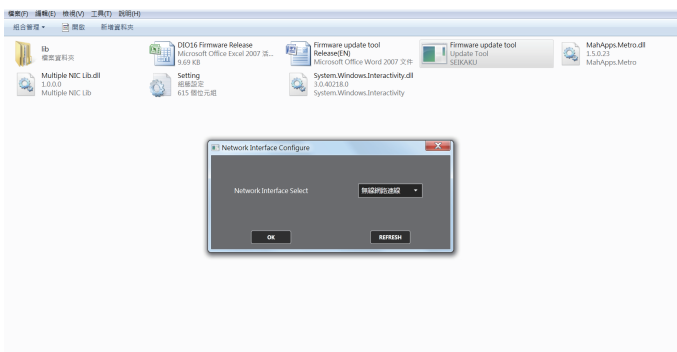
The product transmit or receive digital audio signals based on AES67 digital audio network protocol. It is default to configurate 32 in 32 out AES67 network audio.

AES67 is a standard developed by the Audio Engineering Society (AES) to ensure interoperability between different Audio IP Transport (AoIP) systems. This standard provides a robust and reliable framework for audio IP systems, focusing on interoperability, quality and flexibility. Through standardized device control, connection management, transmission, and clock synchronization, AES67 enables different audio IP systems to work seamlessly together, regardless of the manufacturer or proprietary protocol used. This standard plays a crucial role in professional audio environments, ensuring high-quality, synchronized audio can be transmitted in complex network infrastructures without impacting performance.

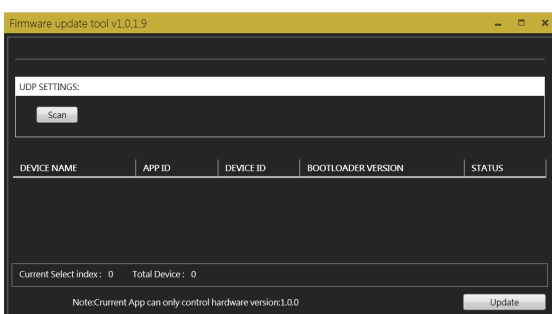


How to update DIO16's firmware

1. A router connected to the LAN port of DIO16 to connect with PC. Open the folder "DIO16 Firmware update tool" on your PC.



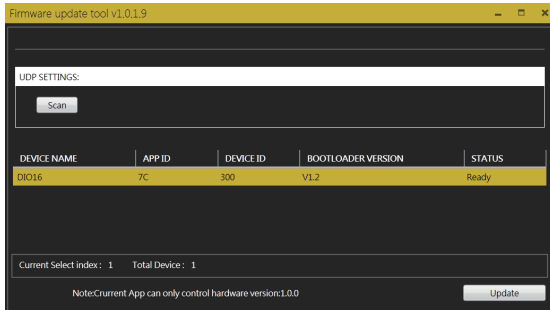
2. Search the devices.



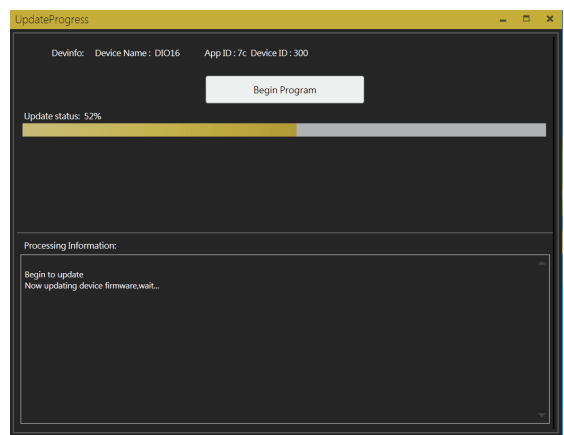
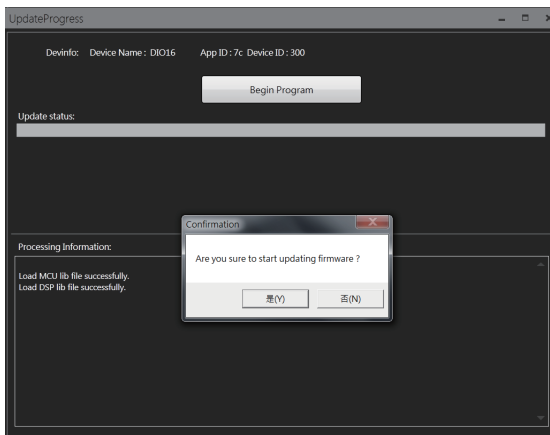


PC Firmware Update

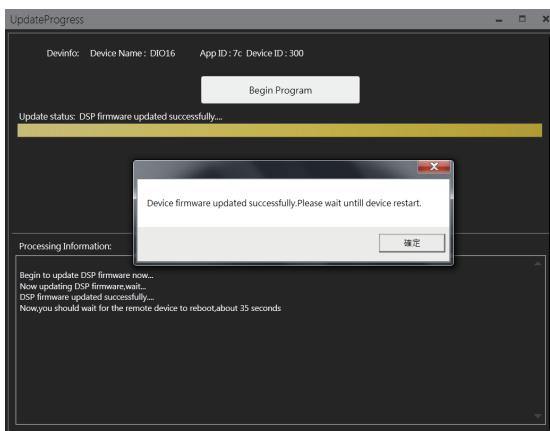
3. Select the device.



