

## NAM x03 and NAM x03-HP



## Technical User Manual



## IMPRINT

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# 1. INTRODUCTION

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Thank you for purchasing a tm stagetec systems professional Network Amplifier Module (NAM).

Both NAM and NAM-HP (high-power) are fully configurable Dante™ network audio capable loudspeaker power amplifiers, featuring internal DSP for discrete dynamics, filter and delay functions, and four autodetecting gigabit LAN ports (2 x Ethernet and 2 x SFP).

Natively Dante™, two LAN interfaces (1x ethernet and 1x SFP) can be configured to facilitate the 'fall-over' redundancy\* capabilities of Dante™ network audio.

The higher powered NAM-HP supports Audio Frequency Induction Loop (AFILS) configurations and 25V Line modes for high impedance distributed speaker systems.

As add-ons, NAMs can be ordered with 'PLUS' option features such as AES3 digital input, analogue audio input / output and external GPIO control.

All NAMs will seamlessly integrate with a Dante™ network to distribute Unicast and Multicast streams to PA endpoints. NAMs can 'subscribe' to any available Dante™ streams and route them independently or in combination to any one of the four amplified outputs.

**Excitingly**, with some simple additions such as PLUS options or the more powerful tm stagetec DIO devices ([tm-systems.com.au/products/dio](http://tm-systems.com.au/products/dio)), legacy analog PA systems can be bridged directly to a digital network infrastructure.

NAMs are completely compatible with Dante™ Domain Manager and are configured by web browser and the tm-stagetec 'Zone Controller' mobile app for Apple and Android.

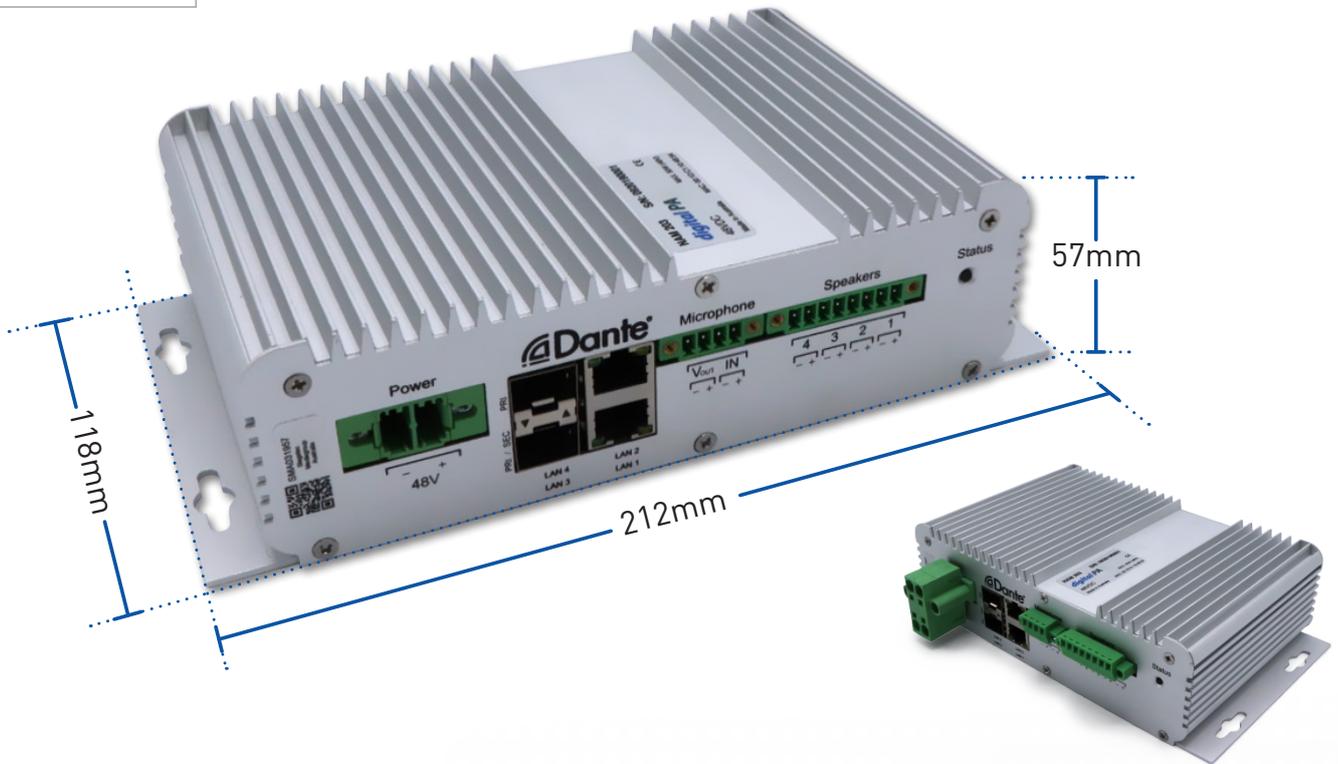
**Please read this manual fully before operating your new NAM.**  
For enquiries and more information please contact us at: [info@tm-systems.com.au](mailto:info@tm-systems.com.au)

\*For production environments and mission critical applications, Audinate's Dante™ network audio protocol combines a main primary network and a redundant secondary network to achieve an automatic and seamless fall-over in the case of a primary network hardware chain failure.

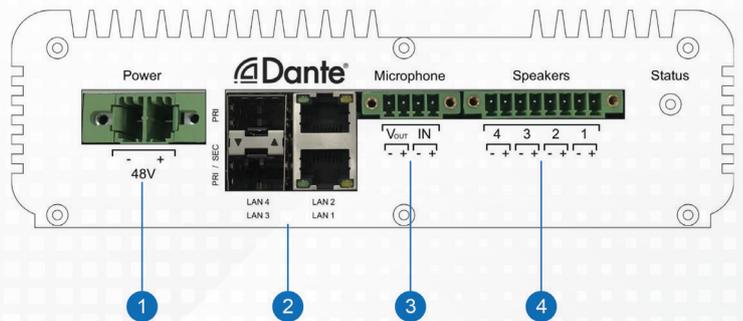
## 2. HARDWARE OVERVIEW

NAMs feature a strong wall mountable die cast aluminium casing with a singular facing panel for all connections.

### Dimensions



### NAM603 Connection Details

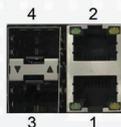


#### 1 Power



2 1  
1: 36V – 52V +  
2: 36V – 52V -

#### 2 LAN



1: LAN 1  
2: LAN 2  
3: LAN 3 (SFP)  
4: LAN 4 (SFP)

#### 3 Microphone



4 3 2 1  
1: Microphone +  
2: Microphone -  
3: Volts +  
4: Ground

#### 4 To Speakers

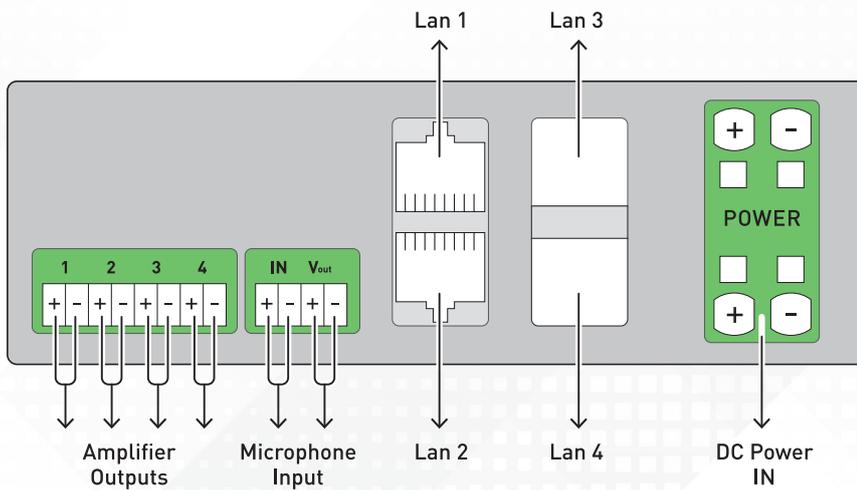


8 7 6 5 4 3 2 1  
1: Speaker 1 +      5: Speaker 3 +  
2: Speaker 1 -      6: Speaker 3 -  
3: Speaker 2 +      7: Speaker 4 +  
4: Speaker 2 -      8: Speaker 4 -

# FIELD INSTALLATION NAM

Optional weatherproof (IP66) field installation casing is also available.

