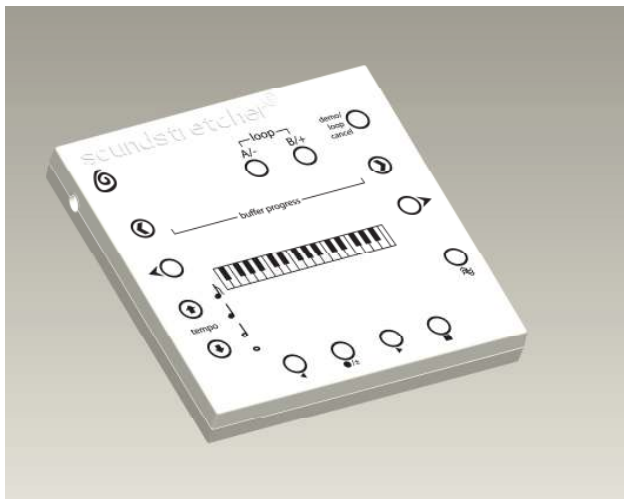


# stretch audio limited

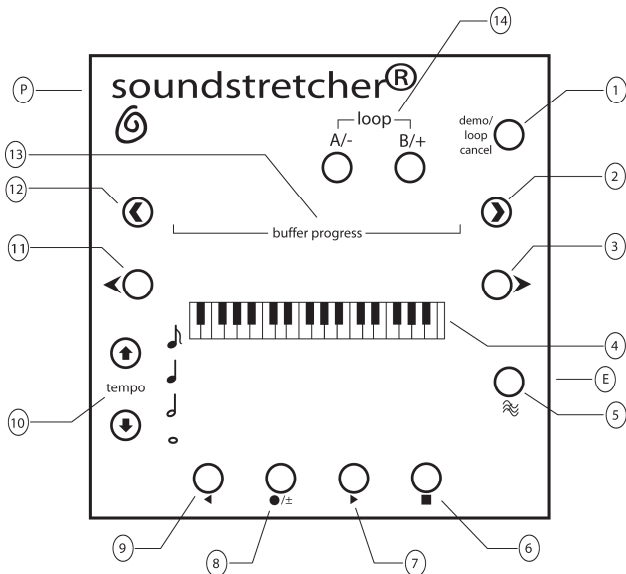


**owner's manual**

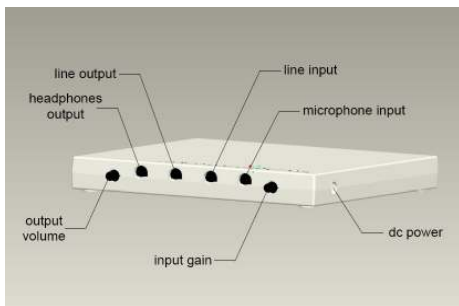
***soundstretcher***<sup>®</sup>

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**Figure 1: soundstretcher® controls**



**Figure 2: rear panel connections**

# control panel functions

- ① demo mode toggle / loop cancel
- ② fast forward / shift loop forward
- ③ pitch analyser - octave shift right
- ④ pitch analyser display
- ⑤ band pass filter toggle on/off
- ⑥ 'stop'
- ⑦ 'play forward'
- ⑧ record / transpose
- ⑨ 'play reverse'
- ⑩ tempo up / down
- ⑪ pitch analyser - octave shift left
- ⑫ fast rewind / shift loop backwards
- ⑬ buffer progress display
- ⑭ loop definition & loop contract / expand
  
- Ⓟ dc power socket
- ⓔ 'erase' button (concealed)

# safety instructions

Keep **soundstretcher**<sup>®</sup> away from heat sources. Do not use **soundstretcher**<sup>®</sup> near water. Avoid objects or liquids getting into the unit. Do not remove screws from or open **soundstretcher**<sup>®</sup>'s casing. Fit the mains adaptor to an easily accessible socket, located near the unit and **only** use the mains power adapter supplied.

# copyright

Copyright 2009 by Stretch Audio Limited. All rights reserved. No part of this publication may be copied or distributed, transmitted, transcribed, stored in a retrieval system, or translated into any human or computer language, in any form or by any means, electronic, mechanical, magnetic, manual or otherwise, or disclosed to third parties without the express written permission of Stretch Audio Limited.

# trademarks

**soundstretcher**<sup>®</sup> is a registered trademark of Stretch Audio Limited.

# quick start guide

In order to familiarise you with **soundstretcher**<sup>®</sup>'s controls, and also to gain an appreciation of its overall concept of operation, as quickly as possible, the unit is pre-configured with a "demo" mode. In demo mode, a short sample of music (which cannot be erased, or recorded over) is available to demonstrate **soundstretcher**<sup>®</sup>'s key features. The following procedure will guide you through the necessary set-up and operation of demo mode:

1

You will need either a pair of active (powered) speakers (e.g. mp3 player or PC speakers) or a pair of earphones, such as those commonly used for mp3 players. If you are using active speakers, connect these to the 3.5mm jack socket labelled (on the bottom face of the unit) 'line out' (see Figure 2). If you are using earphones, connect these to the

2

Connect the supplied AC power adaptor to a wall socket, and connect its flying lead to the DC power inlet socket in the top right-hand corner of the unit, as shown in Figure 2. **Please don't use any power supply other than the one shipped with *soundstretcher*<sup>®</sup>.**

3

You should now see '**SOUNDSTRETCHER**' scrolling across the unit's central dot-matrix display. Touch the ■ button, and the display should clear.

