



Speech
Technology
Center

Analog signal processing device

Denoiser Box

STC-L254

User Guide

Speech Technology Center
Russia

CONTENTS

1. INTRODUCTION.....	4
2. DELIVERY SET	4
3. TECHNICAL DATA.....	5
4. KEY FEATURES.....	6
5. DESIGN AND OPERATION	7
6. OPERATING CONDITIONS	11
7. TRANSPORTATION AND STORAGE	11
8. REGISTRATION CERTIFICATE.....	11

1. INTRODUCTION

Denoiser Box is an analog signal processing device designed to perform real-time noise reduction and speech intelligibility improvement.

Based on an award-winning Denoiser DSP board.

For optimum performance the device should be applied to the speech signal before it is recorded or digitized.

2. DELIVERY SET

1. **Denoiser Box** device with an integrated one-channel noise filtering algorithm
2. AC Mains adapter 100-240V 50/60Hz
3. Non-rechargeable lithium battery (9V)
4. Signal Input Cable (miniXLR - jack 3.5 stereo)
5. Signal Output Cable (miniXLR - jack 3.5 stereo)
6. Carrying case
7. Miniature external microphone
8. User guide

The following components are optionally available in addition to the standard delivery set:

1. Connection cable for connecting the device to Gnome 2 or Gnome 2M voice recorder
2. 12-24V DC car power cable
3. Additional mini-XLR connectors

3. TECHNICAL DATA

Device specification is presented in Table 1.

Table 1

Maximum Li-ion battery-powered operation time without battery replacement		14 hrs
Noise suppression range	One-channel filtering algorithm	0-24 dB
	Two-channel filtering algorithm (with a reference channel)	0-40 dB
Bandpass		200-5000 Hz; 300-3400 Hz
Sampling frequency		11025 Hz
Minimum impedance at headphones output		8 Ohm
AGC range	Input	12 dB
	Output	6 dB
Power consumption at 12 V		50 mA
External DC source voltage	With battery	10-24 V
	Without battery	6-24 V
Dimensions		110×45×113 mm
Weight (without battery)		360 g

4. KEY FEATURES

The device provides:

- Adaptive (self-adjustable) filtration of broadband and harmonic noise and interference with maximum speech signal preservation.
- Bandwidth limitation.
- Automatic signal gain control (AGC).

5. DESIGN AND OPERATION

5.1 General description. Controls, connectors and LED indicators.

The device looks as shown in Figure 1.



Figure 1. Denoiser Box.

Electrical connectors, controls and LED's are located on the front, rear and bottom panels of the device (see Figure 2 and Table 2 for explanations).

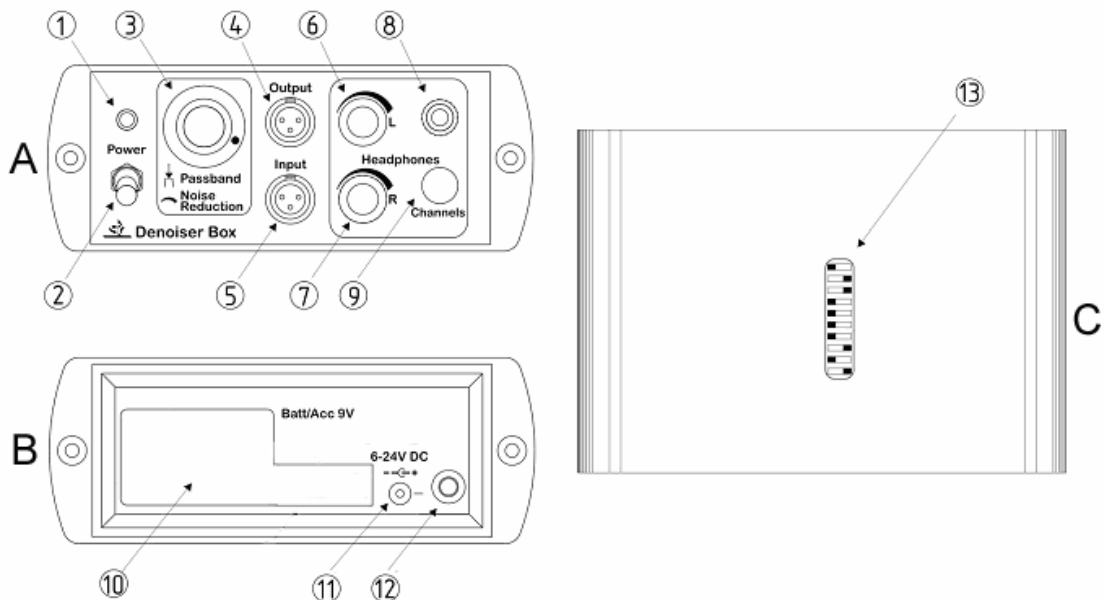


Figure 2. Front (A), rear (B) and bottom (C) panels of the device with designated connectors, controls and LED's.