## Dimensions



### 3. AT A GLANCE

Hardware	
Power	36 - 52 VDC (1.5 A) - with <b>real-time</b> monitoring
Network	2 x Gigabit Ethernet and 2 x Small form-factor pluggable (SFP) ports. AutoDetecting - one of each type assigned per LAN in redundancy config.
Amplification	NAM: 4 x 12 W RMS (8 Ω)                      NAM-HP: 4 x 75 W RMS (8 Ω)
AES-3 IN ( <i>PLUS</i> )	24 bit, sample rate conversion, Input Max 7:1, max range 139 DNR.
Analogue I/O ( <i>PLUS</i> )	Up to 2 in and 2 out at +4 dBu Line Level
GPIO ( <i>PLUS</i> )	Vox sources for GPIO triggers.
Microphone input	48v Phantom, ref level -18 / -20 dBfs, gain -2.5 to +41.5 dB, max in +18 dB.
SD card	Audio files = 48k / 16 bit mono (card FAT32 : allocation unit size 512 bytes).
Status	Amp status LED Indicator. AES 'Lock' LED Indicator ( <i>PLUS</i> option).
Management	Web browser interface (up to 20 users). Zone Controller™ mobile app for Apple and Android devices. Dante™ Domain Manager (DDM). Backup / Restore Remote update

#### Processing

- Speaker Impedance Measurement with definable tolerance range
- Amp status with fault codes
- Onboard tone generator - White, Pink, 1 k Sine, 400 Hz Sine - adjustable level
- Selectable DSP per output and input - AES, Dante™ 1-8, Mic, AES (L,R), Tone and SD Card.
- 2500 ms delay per channel in 1 ms steps.
- VOX control triggers - Dante™ 1-8, Mic, AES (*PLUS* option)
- Latency settings
- 1000 point FIR filter per channel

## 4. SETTING UP

Open the packaging and make sure all accessories are present. The box will contain:

- 1 x NAM unit
- 1 x Quick start guide

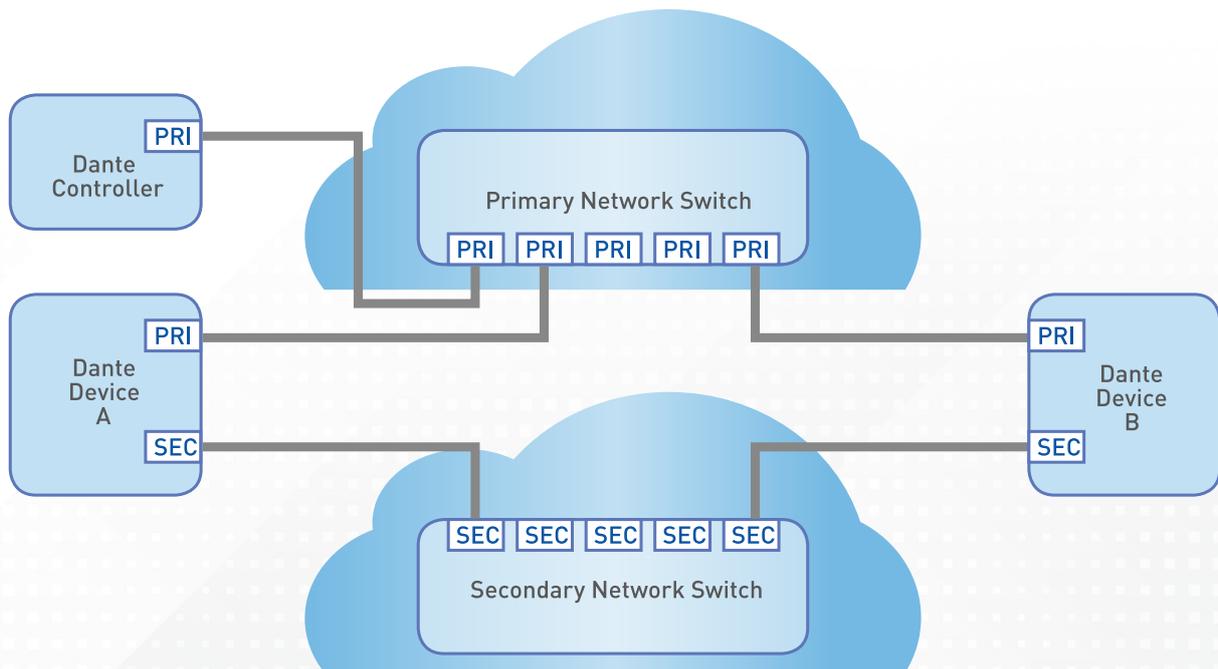
The casing side brackets have pre-drilled holes for flat surface mounting, such as a wall or ceiling. Install the unit in a dry and well ventilated area that is not subject to extreme heat. Take care that the mounting position allows for clear access for cable connections to the unit.

NAM requires a 36 - 52 VDC 1.5 A power source (Phoenix receptacle). **NAM features real-time monitoring of the DC power supply.**

Connect the NAM for your LAN / PA setup. In a basic network configuration, all 4 network ports (copper and fibre) will operate together, much like a 4 port switch. However, this automatically changes if a redundancy configuration is selected.

### OPTIONAL REDUNDANCY

As a fully featured Dante™ device, the NAM can be connected to a secondary network via its designated secondary LAN port. If needed, redundancy is facilitated by the Dante™ Controller. A redundancy configuration is recommended, but is not mandatory.



In a redundancy set up (above), the NAM only needs to be configured as a Dante™ device within the Primary network, and **both networks must have the same link speed**. If the primary network transmits at 1 Gb sec<sup>-1</sup>, this must be matched by the redundant secondary network.

**IMPORTANT: 1 x Gigabit port and 1 x SFP port will be assigned to each network.**

## 5. STATUS VIEW

After powering up the NAM will automatically acquire a network IP address via DHCP.

Dante™ Controller management software can be used to discover this IP address, or you can employ other methods of IP discovery. A web browser can then be used to navigate to the web interface.

The initial **STATUS** page displays a comprehensive overview of the current operational status, including current versions of hardware and firmware, network configuration, and realtime monitoring of the DC power supply input.

**NAM**

- Status
- Login

### STATUS

#### DEVICE INFO

Device Name	HP-TEST-0f9f46
Dante Redundancy	Switched
Dante Preferred Master Clock	OFF
Dante Domain	ADHOC
Dante Domain State	DISCONNECTED
Uptime	5 days, 18 hours, 12 minutes
Temperature	33.19 °C
DC Input	48.43 V

#### VERSIONS

Dante Model ID	52
Dante Software	4.01.001.004
Dante Firmware	4.00.002.010
Device Software	01.01.041
DSP Firmware	02.02.24
Hardware	01.00.000
Options	HP NONE
XML Configuration	3.00.015

#### SWITCH INFO

Status

LAN 1	LAN 2	LAN 3	LAN 4
PRI	PRI	PRI	PRI

#### DANTE NETWORK PRIMARY

Clock State	MASTER
Tx util Kbps	18
Rx util Kbps	41
DHCP active	DHCP
IP Address	10.0.0.119
Mask	255.255.255.0
Gateway	10.0.0.1
DNS Suffix	dpa.com.au
DNS Server	10.218.128.11
MAC Address	00:1D:C1:0F:9F:46

To make any configuration changes, Users must first **Login**.

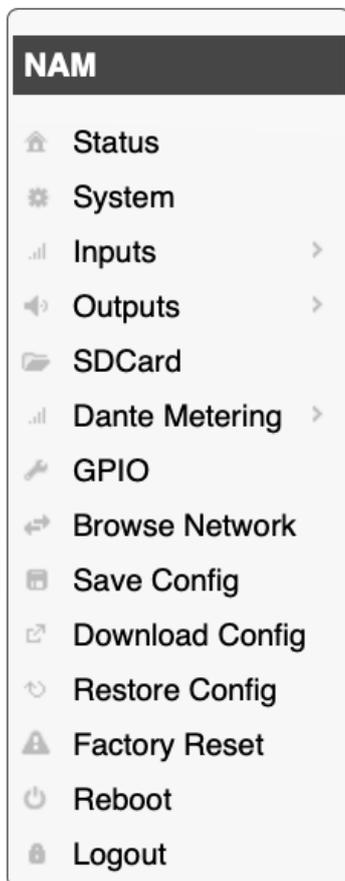
## 6. LOGGING IN

Clicking 'Login' in the left edge menu bar will prompt for a password.  
Enter the password in the text dialog and click 'Ok'.



