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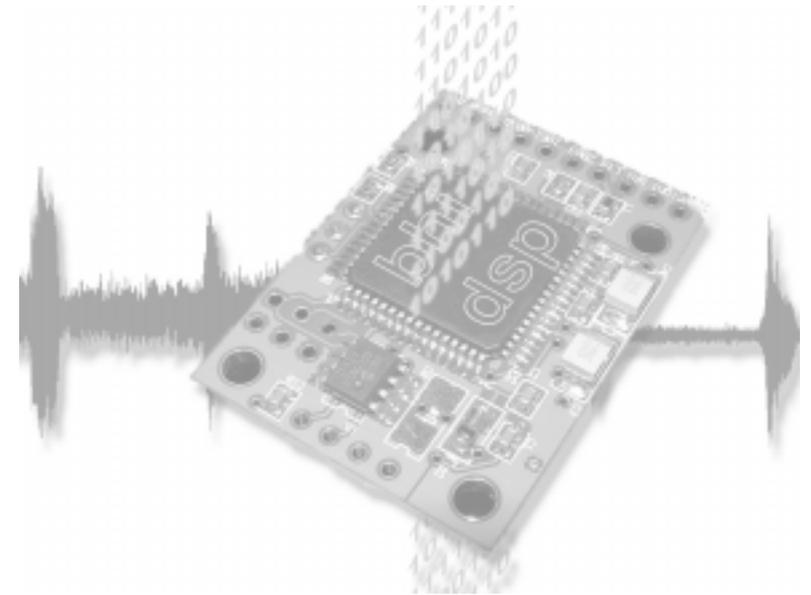
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NEDSP1061-KBD

Noise Eliminating PCB Module

**Generic Installation
and
Operating Manual**



**1061-110D
Issue A**

Important Information

Notes:

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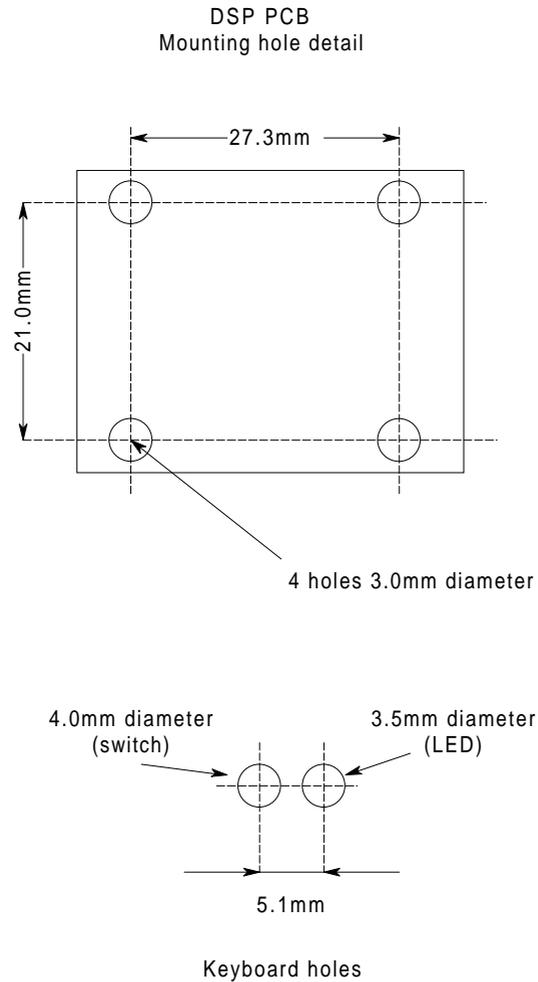
The fitting of the bhi NEDSP1061-KBD module may involve the removal of small surface mount components and the drilling out of the transceivers' case. This should only be carried out by a qualified engineer. bhi accepts no responsibility for the fitting or installation of the NEDSP1061-KBD module and are not liable for any damage to equipment caused by its fitment. Fitting this module may invalidate your warranty.

All attempts have been made to ensure that this information is up to date. It is possible that these instructions contain errors, or the equipment is slightly different to the one used to compile this information. In all cases it is up to the installer to ensure that the module is fitted correctly.

By installing this module you are doing so at your own risk.

7. Machining details

Hole machining details.



Packing List:

Please check the contents of the box.

