DNS 2 dialogue noise suppressor

OWNER’S MANUAL
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AN INTRODUCTION TO THE DNS 2

The DNS 2 is a further development of the DNS technology introduced in the Academy Award winning DNS1000 and the DNS 8 Live dialogue noise suppressors. It is small, light and portable, and ideal for use on location as well as in the studio and in post. Offering two channels of dialogue noise suppression, its simple user-interface allows users to obtain optimum results almost instantly and with the minimum of effort. Nonetheless, it retains the near-zero latency of its predecessors and, with its 4-pin 12VDC power socket, it’s suitable for use in all live situations - not just on location and for live-to-air broadcasting, but also for live sound in venues such as theatres, concert halls, conferences venues, and places of worship.

The DNS 2 operates by dividing incoming signals into a large number of bands. Sophisticated filters analyse each of these and then suppress the noise independently in each. The innovative design of the filter bank eliminates the need to select the range of frequencies in which the unit will operate, and it’s not necessary to adjust the amount of attenuation in individual bands.

Features:

- **Near zero latency**
  A group delay of less than 1ms, so there is no loss of lip-sync.

- **Flexibility**
  The ability to handle a wide range of noise suppression requirements.

- **Speed and ease of use**
  A carefully designed user-interface that maximises speed of use.

- **Audio interfaces**
  24-bit digital audio interfaces conforming to AES/EBU standards plus high-quality analog mic/line inputs with optional +48V phantom power.

- **12VDC power**
  The ability to work anywhere in the world.

- **Powerful processors**
  The latest high resolution floating-point processors to ensure that it handles the most complex processing requirements.
SAFETY INSTRUCTIONS

Read these instructions, and follow them.

■ **Water and moisture**
The DNS 2 and its power adapter must not be exposed directly to rain or moisture. Furthermore, if it is brought directly from a cold environment into a warm one, moisture may condense inside it. Allow the equipment to reach ambient temperatures naturally before connecting the power.

■ **Mounting and ventilation**
Do not subject the equipment to strong sunlight, excessive dust, mechanical vibration or periodic shocks. It is not susceptible to excessive heat build-up, but should be installed away from heat sources such as radiators and audio devices that produce large amounts of heat.

■ **Connections**
Turn off the power to all equipment before making connections.

■ **Cleaning**
Clean the equipment only with a dry cloth. Never use abrasive pads or liquid cleaners such as alcohol or benzene.

■ **Damage requiring service**
The equipment contains no user-serviceable parts and should on no account be opened or dismantled by unauthorised personnel.
The equipment should be returned to qualified service agents when it has been exposed to liquids, when it fails to function correctly, when it has been dropped, or when the case is damaged.
OPERATION

Unpack the DNS 2 carefully. Save the carton and all packing materials since you may need them in the future. In addition to the DNS 2, the box should contain:

- 12V DC power supply
- start-up and safety instructions sheet
- warranty registration card

To maintain reliability and prolong operating life, observe the following environmental considerations:

- the temperature should be maintained between 5° and 30° Celsius
- relative humidity should be in the range 30% to 80% non-condensing
- strong magnetic fields should not exist nearby.

Power sources

Power is supplied by an external DC source of 8–17.5V with a film industry 4-pin XLR. A 12V PSU is included with the unit and this will work on any mains supply in the range 85V to 250V, 50/60Hz AC. Connect its output to the DNS 2 power input and then plug it into the mains supply.

Press the power on/off button to switch power on and off:
- press the button briefly to switch the power ON
- hold the button for a couple of seconds to switch the power OFF

Controls

Each channel has its own process controls and indicators. These comprise two illuminated push buttons, a rotary encoder with an integrated push switch, and a small dot-matrix display. These are used for both setup and process control.

Connections

The DNS 2 offers analog and digital audio connections. It can pass its signal to both outputs irrespective of the input used.

Select the active audio input using the two-position toggle switch on the side of the unit. When the analog inputs are in use, a three-position switch for each channel selects between line, microphone and microphone with +48V phantom powering.

Analog input

Set the input selector switch to ANALOG IN (switch to left).

Connect microphones or line level signals to the analog input XLRs. Select LINE, MIC, or 48V (MIC with 48V phantom power) for each input as appropriate. Connect the analog and/or digital XLR outputs to suitable inputs on your recording or monitoring equipment.
Internal Sync
When the analog inputs are selected, synchronisation is derived by default from a fixed internal 48kHz clock, and the digital output clock is derived from this internal clock.

External Sync
To use the analog to digital conversion of the DnS 2 at a sample rate other than 48kHz, or to lock its digital outputs to house sync, connect an AES3 or AES11 sync signal to the digital input. The front panel sync LED will show green, and the DnS 2 will automatically synchronise to the external signal. Operation at 44.1kHz, 48kHz and 96kHz is supported.

Gain
Press the SETUP button to monitor the input signal level on the displays. If desired, you can use the encoders to adjust the gain of the analog input for each channel.