A screenshot of a 'Login' dialog box. The title bar says 'Login' with a close button. Below the title bar is a dark bar with the text 'ENTER PASSWORD'. Underneath is a text input field with a cursor and a small key icon. At the bottom right are 'Ok' and 'Cancel' buttons.

The default password is, 'password'.



Entry gives full access to all configuration settings via the expanded menu bar options on the left edge of the window.

## 7. SYSTEM MENU

Click on 'System' to access core Dante™ network configuration options.

### 7.1 SYSTEM - GENERAL TAB

#### SYSTEM

General Dante Network

---

#### DEVICE

**Device Name (A to Z, 1 to 9 or -)**  
HP-TEST-0f9f46

**Password**  
..... ?

**Dante Redundancy**      Redundant Switched

**Dante Redundancy after Reboot**      Redundant Switched

**Dante Preferred Master Clock**      ON OFF

**Dante Receive Latency (µs)**      250 500 1000 5000 20000

**Dante Channels per Flow**      2 4 8

#### Status display item

Dante Redundancy:                      Indicates the current redundancy configuration.

#### Configurable options

Device Name:                              Enter a name for your NAM on the network. This name will appear in Dante™ Controller / Domain Manager.

Password:                                      The **Login password** can be changed here.

Dante Redundancy after Reboot:      Advance selection of redundancy configuration post reboot.

Dante Preferred Master Clock:        Determines unit candidacy for the role of master digital clock (see - **Glossary of Terms**).

Dante Receive Latency (µs):            Sets the receive **latency** for this device (see - **Glossary of Terms**). The default value is 1000 µs.

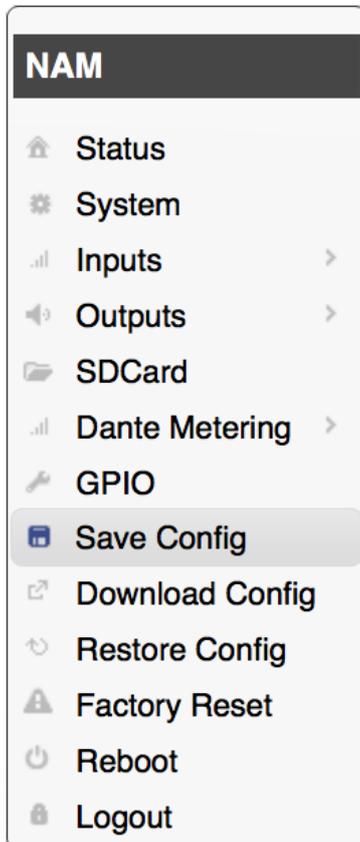
Dante Channels per Flow:                Set channels per Flow (see - **Glossary of Terms**).

## IMPORTANT NOTE:

After making any configuration changes, a prompt will remind you to save your changes.

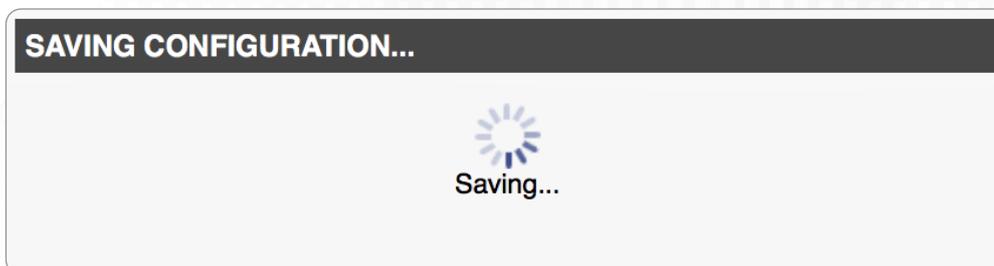
### Don't forget to save your changes!

Click 'Save Config' on the left side menu bar.



It is not mandatory to do this immediately after every adjustment, and an accumulation of configuration changes may be entered before committing to a save.

However, your changes will not be permanently committed to memory until a **save** is applied.



## 7.2 SYSTEM - DANTE NETWORK TAB

Dante™ Primary and Secondary (if required) network configurations are made in this tab.

**SYSTEM**

**General** **Dante Network**

**DANTE NETWORK PRIMARY**

<b>Clock State</b>	SLAVE
<b>Tx util Kbps</b>	8
<b>Rx util Kbps</b>	5057
<b>DHCP Active</b>	<input type="radio"/> OFF <input type="radio"/> ON
<b>DHCP after Reboot</b>	<input type="radio"/> OFF <input checked="" type="radio"/> ON
<b>IP Address</b>	<input type="text" value="192.168.12.57"/>
<b>Mask</b>	<input type="text" value="255.255.255.0"/>
<b>Gateway</b>	<input type="text" value="192.168.12.254"/>
<b>DNS Server</b>	<input type="text" value="192.168.10.1"/>
<b>DNS Suffix</b>	stagetec.com.au
<b>MAC Address</b>	00:1D:C1:0B:DB:DC

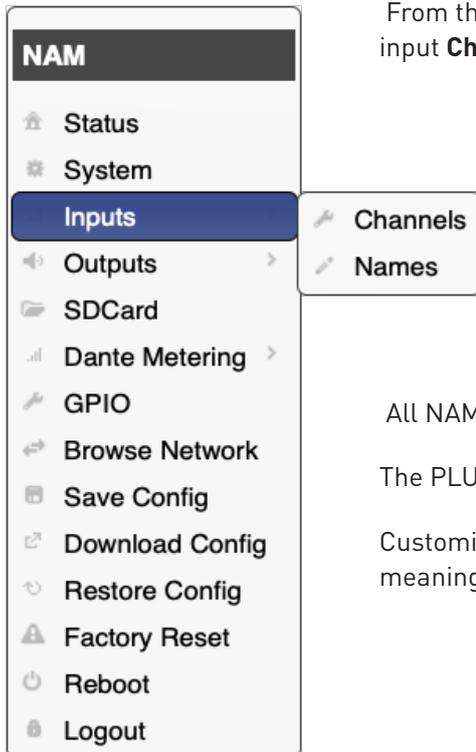
### Status display

- Clock State** - Clock ranking. MASTER or SLAVE.
- Tx util Kbps** - Current transmit network bandwidth usage.
- Rx util Kbps** - Current receive network bandwidth usage.
- DHCP Active:** - Indicates whether or not DHCP is the current method of acquiring a network address.
- DNS Suffix** - The applied network Domain DNS Suffix (see - **Glossary of Terms**).
- MAC Address** - The unique media access control (MAC) network address of the Primary network interface controller (NIC).

### Configurable options

- DHCP after Reboot:** Sets automatic network address acquisition after a reboot. If set to **OFF**, then the **IP Address**, **Mask**, **Gateway** and **DNS Server** fields will become active. **NOTE: A device reboot is necessary to implement the changes.**

## 8. INPUTS MENU



From the side menu, '**Inputs**' gives access to configuration options for available input **Channels** and their customisable **Names**.

All NAMs feature a phantom powered microphone input **Channel**.

The PLUS option features an additional AES-3 input **Channel**.

Customisable naming allows input **Channels** to be assigned user friendly and meaningful names for ease of identification on your network.