- Operating manual
- NEDSP1061-KBD assembly
- Z bracket
- Self adhesive mounting pads
- bhi NEDSP label

To install this module you will need the following additional items:

- service manual/circuit diagram of the equipment in which the module is to be installed.
- all the appropriate tools to disassembling the equipment
- suitable soldering iron and bits for working with surface mount devices.

Before attempting to fit this module study this manual thoroughly along with the service manual for your equipment.

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6.3.2 Demonstration 2:

Follow the procedure as above. Wait for the second 2 tone beep, then release the key.

In this mode the filter level is set to level 3.

The noise cancellation is switched on for 3 seconds, then off for 3 seconds. This loops until the user aborts this mode.

This is a good demonstration for listening noisy SSB conversations showing the before and after.

6.3.3 Exiting the demonstration mode.

Hold down the button until the 2 tone beep is heard. Release the button.

After a short delay the LED will flash indicating the stored level, as during the normal switch on.

6.4 Notes about the noise reduction.

When using the module on level 4 some distortion may be heard. This is quite normal when listening to high levels of noise at level 4.

6.5 Noise reduction levels.

Level	Tone Reduction	White Noise Reduction
1	5dB	11dB
2	8dB	13dB
3	21dB	20dB
4	65dB	35dB

Noise cancellation on/off.

Press and release the button and the led will extinguish, and the noise cancellation will be activated. A short beep will acknowledge the key press.

Changing the filter level.

Hold down the button. The led will flash the filter level, and if the button is held it will step through all the levels. When the desired level has been reached release the button. This new value will be stored in the modules' memory and will be the default setting the next time the unit is powered up.

6.3. Demonstration mode.

The NEDSP1061-KBD module features 2 preset demonstration modes. These demonstrate the noise cancellation abilities of the NEDSP1061 module.

6.3.1 Demonstration 1:

Hold down the button and switch on the equipment. After a short time the unit will emit a 2 tone beep. Release the button. The unit is now in demonstration mode 1. The module will switch the noise cancellation on for 1.5 seconds, then off for 1.5 seconds. It will then move onto the next level and repeat this continuously through all 4 levels.

This mode is particularly effective when the equipment is just receiving static, as it demonstrates the attenuation of white noise at all the levels.

Alternatively tune the equipment into a good quality FM speech broadcast. This demonstration shows how little the DSP alters the speech, at any of the levels.

1. Introduction

The NEDSP1061-KBD is a modular solution to noise reduction. It incorporates DSP technology to provide up to 35dB of noise cancellation. The module is controlled by a single pushbutton with LED indication for ease of use.

1.1 NEDSP1061-KBD module features:

- Fully adaptive to changing noise environments
- Input and output level controls
- Input overload indication
- Virtually no distortion to speech signal
- Up to 35dB of noise cancellation
- 4 levels of noise reduction
- 5 – 15V supply range
- 4.6dB on board gain
- Single key operation of all functions
- LED indication of DSP level and status
- Small size 26mm x 37mm

1.2 Limitations.

This module is designed to pass speech. Other signals such as data and music will to some degree pass through, but the integrity of these signals cannot be guaranteed.

This module is designed to be placed in a low level audio path only. The module will not drive a loudspeaker or other high power load (see bhi amplified DSP module). The unit is single channel (mono).

This module is designed for communication type applications. The upper frequency limit is 4.5KHz and therefore not suitable for hi fidelity applications.

1.3 Audio DSP Noise cancellation.

The bhi DSP processes the incoming audio signal and then differentiates the speech from the noise. The unwanted noise and interference is then attenuated to leave only the speech.

The following diagrams are taken from actual audio signals and illustrate how the audio signal is being processed.