Table 2 (see Figure 2)

No.	Description
1.	<p>Status indicator LED</p> <p><i>Red:</i> power switched on; noise cancellation, AGC and bandwidth limitation enabled.</p> <p><i>Green:</i> power switched on; noise cancellation, AGC and bandwidth limitation disabled (direct input and output of unprocessed signal).</p>
2.	<p>Two-position power toggle with a locking mechanism to prevent accidental switching.</p>
3.	<p>Dual-action rotary knob/push-button to control noise reduction:</p> <p>Push successively to select passband.</p> <p>Turn clockwise to enable AGC and noise reduction and to increase noise suppression degree.</p> <p>Turn counterclockwise to reduce noise suppression and to disable noise reduction and AGC.</p>
4.	<p>MiniXLR jack for connection to devices performing recording/ transmission of processed signal.</p>
5.	<p>MiniXLR jack for connection to external speech signal source.</p>
6.	<p>Headphones volume control knob (left channel).</p>
7.	<p>Headphones volume control knob (right channel).</p>
8.	<p>Headphones 3.5 mm stereo jack.</p>
9.	<p>Playback channel selection button (L; R; L+R).</p>
10.	<p>Battery compartment lid.</p>
11.	<p>External DC source connector socket.</p>
12.	<p>Service button (for technological purposes)</p>
13.	<p>Set of switches for adjusting signal transmitter/receiver (input/output) type (mic-mic, mic-line, line-mic, line-line).</p>

5.2 Principle of operation

Before you start, make sure the bottom panel switches (No.13) are at appropriate positions for connecting to external signal transmission/reception devices.

If necessary, set the switches to required positions as shown in Table 3.

Table 3

Switch		1	2	3	4	5	6	7	8	9	10
		Output				Input					
Left chan.	Line	off		on		on		off			
	Mic	on		off		off		on			
Right chan.	Line		off		on		on		off		
	Mic		on		off		off		on		
Operation										off	on
Service switch (for technological purposes)										on	off

To access the device rear panel and connect power supply, open the fold-down lid of the battery compartment giving it a push along the pivot pin as shown in Fig.3.

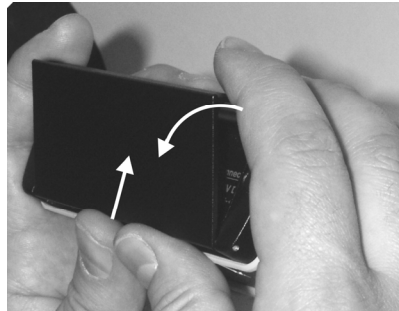


Figure 3. Opening the device rear lid

Insert the battery into the compartment (No.10 in Fig.2) or connect an external DC power supply (No.11 in Fig. 2).

Tip: The battery compartment lid can be removed using a small flat-head screwdriver – just insert it into the opening and tilt slightly to pry open the lid.

Connect the device input to an external signal source (microphone or line output) and its output to a recorder or some other device for audio signal recording/transmission. You can also attach headphones (No.8 in Fig.2) if you wish to control signal processing quality.

Tip: Using headphones may reduce battery-powered operation time (9V) by approximately 30-40%.

After you performed all listed operations, turn on the power. To do this you should first pull the power toggle (Fig.2 No.2) and then set it to the upper position. The indicator LED will light up green. If input signal is available, it will be transmitted to the device output unprocessed and you will be able to hear it through the headphones.

Tip: When connecting an external signal source, keep in mind that if one-channel filtering algorithm is applied to the input signal, only left channel data will be processed.

Once the input signal is present, rotate the knob (Fig. 2 No.3) one “step” clockwise and then push its cap successively to select the most suitable passband. After that continue rotating the knob clockwise smoothly until you obtain optimum noise suppression with maximum preservation of the speech signal.

Once passband selection and/or noise suppression has been enabled, the status indicator LED light (Fig. 2 No.1) will change to red. Signal level normalization will be performed, as a result of which weak signal components (including noise) will be enhanced up to half the dynamic range. Noise reduction will start on completion of the signal normalization process.

Tip: With the AGC feature enabled and noise reduction at its lowest, it may seem that the noise level in the signal increases. This perceptual effect is caused by the overall signal amplification (including target speech signal). Smoothly increasing noise reduction level you will eliminate the noise while preserving the amplified signal.

To reduce noise suppression, turn the knob (Fig.2 No.3) counter-clockwise.

To disable noise reduction, keep rotating the knob (Fig.2 No.3) counter-clockwise until the indicator LED light (Fig.2 No.1) changes from red to green.

To control signal processing quality via headphones select the monitored channel by pressing the channel selection knob (Fig.2 No. 9) successively (Left channel is selected by default). Then adjust signal volume with the volume control knobs (No.6 and No.7 in Fig.2).

6. OPERATING CONDITIONS

- Temperature range: -20 to +60° C.
- Relative humidity (non-condensing): less than 95% at +30° C.

7. TRANSPORTATION AND STORAGE

Transportation is carried out by all transport vehicles at the temperature between -50 and + 60° C with protection from direct sunlight and atmospheric precipitation.

Shelf life in warm conditions at the temperature between -5 and +40° C and humidity below 80% is 10 years.

8. REGISTRATION CERTIFICATE

Tested and approved

Analog signal processing device Denoiser Box STC-L254

serial number _____ conforms to technical requirements and is declared suitable for use.

Adjustment conducted by _____

Date of issue _____

Warranty

The manufacturer guarantees that the issued devices conform to the technical requirements, whereby the user observes the conditions and regulations of operation, storage and transport, for a period of **24 months** from the date of sale.

During the warranty period the manufacturer is obliged to repair the devices at no charge.

Repair of devices disabled as a result of improper use, storage and/or transport, as well as repair after the time of the guarantee has expired, may be provided by the manufacturer according to a separate agreement.

Technical Support

Our developers are always ready to assist you. In case of any questions please don't hesitate to contact us:

Tel: +7 (812) 325-8848

Fax: +7 (812) 327-9297

E-mail: help@speechpro.com

Web-site: <http://www.speechpro.com>

We hope that you will like our product. Please note that we are always ready to develop any customised solution for you. Any questions regarding our products and development costs should be addressed to our Sales department: sales@speechpro.com).

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