## 8.1 INPUTS - CHANNELS - MICROPHONE TAB

Microphone

---

MICROPHONE PREAMPLIFIER

**Audio Reference Level dBFS**   

**Phantom Power**   

**Gain**     0.0 dB

---

EQ

**BiQuad Filter**   

<b>BiQuad 1</b>	<input type="button" value="Parametric"/> ▾	50 ▾ Hz	0.0 ▾ Gain	1.0 ▾ Q
<b>BiQuad 2</b>	<input type="button" value="Parametric"/> ▾	125 ▾ Hz	0.0 ▾ Gain	1.0 ▾ Q
<b>BiQuad 3</b>	<input type="button" value="Parametric"/> ▾	500 ▾ Hz	0.0 ▾ Gain	1.0 ▾ Q
<b>BiQuad 4</b>	<input type="button" value="Parametric"/> ▾	1000 ▾ Hz	0.0 ▾ Gain	1.0 ▾ Q
<b>BiQuad 5</b>	<input type="button" value="Parametric"/> ▾	3000 ▾ Hz	0.0 ▾ Gain	1.0 ▾ Q
<b>BiQuad 6</b>	<input type="button" value="Parametric"/> ▾	8000 ▾ Hz	0.0 ▾ Gain	1.0 ▾ Q
<b>BiQuad 7</b>	<input type="button" value="Parametric"/> ▾	16000 ▾ Hz	0.0 ▾ Gain	1.0 ▾ Q

---

DYNAMICS

**Dynamics**   

**AGC Drive**     0 dB

**Limiter Threshold**     -6 dBFS

---

MULTI BAND NOISE GATE (100HZ - 6KHZ)

**Noise Gate**   

**Decay**     80 dB/Sec

**Threshold**     -60 dBFS

**Depth**     -20 dB

### Configurable options

- Audio Reference Level dBFS:** Set -18 or -20 dBFS, depending on your working standard.
- Phantom Power:** When 'ON' is selected, 48 VDC will be sent to the mic input.
- Gain:** Raise or reduce gain within the range: -2.5 dB to 41.5 dB.
- BiQuad Filter (and bands):** Enable / disable EQ filtering. Choose filter type and settings.
- Dynamics:** Enable / disable compressor/limiter and settings.
- Noise gate:** Enable / disable multiband noise gate and settings.

## 8.2 INPUTS - NAMES - AES TAB (PLUS OPTION)

The AES tab provides information about the current **Lock Status** of the AES input connection.

**INPUTS**

Microphone **AES**

**AES INPUT**

Lock Status ✓ OK

## 8.3 INPUTS - NAMES - CHANNEL NAMES TAB

Inputs can be assigned user friendly names for ease of identification and administration.

**DANTE TRANSMITTERS**

Channel names

NAME / TYPE	LABEL
AMP Mon 1	Main Program Output
AMP Mon 2	Auxiliary Feed
AMP Mon 3	Backup Feed
AMP Mon 4	Unused 1
MIC	Microphone - Neumann U87
None	Unused 2
AES L	Safety Monitor AES (L)
AES R	Program Commentary AES (R)

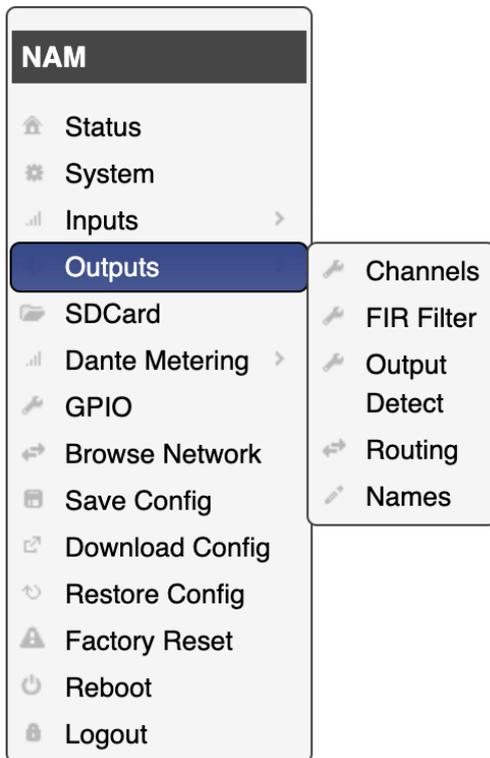
### Configurable options

Type in text names for each channel.

**NOTE:** AES L and R are only available as a *PLUS* option.

## 9. OUTPUTS MENU

From the side menu, selecting '**Outputs**' gives access to a broad set of configuration options for the four amplifier outputs, as well as their interactions with connected speakers.



Each of the 5 sub-menus expand further.

## 9.1 OUTPUTS - CHANNELS - GENERAL TAB

The General tab provides a **STATUS** display for important functional attributes of each amplifier channel and selectable options for Amplifier Mode and a Tone Generator.

**OUTPUTS**

General | AMP CH 1 | AMP CH 2 | AMP CH 3 | AMP CH 4 | AES CH 1

AES CH 2

**GENERAL**

Amplifier Mode: 4x12W@8Ohm

**STATUS**

Amp1 CH1-CH2 Communication: ✓ OK

Amp1 CH1-CH2 Over Current: ✓ OK

Amp1 CH1-CH2 Clocking: ✓ OK

Amp2 CH3-CH4 Communication: ✓ OK

Amp2 CH3-CH4 Over Current: ✓ OK

Amp2 CH3-CH4 Clocking: ✓ OK

**TONE GENERATOR**

Tone: WHITE

Volume (ref -18): 0.0 dBFS

### Status display

- Amp(n) CH(n)-CH(n) Communication - 'OK' = control signals are working
- Amp(n) CH(n)-CH(n) Over Current - 'OK' = no power overloading
- Amp(n) CH(n)-CH(n) Clocking - 'OK' = digital Clock sync

### Configurable options

- Amplifier Mode:** Selections here depend on which NAM model you have. You can select the configuration of power amplifier to 'n' speakers of a given resistance ( $\Omega$ ). For NAM-HP, AFILS and 25 V power modes are set here.
- Tone:** Select from 4 types. White noise, pink noise, 1 kHz sine and 400 Hz sine.
- Volume (ref -20):** Use the slider to apply gain or gain reduction to the tone within the range: -57 dBFS and 0 dBFS. **NOTE:** a number can be typed directly in the 'dBFS' field.

## 9.2 OUTPUTS - CHANNELS - AMP CH(N) TABS

The available AMP CH(n) tabs each contain the same configuration options.

**NOTE:** The number of available AMP CH(n) tabs depends on the **Amplifier Mode** setting (see 9.1)

The screenshot displays the configuration interface for AMP CH 1. At the top, there are tabs for General, AMP CH 1 (selected), AMP CH 2, AMP CH 3, and AMP CH 4. Below the tabs, the interface is organized into several sections:

- CHANNEL 1**
  - Speaker Status:** A button labeled "FAULT" with a warning icon.
  - Volume:** A slider set to 0.0 dB.
  - Soft Clipper:** A slider set to -4 dBfs.
  - Line Mute:** Two buttons, "MUTE" and "UN-MUTE", with "UN-MUTE" being active.
  - Source:** A dropdown menu set to "CH1 DANTE".
- EQ**
  - FIR Filter:** Two buttons, "ON" and "OFF", with "OFF" being active.
  - BiQuad Filter:** Two buttons, "ON" and "OFF", with "OFF" being active.
  - BiQuad 1-7:** Seven rows of parametric filter settings. Each row includes a dropdown menu set to "Parametric", a frequency value (50, 125, 500, 1000, 3000, 8000, 16000 Hz), a gain value (0.0), and a Q factor (1.0).
- DYNAMICS**
  - Dynamics:** Two buttons, "ON" and "OFF", with "OFF" being active.
  - AGC Drive:** A slider set to 0 dB.
  - Limiter Threshold:** A slider set to -6 dBfs.
- DELAY**
  - Delay:** Three input fields for 0 msec, 0.0 meters, and 0.0 feet, followed by a percentage slider.
  - uDelay:** A slider set to 0 Samples.
- VOX CONTROL**
  - VOX Source:** A dropdown menu set to "CH1 DANTE".
  - VOX Enable:** Two buttons, "OFF" and "ON", with "OFF" being active.
  - VOX Mode:** Three buttons, "ROUTE", "DIM", and "MIX", with "ROUTE" being active.
  - VOX Timeout:** A slider set to 2 Sec.
  - VOX Threshold:** A slider set to -50 dBFS.
  - VOX Dim Level:** A slider set to -20 dB.