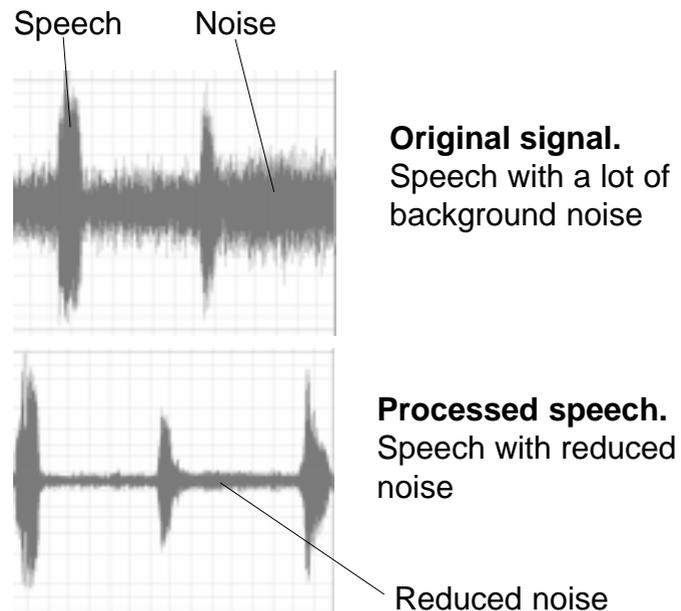


Figure 1. Noise cancellation.

6. Operation

6.1 Introduction.

All functions of the NEDSP1061-KBD are controlled by a single button.

- Single press turns the noise cancellation on/off.
- Holding down the button changes the DSP filter level.

The mode of operation is indicated both visually and audibly.

The LED is illuminated red when the noise cancellation is off.

When the noise cancellation level is changed the LED will flash green to indicate which level has been selected. Simultaneously the DSP will beep to give audible indication of DSP level. This allows the operator to change the DSP level without having to look at the LED to see which level has been selected.

A short beep is emitted to acknowledge a button press. The module will store the current DSP level, and will return to this level when the equipment is switched on.

6.2 Operation.

Switch on the equipment.

The LED will illuminate red to indicate the noise cancellation is off. The unit will flash/beep to indicate the DSP filter level last used.

5. Troubleshooting

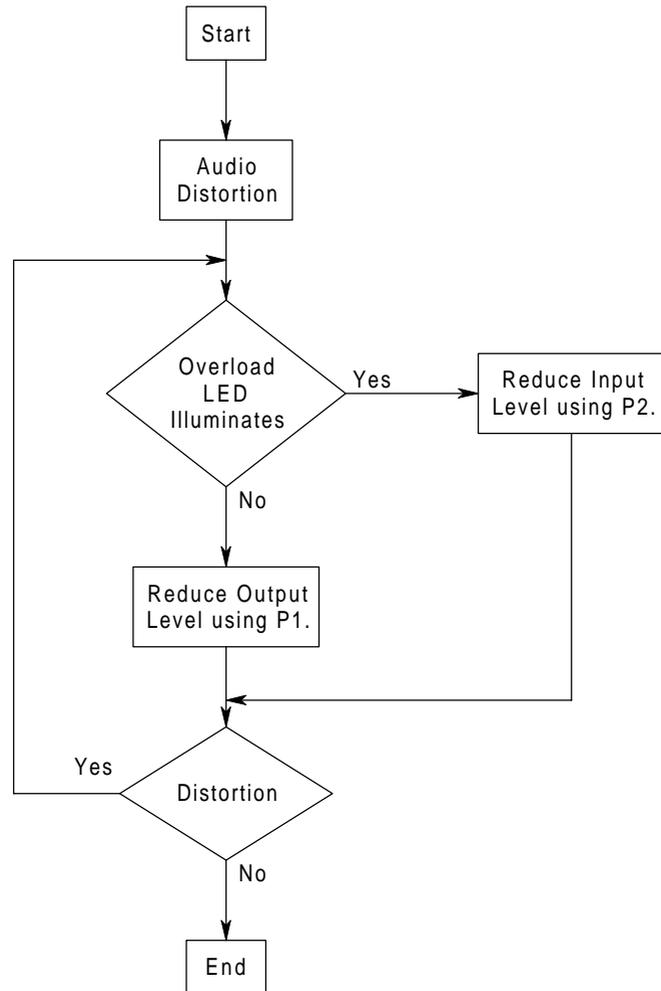


Figure 6. Troubleshooting flowchart.

2. Module description

2.1 Module Layout.

The following diagram shows the layout of the NEDSP1061-KBD module.