**4**

Touch the [demo/loop cancel] button. A green LED co-located with this button should now be illuminated, indicating that the unit is in demo mode.

**5**

Touch the ► button. You should now hear the demo mode music sample being played (you may want to adjust the volume control - see Figure 2). Note that you can also play backwards by touching the ◀ button, and pause the music by touching the ■ button.

**6**

The dot matrix display should be showing a visual representation of the music that is being played. To help you understand how this relates to the music being played it will be useful to 'loop' a short section of it, and then slow it down. The following two steps will guide you through this.

**7**

While the demo mode music is being played, touch the [A] button, followed two or three seconds later by the [B] button. You should now hear the short section of music "captured" between your two button touches being repeated indefinitely. If you want to cancel the "loop" you have just created, touch the [demo/loop cancel] button. You can now create a different loop.

**8**

To slow the music down, touch the ↓ button once. You should now hear it at half tempo, indicated by the LED collocated with the ♪ symbol being illuminated. If you wish, you can slow down the music further, first to quarter tempo, and then to eighth tempo, through successive touches of the ↓ button.

If you have followed these steps, you should now be listening to a very short loop of music which is slowed down from normal tempo. Take a look at the display — you should see a series of vertical lines moving back and forth across the width of the display. The left-most of these lines, at a given instant in time, represents the ‘fundamental’ pitch component of the sound being heard. You can determine its pitch by reading it off the representation of a keyboard below the display.

Lines to the right of the one representing the fundamental pitch component represent harmonics of the sound you are hearing. The first of these, the 2nd harmonic, should appear precisely an octave (12 semi-tones) to the right of the fundamental. The next harmonic (the 3rd), if visible, will be a further 7 semi-tones to the right. Further explanation of the ‘harmonic series’ produced from a single tone of a musical instrument is given in on page 19.

The demo music comprises the sound of just one instrument. With this piece, it should be easy to recognise the harmonic series associated with each individual note produced by the instrument, and then identify the fundamental. However, a real application of **soundstretcher**<sup>®</sup> will typically involve analysis of an instrumentalist's solo, whilst being accompanied by other instruments. In this scenario, it may be challenging to distinguish the pitch components of the soloist from those of the other instruments. The short piece of music selected for demo mode is intentionally easy to analyse so that you can gain a thorough understanding of how **soundstretcher**<sup>®</sup> is intended to be used, before attempting to analyse typical solos which, in general, will be more difficult.



We hope this brief demonstration has helped you understand the basics of music analysis using **soundstretcher**<sup>®</sup>. You are now ready to use **soundstretcher**<sup>®</sup> for real!

Please proceed to the next section to learn **how to record a sample of music**. If, at any time, you feel a need to re-visit some of the basic principles, please return to experiment with the demo piece.

*The 20" demo sample is an improvisation by British tenor saxophonist Joel Purnell. Please check out Joel's website:*

**[www.joelpurnell.com](http://www.joelpurnell.com)**

# **using your soundstretcher®**

# record operation

## ***cable set-up & choice of sound source***

**soundstretcher**<sup>®</sup> will typically be used to analyse music sourced from an MP3 player, CD player, tape deck, or perhaps even a vinyl record player. In the case of all such audio players, if available, connect the player's 'line out' socket to **soundstretcher**<sup>®</sup>'s "line input" socket (see Figure 2). A 3.5mm jack lead is provided for this purpose. Of course, your player's 'line out' may use a different style of connector, in which case you will have to obtain the appropriate lead.

Some MP3 players may not have a 'line output' connection, instead offering only a headphone output. You can use such an output, but please ensure that the player's volume is turned down *very* low, to ensure that **soundstretcher**<sup>®</sup>'s input is not overloaded, which could possibly result in a distorted recording.

You may, alternatively, want to analyse live rather than pre-recorded music. A microphone input (again, see Figure 2) is provided for this purpose. This input should also be used if you wish to connect a guitar pick-up, or a pick-up from some other instrument.

Ensure that an audio output is connected to **soundstretcher**<sup>®</sup> – please see **quick start guide** step 1 for details.

## ***record procedure***

If you haven't already done so, switch on ***soundstretcher***<sup>®</sup> by inserting the flying power lead into the power socket located in the top left hand corner, as shown in Figure 1. You should see the name '**SOUNDSTRETCHER**' scroll across the dot matrix display.