## Status display

**Speaker Status:** Indicates an 'OK' or 'FAULT' outcome for connected speaker detection.

## Configurable options

- Volume:** The slider sets the output volume of the amp channel. range: -72 dB to 24 dB. **NOTE:** a numeric setting can be typed into the 'dB' box directly.
- Soft Clipper:** Clips the level of the input signal asymmetrically according to the set thresholds.
- Line Mute:** **MUTE** or **UNMUTE** the amp channel output.
- Source:** Select an audio source for the amp channel from the drop down menu.
- FIR Filter:** Enable / disable the amp channel Finite Impulse Response (FIR) filter.
- BiQuad Filter:** Enable / disable EQ filtering. Choose filter type and settings for multiple bands.
- Dynamics:** Enable / disable compressor / limiter and settings. Automatic Gain Control (AGC) Drive range: 0 - 20 db, Limiter range: -20 to -2 dBFS.
- Delay:** Adjustable channel output delay of up to 2500ms can be defined directly (in text field) in either milliseconds, metres or imperial feet.
- μDelay:** Set with the slider - a sample accurate (max 48) delay can be specified for phase based line arrays.
- VOX Source:** Use the drop down menu to select a VOX source from Dante™ channels 1-8, the microphone input, the AES left or AES right inputs (PLUS option).
- VOX Enable:** Enable / disable VOX side chain functionality.
- VOX Mode:** Choose which VOX mode to operate in. See 'VOX FUNCTION' (below).
- VOX Timeout:** This slider sets the time period after which the unit reverts to normal amplification operation after the **VOX source** input drops below its set threshold volume. The timeout period ranges from 2 to 20 seconds.
- VOX Threshold:** This slider sets the volume threshold that the **VOX Source** must breach in order to trigger VOX functionality. Range: -70 to 0 dBFS.
- VOX Dim Level:** This slider sets the volume attenuation level for the main channel output when the unit is in VOX '**DIM**' Mode. Range: -144 to -6 dB.

## VOX function

The **VOX Source** can be thought of as a side chain input that beyond a definable volume threshold attenuates the main amp channel output by a definable amount. The Vox function has 3 modes.

### Mode 1 - ROUTE

When it rises above the set threshold volume, the **VOX Source** will be hard routed straight to the main amp channel output, completely overriding the main output source until the **VOX Timeout** duration has been passed **AND** the **VOX Source** volume has dropped back below the set threshold.

### Mode 2 - DIM

The **VOX Source** itself will not be routed to the amp channel output. However, when the **VOX Source** rises above the set threshold volume, a definable attenuation of the main output channel will occur until the **VOX Timeout** duration has been passed **AND** the **VOX Source** volume has dropped back below the set threshold.

### Mode 3 - MIX

When it rises above the set threshold volume, the **VOX Source** will be mixed with the main output source until the **VOX Timeout** duration has been passed **AND** the **VOX Source** volume has dropped back below the set threshold.

## 9.3 OUTPUTS - CHANNELS - AES CH TABS (PLUS OPTION)

### OUTPUTS

General AMP CH 1 AMP CH 2 AMP CH 3 AMP CH 4 **AES CH 1** AES CH 2

#### CHANNEL 1

**Volume**  0.0 dB

**Line Mute** MUTE **UN-MUTE**

**Source**

#### VOX CONTROL

**VOX Source**

**VOX Enable** OFF **ON**

**VOX Mode** **ROUTE** DIM MIX

**VOX Timeout**  2 Sec

**VOX Threshold**  -50 dBFS

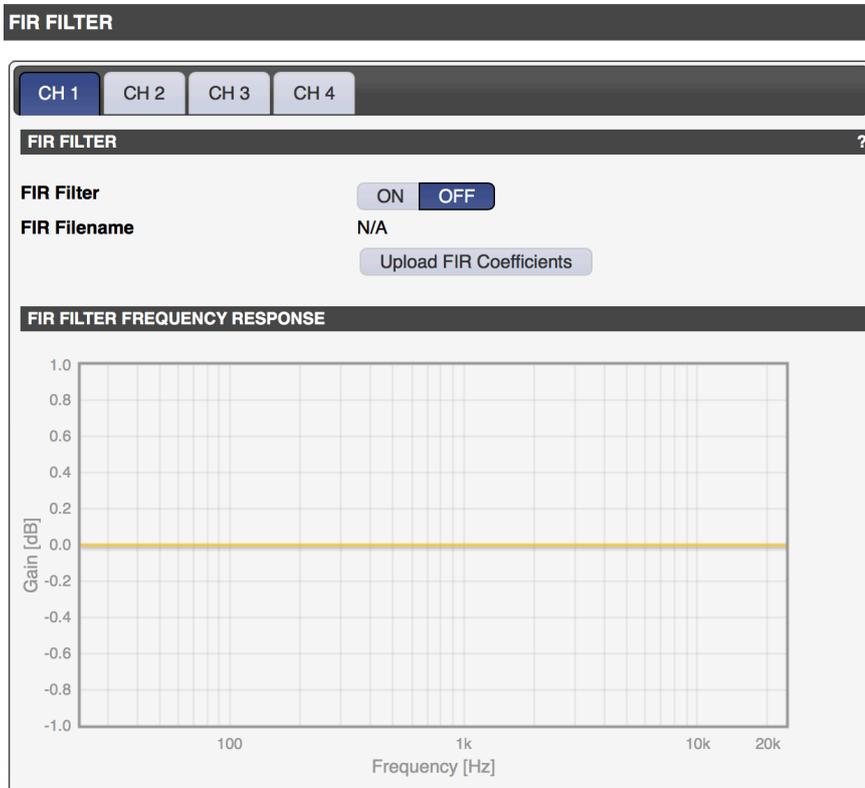
**VOX Dim Level**  -20 dB

### Configurable options

- Volume:** The slider sets the output volume of the amp channel. The range is -72 dB to 24 dB. **NOTE:** a numeric setting can also be typed in directly to the 'dB' box.
- Line Mute:** **MUTE** or **UNMUTE** the amp channel output.
- Source:** Use the drop down menu to select a source from Dante™ channels 1-8, the microphone input, the AES left or right inputs (NAM PLUS), the tone generator or the MicroSD card.
- VOX Source:** Select a VOX source from Dante™ channels 1-8, the microphone input, the AES left or the AES right inputs (PLUS option).
- VOX Enable:** Enable / disable the VOX side chain functionality.
- VOX Mode:** Choose which VOX mode to operate in.
- VOX Timeout:** This slider sets the time period after which the unit reverts to normal operation after the 'disappearance' of the **VOX source** input. Range = 2 to 20 secs.
- VOX Threshold:** This slider sets the volume threshold that the **VOX Source** must breach in order to trigger the VOX functionality. Range = -70 to 0 dBFS.
- VOX Dim Level:** This slider sets the volume attenuation level for the main channel output channel when the unit is using VOX **Mode 2** (DIM). Range = -144 to -6 dB.

## 9.4 OUTPUTS - FIR FILTER - CH TABS

Each of the outputs boasts an independent 1000 point Finite Impulse Response (FIR) filter, with the function to upload FIR preset curves.



### Configurable options

**FIR Filter:** Enable / disable the amp channel FIR filter.

**FIR Filename:** Click **Upload FIR Coefficients** to access a .fir file upload dialog. A preset file can be uploaded to the channel and its filename will be displayed. The frequency response chart will also update to display the curve of the uploaded FIR preset.

**NOTE:** A FIR curve can only be completely cleared by uploading a replacement .fir file or factory resetting the NAM.

## 9.5 OUTPUTS - OUTPUT DETECT - GENERAL TAB

The Speaker Detection General tab gives status and impedance details of all connected speakers and allows configuration of Speaker Detection parameters.

### SPEAKER DETECTION

General CH 1 CH 2 CH 3 CH 4

#### GENERAL

**Single Shot Measurement**  ON  OFF

**Refresh Rate**  60 Sec

#### STATUS

Ch-1 (avg Ohm)	<input checked="" type="checkbox"/> OK
Ch-2 (avg Ohm)	<input checked="" type="checkbox"/> OK
Ch-3 (avg Ohm)	<input checked="" type="checkbox"/> OK
Ch-4 (avg Ohm)	<input checked="" type="checkbox"/> OK

### Status display

Ch(n) (avg Ohm): After a Speaker Detection pass, an average impedance measurement for that speaker will be displayed in brackets in place of 'avg Ohm'. For example, **Ch-1 (avg 8.1 Ohm)**.