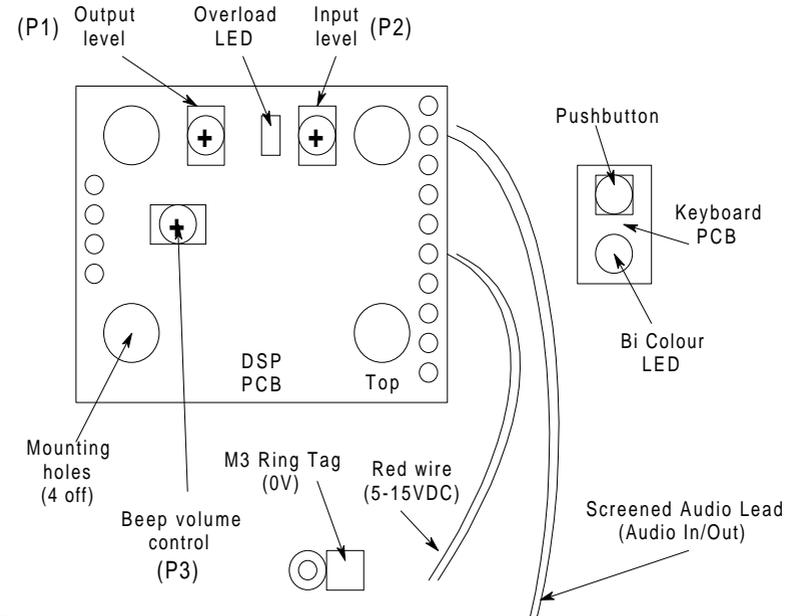


Figure 2. Module layout.

2.2 Module Connections.

The NEDSP1061-KBD module has five connections.

Red wire:	5 - 15VDC
M3 Tag:	0V
Screened Lead:	
Red	Audio In
Blue	Audio Out
Black	Audio Screen

2.3 Electrical characteristics.

Electrical Characteristics					
Parameter	Description	Min	Typ	Max	Units
V _{in}	Supply voltage	5	9	15	V
I _{in}	Supply current		45	50	mA
In	Audio input signal	50	300		Vrms
Out	Audio output signal (1.7 Xs input max)			630	Vrms

Table 1. NEDSP1061-KBD Electrical characteristics

2.4 Controls.

Controls are provided to allow the NEDSP1061-KBD to be integrated in to the target system. 3 level controls are provided.

2.4.1 Input Level:

To set the audio level to the optimum level for the DSP.

2.4.2 Output Level:

To match the output level of the DSP module to that of the following stage.

2.4.3 Beep volume level:

Allows the user to adjust the beep volume control to suit. The beep volume can be reduced to zero if required.

The modules are factory set to the maximum level.

Turning the potentiometers anti clock wise will increase the levels.

4. Setup

The levels come factory set to the maximum position. This should be adequate for most applications. However the module can be adjusted as follows.

Tune the equipment to a strong signal.
Switch off the noise reduction (LED will illuminate RED).

Adjust the input P2 until the overload led illuminates.
Back off the pot slightly.

Adjust P3 to give the correct listening volume, without distortion.

Adjust P1 to give the desired beep volume level, or off if required.

connection (this screens the cable and acts as a mechanical fixing for the cable, protecting the capacitor pads).

3.3.2 Power connections.

5 - 15VDC (9V typically) is required to operate the module. The lower the voltage, the less heat the module will have to dissipate.

Locate a convenient point to connect the power. Ensure that this point is connected after the power switch, otherwise the DSP module will be drawing power all the time, and may flatten the batteries (where fitted). Connect the red wire to this point.

The 0V connection is formed using the M3 ring tag. Locate a suitable 0V point (such as a PCB retaining screw that is fixed into the chassis).

When routing the wires, ensure they are away from strong sources of RF or high voltage.

Note:

The potentiometers do not have end stops. It is possible to set the potentiometer in a dead band between the ends, resulting in the audio being lost.

2.4.4 Overload LED.

The overload LED circuit monitors the amplitude of the audio level entering the DSP module. The LED will illuminate when the amplitude exceeds the maximum permitted level. If the amplitude is increased further the DSP will clamp the audio signal to prevent damage to the DSP input. This will cause the audio signal to become distorted. The optimum level is achieved when the loudest peaks of the input audio, just cause the LED to glow.

2.5 Module mounting.

The DSP module has four mounting holes that can be used to retain the unit inside the equipment. Alternatively a self adhesive pad is supplied to allow the module to be mounted in a convenient position - without the need for drilling.

Two holes need to be drilled in the casing of the equipment for the keyboard. Hole sizes and positions can be found in section 7.

The keyboard can be retained using the supplied 'Z' bracket or alternatively retained using a suitable adhesive, or the mounting pads supplied.