Press the SETUP button again to return to the process control page. The operations of the controls and displays will also revert to process control page after a short idle period.

Digital input
Set the input selector switch to DIGITAL IN (switch to right) and connect an AES digital source to the digital input XLR. Connect the digital and/or analog output XLRs to suitable inputs on your recording or monitoring equipment.

The unit will lock to any AES3 signal with a sample rate of up to 96kHz that is presented to its inputs. Operation is supported at 44.1kHz, 48kHz and 96kHz.

Sync
If the input selection switch is set to digital and no valid digital signal is present at the digital input, the SYNC LED will light up red and the DnS 2 will not process audio.

Enabling the analog outputs
The analog I/O accounts for about one third of the DnS 2’s power consumption. To save power, it will shut down when the digital input is selected, resulting in digital-to-digital operation.

To use the DnS 2 “digital IN, analog OUT”, you can re-enable the analog outputs by pressing SETUP to enter the setup page and then pressing both DNS ON buttons simultaneously. Repeat this operation to switch the analog outputs off again.

USB
There is a USB socket for updating the firmware.
**Processing**

**Process On/Off**

Use the DNS ON buttons to switch the DNS process on and off for each channel.

**Learn**

Use the LEARN buttons to control whether the noise detector in the DNS 2 adapts continuously to the audio signal. Switching the LEARN off freezes the noise detector, and the noise detector is reset when the LEARN is switched back on.

**Attenuation**

The default action of each encoder is to adjust the amount of noise attenuation applied to the signal, and this is shown on the left-hand half of the display. The representation of the fader within the display shows the current position of the control, and the bargraph shows the instantaneous amount of attenuation being applied to the signal. The solid bar shows the average attenuation across all frequencies, and the shaded bar shows the maximum attenuation across all frequencies.

**Bias**

The encoder also provides control of the Bias, which is shown on the right-hand half of the display. Click an encoder to enable adjustment of the Bias, and click it again when you wish to switch back to controlling the Attenuation. The encoders will also revert to controlling the Attenuation after a short idle period.

The Bias is a ‘center-zero’ control, and the fader shows the current position. Raise the Bias to increase the amount of noise detected. This will allow the process to remove more noise, but may lead to compression of the wanted audio and make the signal sound dry. Lower the Bias to decrease the amount of noise detected. This will allow the process to retain more ‘atmos’, but it will remove less noise.

The right-hand bargraph shows the detected long-term signal to noise ratio (SNR). The solid bar shows the detected noise level, and the shaded bar shows the detected long-term signal level; consequently, the difference between the heights of the solid and shaded bars indicates the long-term SNR. When the Bias is above or below center, it biasses the noise detector somewhat upwards or downwards. You can see this effect reflected in the height of the solid bar, which tends to increase as you raise the Bias (and vice-versa).

**Linking**

The two channels of the DNS2 can operate in three different link modes. You can cycle through these by pressing both encoders simultaneously.

**Unlinked**: The two channels of the DNS2 operate completely independently. This mode is useful for processing two separate sources, for example a boom mic and a radio mic.
**Linked:** The audio channels remain separate, but their control settings are linked together. This mode is particularly suitable for stereo signals. (When using analog inputs, the input gains are linked if both are set to mic or both are set to line, but if one input is set to mic and the other to line then the input gains are not linked.)

**Mono split:** Input channel 1 is split and sent to both process channels and outputs. The channel 2 input signal is not used in this mode. The process channels have independent controls, so this allows a single input signal to be processed in two different ways, or (by switching off the processing of one channel) for the two outputs to be processed and unprocessed versions of the channel 1 input signal.

The input selection and link mode are indicated at the bottom of the process channel displays. Linked mode is indicated by an ‘=’ symbol, and mono split mode is indicated by an ‘>’ symbol. The input selection is indicated by M/L/D for microphone, line or digital respectively, followed by a 1 or 2 to indicate the input channel number. Hence, in mono split mode both screens show channel 1.

**Other information**

**Panel lock**
A toggle switch on the side of the DNS 2 disables all of the front panel controls with the exception of the power button, which can still perform its power on function. In general use, switch this to OFF (switch in upper position). Switch it ON to prevent accidental adjustment of the front panel controls.

**Screensaver**
The intensities of the displays and front panel LEDs will drop after a period of inactivity. Touching any control will bring the brightnesses back to normal.