4. Touch "update" icon and then click "yes" on pop-up dialog box to start updating the firmware.

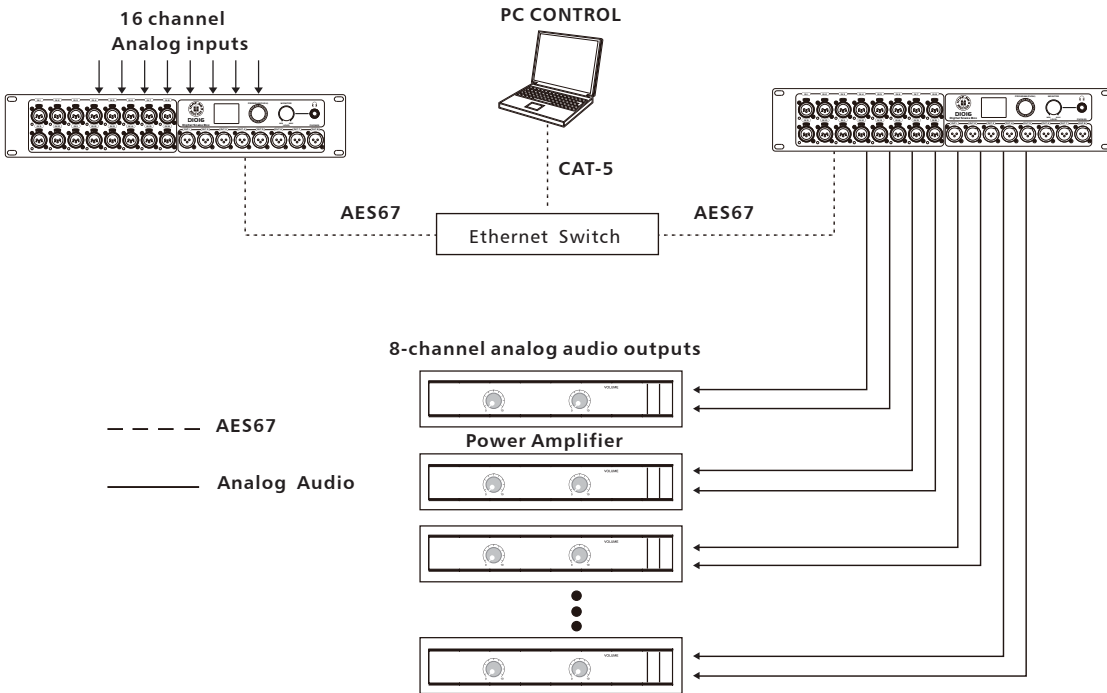


5. Tips box will appear upon firmware update completed.

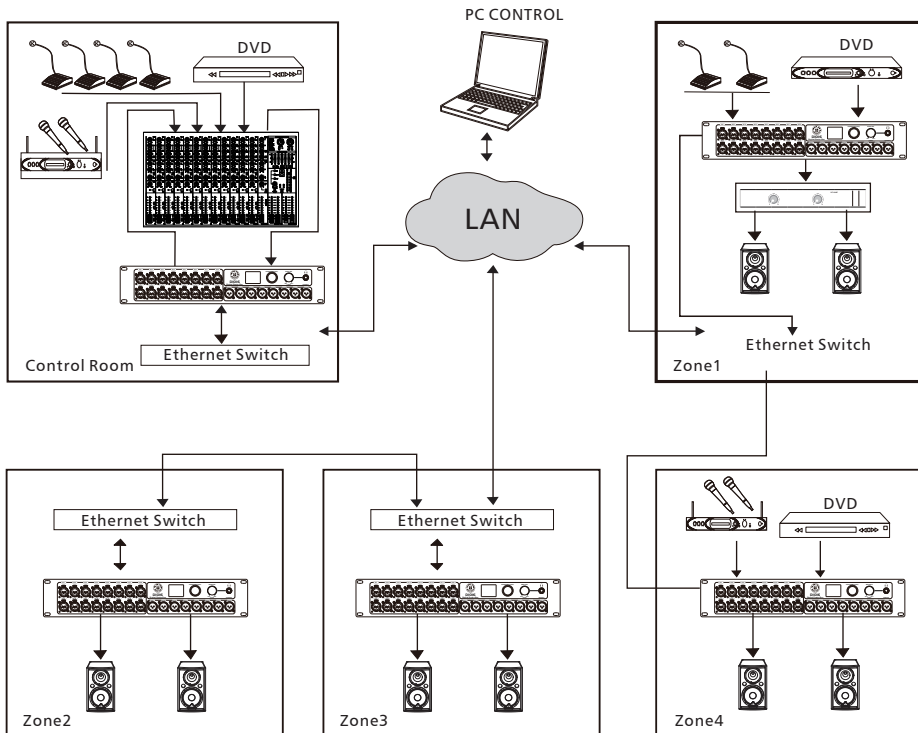


System Linkage Diagram

DIAGRAM(1)