In some equipment it may be possible to clamp the bracket under the loudspeaker bracket.

Cover the keyboard holes with the supplied self adhesive label.

3. Installation

3.1 Introduction.

Before commencing installation study the equipment's service manual/circuit diagram thoroughly to familiarise yourself with the circuit diagram and disassembly procedure.

3.2 Circuit location.

The NEDSP1061-KBD module is inserted into the path of noisy audio. Using the input and output level controls allows the unit to appear transparent to the audio signal.

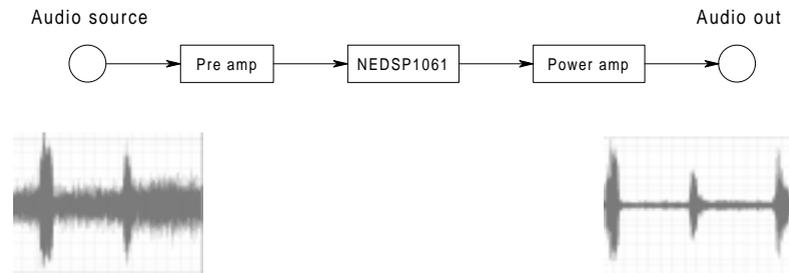


Figure 3. Basic connection diagram

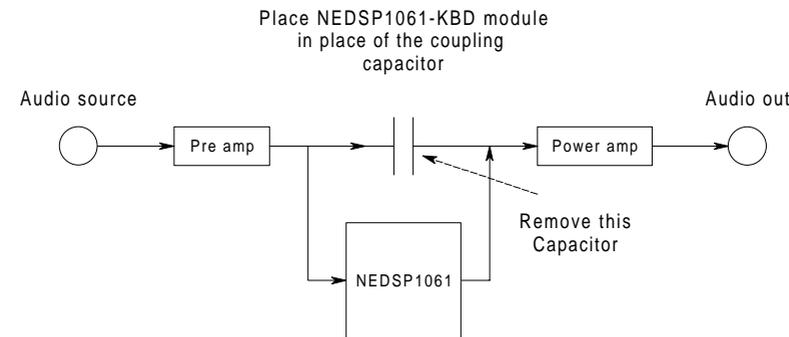


Figure 4. NEDSP1061-KBD Audio path

For optimum performance provide the module with a constant amplitude signal, for example before the volume control.

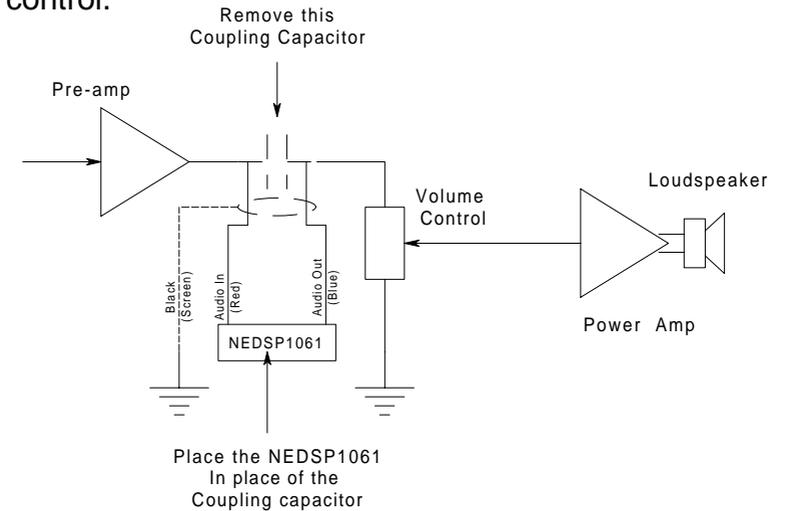


Figure 5. NEDSP1061-KBD recommended position.

Note:

On some modern receivers/transceivers the volume control is digital and doesn't operate in the audio path. Contact the manufacturer for advise for the most suitable position for the DSP module..

3.3 Fitting.

After locating a suitable location for the module in the circuit, refer to the service manual for disassembly information.

3.3.1 Audio connections.

Carefully remove the chosen coupling capacitor, taking care to not damage the PCB pads. Solder the blue wire from the screened lead to the power amp side of the capacitor and the red to the other.

The black wire should be connected to a convenient 0V