**Signal level LEDs**
Bi-colour LEDs indicate the signal level for each channel:
- **Off** = silence
- **Green** = normal
- **Red** = close to clipping

**Synchronisation LED**
The sync LED indicates the current sync source as shown in the following table:

<table>
<thead>
<tr>
<th>Input switch</th>
<th>Digital input lock</th>
<th>Sync status</th>
<th>Sync source</th>
<th>Audio source</th>
<th>Sync LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog</td>
<td>No</td>
<td>Normal</td>
<td>Internal</td>
<td>Analog</td>
<td>Off</td>
</tr>
<tr>
<td>Digital</td>
<td>No</td>
<td>Error</td>
<td>Internal</td>
<td>Mute</td>
<td>Red</td>
</tr>
<tr>
<td>Analog</td>
<td>Yes</td>
<td>Normal</td>
<td>External</td>
<td>Analog</td>
<td>Green</td>
</tr>
<tr>
<td>Digital</td>
<td>Yes</td>
<td>Normal</td>
<td>External</td>
<td>Digital</td>
<td>Green</td>
</tr>
</tbody>
</table>

**Hard power OFF**
If a problem occurs, you can switch off the unit by pressing the power on/off button for 5 seconds or more to perform a ‘hard’ power OFF.
Mounting the DNS 2

You may mount the DNS 2 on a camera or other equipment using the mounting holes on the underside and rear of the unit. Refer to these diagrams for dimensions and mounting positions.
DECLARATION OF CONFORMITY

Date of issue 18 April 2016
Equipment CEDAR DNS 2
Manufacturer CEDAR Audio Ltd
Address 20 Home End, Fulbourn, Cambridge CB21 5BS, UK

This is to certify that the aforementioned equipment, when used in accordance with the instructions in this manual, fully conforms to the protection requirements of the following EC Council Directives: on the approximation of the laws of the member states relating to:

  Applicable standards: EN 61000-6-1:2007
  EN 61000-6-3:2007+A1:2011

- **2006/95/EC Low Voltage Directive**

In order to comply with EMC regulations, you must connect the DNS 2 using metal-shelled connectors and good quality shielded cable.

**Restriction of Hazardous Substances (RoHS) Directive**

All hardware products and sub-assemblies manufactured by CEDAR Audio Ltd are designed to be compliant with Directive 2002/95/EC, Restriction of Hazardous Substances. The manufacturing processes include the assembly of purchased components and/or sub-assemblies from various sources. Any statement of RoHS compliance made by CEDAR Audio Ltd may be based, in part or in full, on statements provided by suppliers. Thus whilst every effort is made to ensure compliance, CEDAR Audio Ltd may not have undertaken independent tests to establish the compliance of such components and/or sub-assemblies.

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CONTACT INFORMATION

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SPECIFICATION

Inputs

Line input
Connector: Balanced XLR3F
Impedance: 10kΩ
Nominal signal level (0dB gain): +4dBu
ADC line up (0dB gain): +4dBu : -20dBFS
Clipping level (0dB gain): +24dBu
Dynamic range (0dB gain): > 102dB (AES17 unweighted)
THD+N (0dB gain): < 0.005%
Gain range: -6dB to +54dB

Microphone input
Connector: Balanced XLR3F
Impedance: 2kΩ
Gain range: 18dB to 78dB
ADC line up (36dB gain): -32dBu : -20dBFS
Dynamic range (36dB gain): > 102dB (AES17 unweighted)
THD+N (36dB gain): < 0.005%

Phantom Power
Type: P48 (IEC61958)
Unloaded voltage: +48V ± 4V
Current available: 10mA per microphone
Short circuit protection: Indefinite

Digital input
Connector: Balanced XLR3F
Format: AES3 (IEC60958) or AES11 (DARS)
Sample rate sync range: 40kHz to 100kHz

Outputs

Line output
Connector: Balanced XLR3M
Nominal signal level: +4dBu
DAC line up: -20dBFS : +4dBu
Maximum output: +24dBu
Dynamic range: > 102dB (AES17, unweighted)
THD+N: < 0.005%
Minimum load impedance: 600 Ohm
Short circuit protection: Indefinite

Digital output
Connector: Balanced XLR3M
Format: AES3 (IEC60958)
Sample rate (internal sync): 48kHz (±50ppm)
Sample rate (external sync): locked to digital input
DSP

AD/DA conversion
Resolution: 24-bit linear PCM
Sample rate (internal sync.): 48kHz
Sample rate (external sync.): 40kHz to 100kHz

DSP Processor
Type: Floating point
Resolution: 40-bit
Peak computation: 2.4 GFLOP/s
Sample rates: 44.1kHz, 48kHz, 96kHz

Power

Power input
Voltage: 8V to 17.5V (nominal 12V)
Connector: XLR4M (pin1 -, pin4 +)
Reverse polarity protection: Indefinite
Over-voltage protection: Indefinite, up to 50V
Power consumption (digital I/O): 3W typical
Power consumption (analog I/O): 4W typical
Max power consumption @ 12V: 4.5W (P48 off), 6W (P48 on)

Power adapter
Input voltage: 85VAC - 250VAC, 50 - 60Hz
Input power: <15W
Input connector: UK/US/EU
Output voltage: 12V
Output current: 1A (max.)
Output connector: XLR4F (pin1 -, pin4 +)

E&OE.

The Company reserves the right to change specifications without notice.
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