The 'OK' status display means that correct impedance is detected. Otherwise 'FAULT' will be displayed.

### Configurable options

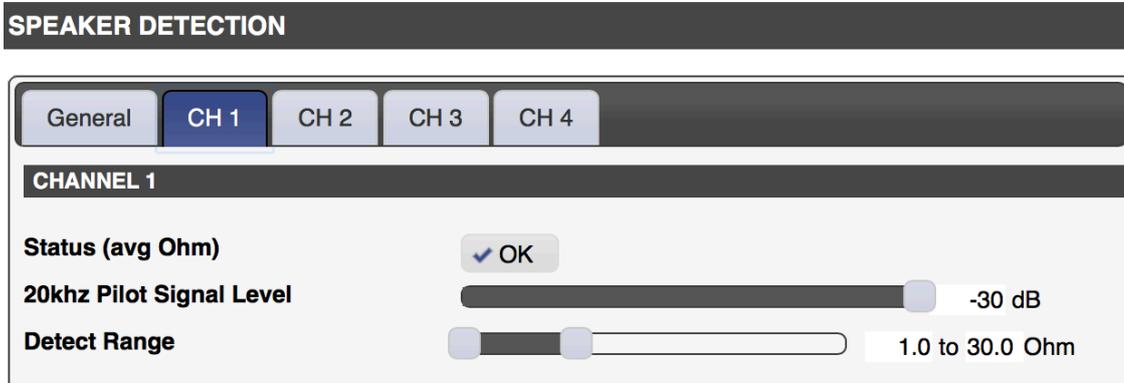
**Manual Refresh:** Initiates an immediate speaker detection for all amplifier outputs.

**Auto Refresh Rate:** This controls how often automatic speaker detection is repeated for all amplifier outputs. Time period range: 1 to 600 seconds.

**Detect Mode:** Define whether the Speaker Detection facility uses a 10Hz or 20kHz pilot audio signal.

## 9.6 OUTPUTS - SPEAKER DETECT - CH TABS

The CH (n) tabs allow adjustment of speaker detection parameters.



### Status display

**Status (avg Ohm):** An 'OK' status display confirms a Speaker Detection and the average detected impedance is displayed (avg ~ Ohm). Otherwise, 'FAULT' is shown.

### Configurable options

**Speaker Detection:** Enables / disables Speaker Detection for the channel.

**Pilot Signal Level:** This slider allows setting the level of the 10 kHz or 20 kHz Speaker Detection signal. Range: -60 dB to -30 dB.

**Detect Range:** The dual ended slider defines the impedance detection range. Range: 1  $\Omega$  to 100  $\Omega$  - set by the double ended slider.

## 9.7 OUTPUTS - ROUTING - CH 1-8 TAB

This section sets the possible Dante™ network audio subscriptions - which can be used as amplified outputs to speakers or as VOX side chain inputs..

### ROUTING

#### CH 1-8

##### 01 - DEFAULT 1 - NONE (01)

Subscription	SAM BC 1 L@BGM-PC	 
Mute	<input type="button" value="ON"/> <input checked="" type="button" value="OFF"/>	
Latency $\mu$ s	6000	
Status	DYNAMIC	
Flow	1	

##### 02 - DEFAULT 1 - NONE (02)

Subscription	SAM BC 1 R@BGM-PC	 
Mute	<input type="button" value="ON"/> <input checked="" type="button" value="OFF"/>	
Latency $\mu$ s	6000	
Status	DYNAMIC	
Flow	1	

### Status display

- Subscription:** Displays the name of the current Dante™ subscription for the channel.
- Mute:** **ON** or **OFF** - enables or disables the stream.
- Latency  $\mu$ s:** Shows the current Latency setting applied to the Dante™ channel.
- Status:** The type of Dante™ route subscription.
- Flow:** Shows which Dante™ Flow (see - **Glossary of Terms**) the NAM is subscribed to.

### Configurable options

The Add / Change Subscription button  displays a list of available Dante™ devices.

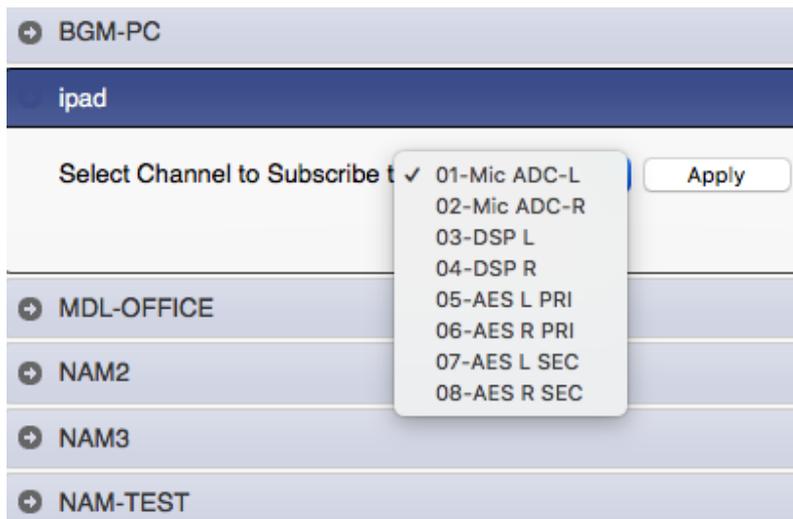
#### Select Source for Channel 1

Filter

- BGM-PC
- ipad
- MDL-OFFICE
- NAM2
- NAM3
- NAM-TEST

Cancel

Clicking on a device will reveal a drop down menu featuring all available Dante™ streams being broadcast by that device.



After selecting a stream, click 'Apply' to subscribe to it.

To remove a stream, click the Clear Subscription button  clear the Dante™ channel.

A confirmation dialog will ask you to confirm.



## 9.8 OUTPUTS - NAMES - CHANNEL NAMES TAB

The 8 Dante™ network audio subscriptions can be assigned user friendly names for ease of operation and administration later on.

**DANTE RECEIVERS**

**Channel names**

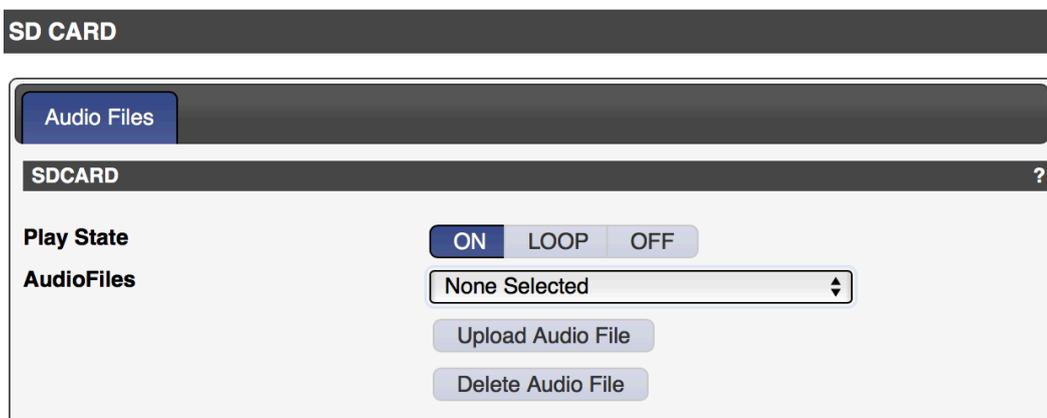
INDEX / TYPE	NAME
01	<input type="text" value="Background Music"/>
02	<input type="text" value="Neumann U87 mic booth"/>
03	<input type="text" value="Foxtel feed"/>
04	<input type="text" value="Building announcements"/>
05	<input type="text" value="News feed"/>
06	<input type="text" value="CH6"/>
07	<input type="text" value="CH7"/>
08	<input type="text" value="CH8"/>

Names can be typed directly in to the text area for each subscription channel.

## 10. SD CARD - AUDIO FILES TAB

NAM comes with an onboard Micro SD port for the purpose of storing and playing user generated .wav files (48 kHz, 16 bit, mono).