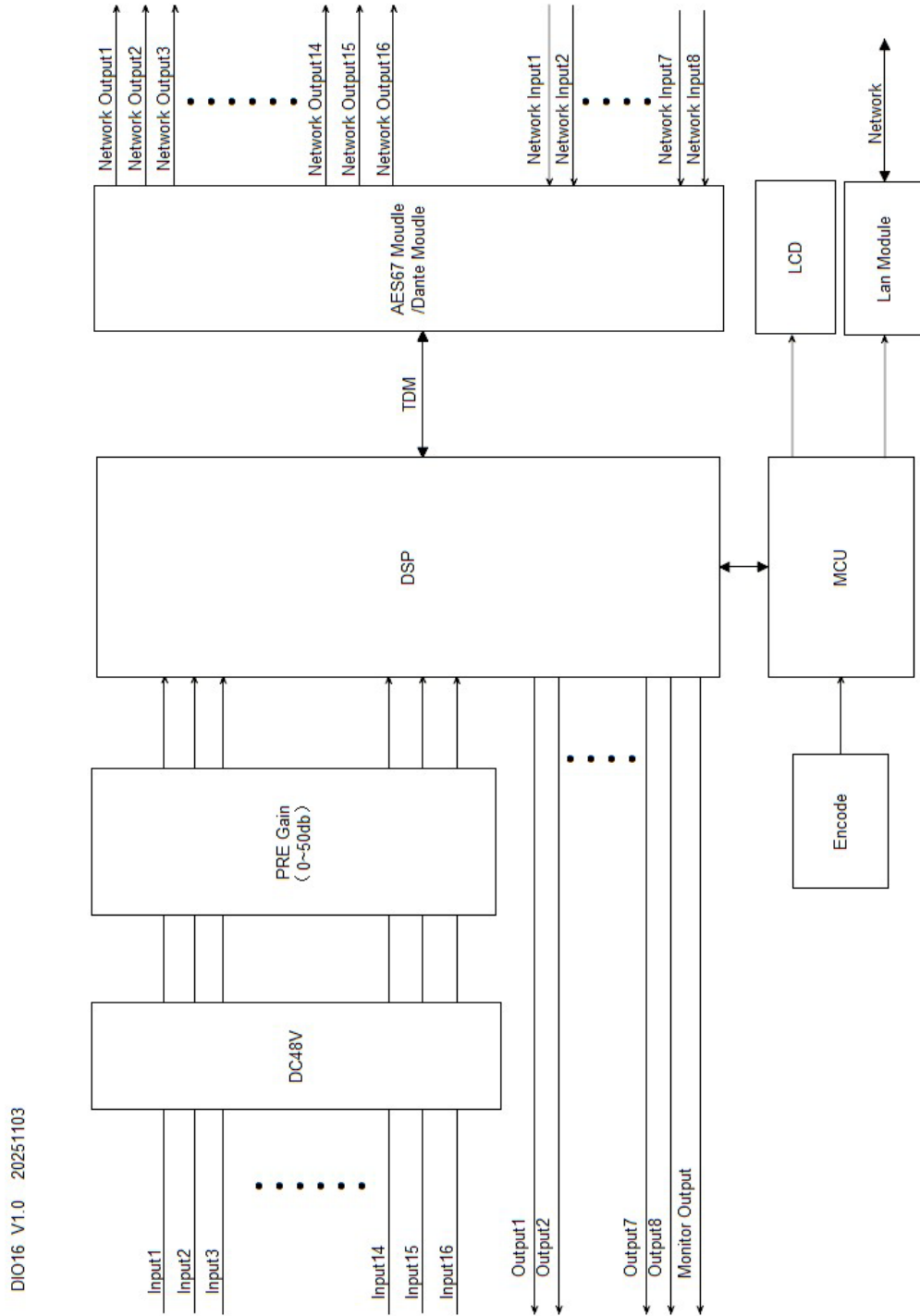


DIAGRAM(2)



9

Block Diagram



Technical Information

Frequency Response	22Hz~20KHz at 0dBu +1/-2.5dB
Distortion(THD&N)	<0.03% at 0dBu 1KHz
SNR(Signal to Noise Ratio)	107dB
Maximum XLR Outputs Level	+20dBu \pm 0.5dB
Phantom Power	+48VDC
EIN(Input noise)	125dB
Maximum HeadPhones Output Level	+20dBu \pm 0.5dB
Input to Output Crosstalk (at +0dBu 1KHz)	<-105dBu
Adjacent Channels Crosstalk (at +0dBu 1KHz)	<-105dBu
Bus Noise	<-89dBu
ADC Dynamic Range	113dB
DAC Dynamic Range	113dB
Internal Processor	32-bit , floating point
ADC bit depth	32bit
DAC bit depth	24bit
Input Impedances	6.8K Ω
Output Impedances	120 Ω
operating free-air temperature range	0~40 $^{\circ}$ C
storage temperature range	-20 $^{\circ}$ C~60 $^{\circ}$ C



TOPP PRO MUSIC GEAR

www.topppro.com