Micro SD cards are required to be formatted as FAT32 with an allocation unit size of 512 bytes.



### Configurable options

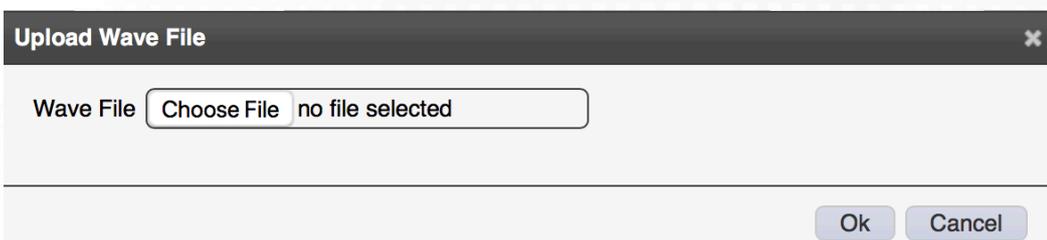
**Play State:** When 'ON' is selected, any audio file selected from the **Audio Files** drop down menu will play immediately upon selection - and once only. In this mode, a selected audio file can also be triggered via GPIO or UDP protocol. (This mode does not have to be selected to play the file via GPIO or UDP. This mode reverts back to OFF after the file is played once).

When 'LOOP' is selected, any audio file selected from the **Audio Files** drop down menu will play over and over continuously until the Play State mode is changed.

When 'OFF' is selected, the SD Card audio file functionality is disabled.

**Audio Files:** The drop down menu lists all audio files stored on the SD Card, and is used to select a file for playback.

Click the **Upload Audio File** button to upload a new file from your computer. An file search dialog will facilitate the upload process.



Click the **Delete Audio File** button to delete the currently selected audio file from the SD Card. A confirmation dialog will warn you before the deletion process.

**Important note:** Files uploaded via the webpage are limited to 2mb in size. Files larger than this must be directly copied to the SDCard manually.

## 11. DANTE™ METERING

### 11.1 RECEIVERS - PEAK VALUES TAB

NAM provides real-time level metering of the audio volume of all Dante™ network audio streams that the NAM is currently subscribed to. Notice that where they have been assigned, user defined names for the streams are used in the display.

DANTE RECEIVERS										
Peak Values										
01 - Background Music	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
02 - Neumann U87 mic booth	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
03 - Foxtel feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
04 - Building announcements	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
05 - News feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
06 - CH6	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
07 - CH7	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
08 - CH8	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS

### 11.2 DANTE™ METERING - TRANSMITTERS - PEAK VALUES TAB

NAM also provides real-time level metering of the audio volume of all physical input sources: the microphone input, SD Card audio files, Tone generator and AES L+R (NAM PLUS). Notice that where they have been assigned, user defined names for the input sources are used in the display.

DANTE TRANSMITTERS										
Peak Values										
01 - Main Program Output	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
02 - Auxiliary Feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
03 - Backup Feed	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
04 - Unused 1	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
05 - Microphone - Neumann U87	-72	-63	-54	-45	-36	-27	-18	-9		-99 dBFS
06 - Unused 2	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
07 - Safety Monitor AES (L)	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS
08 - Program Commentary AES (R)	-72	-63	-54	-45	-36	-27	-18	-9		-126 dBFS

## 12. GPIO (*PLUS* OPTION)

As a *PLUS* option, a general-purpose input/output (GPIO) add-on is provided for extended control functionality, which is user definable.

The screenshot shows a web-based configuration interface for the GPIO (General Purpose Input/Output) feature. At the top, there are two tabs: 'GPIO CH 1' (selected) and 'GPIO CH 2'. Below the tabs, the main configuration area is titled 'GPIO CHANNEL 1'. The settings are as follows:

- GPI:** A toggle switch set to 'OFF'.
- GPO:** A toggle switch set to 'OFF'.
- GPI poll interval in  $\mu$ s:** A text input field containing '50000'.
- GPI on function:** An empty text input field.
- GPI off function:** An empty text input field.
- GPO Event:** A dropdown menu with 'UDP' selected.
- VOX Source:** A dropdown menu with 'CH1 DANTE' selected.
- VOX Timeout:** A slider control set to '2 Sec'.
- VOX Threshold:** A slider control set to '-50 dBFS'.

### Status display

**GPI:** Displays incoming GPI signal status. It's either there '**ON**' or not there (**OFF**).

### Configurable options

**GPO:** When '**ON**', audio output as defined by the configuration is enabled.

**GPI poll interval:** How often NAM checks for a GPI signal. The default is every 50000  $\mu$ s.

**GPI on function:** Can be used to trigger any API event within the device when set high.

**GPI off function:** Can be used to trigger any API event within the device when set low.

**GPO event:** Select GPO triggers from the dropdown menu (see - GPIO options, below).

**VOX Source:** Select a VOX source from Dante™ channels 1-8, the microphone input, or AES L / R inputs (*PLUS* option).

**VOX Timeout:** This slider sets the time period after which the unit reverts to normal amplification operation after the **VOX source** input drops below its set threshold volume. The timeout period ranges from 2 to 20 seconds.

**VOX Threshold:** This slider sets the volume threshold that the **VOX Source** must breach in order to trigger VOX functionality. Range = -70 to 0 dBFS.

## 12.1 GPIO OPTIONS

The GPIO configuration tabs feature a 'GPIO Event' control drop down selection menu. The menu allows selection of any one of the listed occurrences as a means of triggering a GPIO event.

A screenshot of a dark grey dropdown menu with white text. The menu is open, showing a list of options. The first option, 'UDP', is preceded by a white checkmark. The other options are listed in all caps.

- ✓ UDP
- NET1 LINK FAIL
- NET2 LINK FAIL
- NET1-2 LINK FAIL
- VOX
- AES SYNC FAIL
- CH1 DANTE MUTE
- CH2 DANTE MUTE
- CH3 DANTE MUTE
- CH4 DANTE MUTE
- CH5 DANTE MUTE
- CH6 DANTE MUTE
- CH7 DANTE MUTE
- CH8 DANTE MUTE
- SYSTEM FAULT
- SYSTEM OK

**UDP:** GPIO is triggered by a UDP command via the LAN.

**NET1 LINK FAIL:** GPIO is triggered by a network link failure.

**NET2 LINK FAIL:** GPIO is triggered by a network link failure.

**NET1-2 LINK FAIL:** GPIO is triggered by the failure of all network links.

**VOX:** GPIO is triggered by a VOX input.

**AES SYNC FAIL:** GPIO is triggered by a synchronisation failure of the the AES digital I/O.

**CH1 DANTE MUTE:** GPIO is triggered by silence on the Dante™ Channel (Path Fail Alarm).

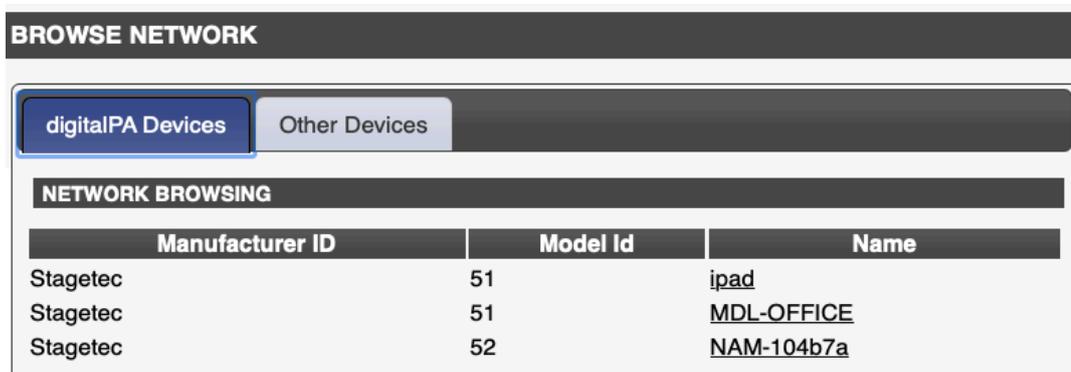
**SYSTEM FAULT:** GPIO is triggered by a detected system fault.

See Appendix for GPI/O pin outs.

## 13. ADMINISTRATIVE FUNCTIONS

The following side menu functions provide non-audio related device management functionality.

**Browse Network:** Provides a list of Dante™ devices on the network (**digitalPA Devices** tab) and also other visible devices (**Other Devices** tab).



The screenshot shows a web interface titled "BROWSE NETWORK". It has two tabs: "digitalPA Devices" (selected) and "Other Devices". Below the tabs is a section titled "NETWORK BROWSING" containing a table with three columns: "Manufacturer ID", "Model Id", and "Name".

Manufacturer ID	Model Id	Name
Stagetec	51	ipad
Stagetec	51	MDL-OFFICE
Stagetec	52	NAM-104b7a

**Save Config:** Frequent use of this is strongly encouraged! This single clickable function is used to save changes throughout the entire configuration process. When a '**Save Config**' is required, a prompt window appears above the current window to inform the User.

**Download Config:** When clicked, this single clickable function facilitates a .xml file download of the current configuration of the NAM unit to your computer / device.

**Restore Config:** Enables a previously saved .xml configuration file to be reloaded into NAM, OVERWRITING THE CURRENT CONFIGURATION.

**Factory Reset:** Use with care. This function wipes the current configuration and reverts it to a factory default condition. Without a backup config .xml file, there is no way to recover the previous configuration after doing this.

**Reboot:** Facilitates a complete re-start of the NAM unit.

**Logout:** Click '**Logout**' to leave configuration mode and return to view STATUS only mode.

## 14. GLOSSARY OF TERMS

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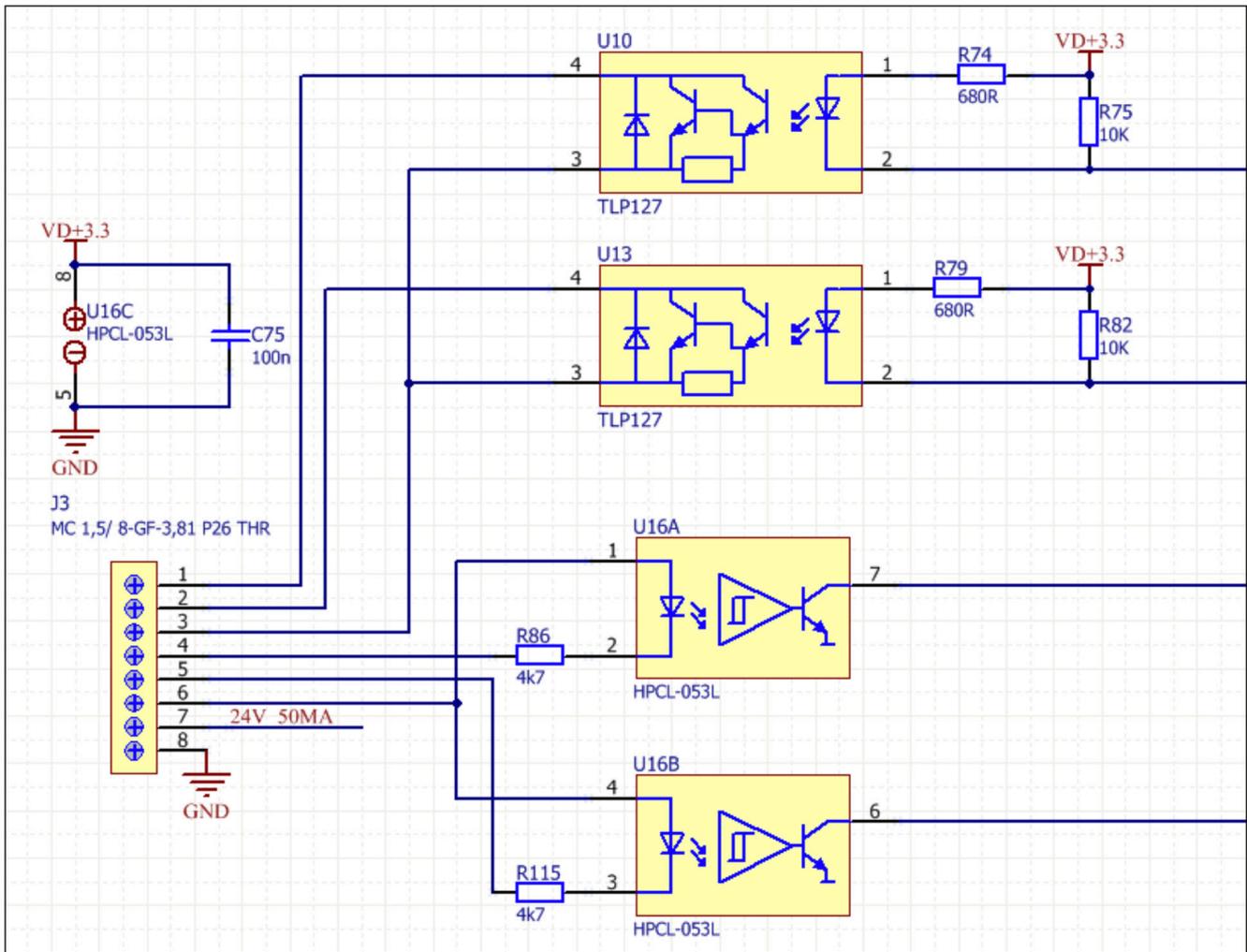
- DNS Suffix:** The DNS suffix specifies the network Domain name to be appended to the computer name when completing its Fully Qualified Domain name (FQDN). If a computer doesn't have the correct DNS suffix, it may have name resolution issues and may be unable to join a network Domain.
- FIR:** A Finite Impulse Response filter is a digital equalisation tool that can compensate for loudspeaker non linearities or counter the effects of room acoustics. An FIR filter is typically used when a speaker manufacturer develops and provides a proprietary FIR coefficient file that corresponds directly to their own loudspeaker or speaker cabinet, addressing frequency and phase issues based on their own measurements and formulations.
- Flow:** For network bandwidth efficiency Dante™ normally packages audio into 4-channel 'Flows' when using Unicast. Flows are unique to each receiver and 1 channel sent to 1 receiver will use the same bandwidth as 4 channels. This means that Flows will always exist as a group of four per channel, even if three of them are 'empty' (contain no audio stream).  
HOWEVER, NAM has the inbuilt functionality (System > General) to choose between 2, 4 and 8 Flows per channel - a further bandwidth saving option.
- Latency:** Latency is the time taken for a signal to travel from the input to the output of a system. All digital systems exhibit latency. Each Dante™ receiver introduces a specific, user-adjustable amount of latency before playing out audio to account for any delay variation in the network or end device, and this guarantees that all devices play out in perfect sync. Dante™ Controller sets this latency per device, and the value selected should be based on the size of the network.
- Master Clock:** Dante™ audio networks utilise a master clock device to precisely co-ordinate data transfer among all network devices. The winning master clock candidate is normally designated by the Dante™ Controller application, or the Dante™ Domain Manager application.
- Redundancy:** For '**Redundant**' operation, the NAM must be configured so that there is 1x Ethernet connection and 1x SFP connection in each of the primary and secondary networks (essentially different VLANs). The order is irrelevant as long as the configuration is clear and understood. In a '**Switched**' configuration, redundancy is not used and all four LAN ports are connected via the internal switch function (all in the same VLAN).

## HARDWARE LED STATUS

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State	Description
Steady LED on	System operating normally
Continual rapid flashing	CPU firmware update in progress
Error Codes (n)	(n)500 ms flashes followed by 3 secs OFF
1	DSP communication – sync fault
2	AMP IC CH1-2 communication fault
3	AMP IC CH3-4 communication fault
4	Temperature sensor communication fault
5	MIC - Speaker Detect communication fault
6	SD card Initiation fault
7	TDM Delay - SDRAM IC readback fault

## GPI/O PIN OUTS



Pin 1 - O/C + GP0 1

Pin 2 - O/C + GP0 2

Pin 3 - O/C- Common GP0 1-2

Pin 4 - Opto+ GPI 1

Pin 5 - Opto+ GPI 2

Pin 6 - Opto- Common GPI 1-2

Pin 7 - 24V 50 ma limited

Pin 8 - Gnd