With the sound source you have just connected switched off, touch the ■ button. If the ***soundstretcher***<sup>®</sup> unit is brand new, the display should now be showing a single horizontal line. If this isn't the case, before you record a new sample, you must first follow the *erase procedure* described in the next section.

Switch on your sound source (for example, by pressing its "play" button, or similar). You should now hear music from your sound source being played through the speakers (or earphones) connected to ***soundstretcher***<sup>®</sup> (you may have to adjust the output volume on your sound source and/or the "input gain" control on ***soundstretcher***<sup>®</sup> - see Figure 2.

The display should be indicating a visual representation of the music being played through ***soundstretcher***<sup>®</sup> similar to the display shots shown in Figure 6. The purpose of this display mode is to help you adjust the audio input to an appropriate level for recording.

The three example display shots shown in Figure 6 show typical waveforms for a range of audio input levels.

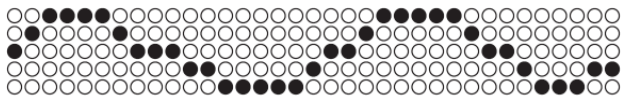


Figure 6a – input level too high

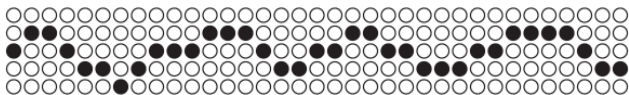


Figure 6b – input level OK

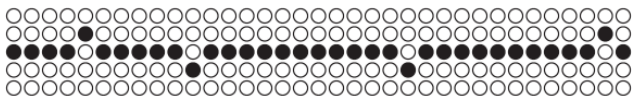


Figure 6c – input level too low

**Figure 6 - Dot matrix display in record mode**

In Figure 6a, the waveform is seen to be “clipped”, due to the input level being too high. In this state, the sound played through **soundstretcher**<sup>®</sup> will probably be very distorted. The input level should be reduced, either by adjustment of **soundstretcher**<sup>®</sup>'s ‘input gain’ control (see Figure 1), or through adjustment of the output volume on your sound source.

The display shot shown in Figure 6c shows the result of the input level being too low. In this case the level should be increased such that the waveform resembles that shown in Figure 6b, i.e. large enough in amplitude to continually register on the display, but not too high to “clip” on the vertical extremes.

It should be noted, however, that you needn't worry too much about getting the input level exactly right, since **soundstretcher**<sup>®</sup> incorporates a certain degree of automatic gain control, making possible satisfactory recording results over a wide range of input levels.

Having adjusted the input level appropriately, you are now ready to record. Touch the ●/± button to 'arm' the recording operation. This should result in a red LED co-located with the ●/± button to be illuminated. When you're ready to record, e.g. after cueing up the start of a solo, or whatever, on your sound source, touch the ► button.

The record operation will now begin, indicated by the red LED co-located with the ●/± button, and the green LED co-located with the ► button, both being illuminated. As you record, the eight Buffer Progress LEDs (Figure 1) roughly indicate the proportion of the memory available that has been filled.

The total memory available is sufficient for you to record up to five minutes of sound (*usually* enough for a complete solo). You can terminate the record operation at any time by touching the ■ button. If you don't, the recording will automatically stop when the buffer capacity has been reached (i.e. after 5 minutes).

The sound is recorded onto non-volatile "flash" memory, which means that the recording is maintained even after removing power from **soundstretcher**<sup>®</sup>. To record another piece of music, please note that you must follow the *erase* procedure, described in the next section. You cannot simply "record over" an existing recording.

## ***erase procedure***

A recorded music sample can be erased, in preparation for making another recording by following the record procedure:

- 1) Ensure **soundstretcher**<sup>®</sup> is not in demo mode, by touching the [demo/loop cancel] button, if necessary
- 2) Ensure **soundstretcher**<sup>®</sup> is not currently playing back a sample, by touching the ■ button, if necessary.
- 3) Using a pointed object, such as a biro, press the concealed 'erase' button shown in Figure 1.

You should now see the red LED co-located with the ●/± button flashing. This indicates that the erase operation is in progress. ***Please avoid switching off soundstretcher***<sup>®</sup> ***during the erase operation.***

The time taken to perform a complete erase operation is proportionate to the length of the recording being erased. In fact, it is roughly a fifth of the duration of the recording. For example if you filled the entire five minute buffer during your previous record operation, it will take about a minute to erase this recording.

The completion of the erase process is indicated by the red LED no longer flashing. **soundstretcher**<sup>®</sup> should now have returned to "record mode", i.e. it will loop through any applied audio signal to its "line out" and "phones" sockets, and the display will show the applied signal.

**soundstretcher**<sup>®</sup> is now ready to record a new sample. If, by any chance you do happen to switch off during the erase operation, you will not damage **soundstretcher**<sup>®</sup>, but you will cause the next recording to be partially or completely corrupted. To rectify this, make a 'dummy' recording lasting as least as long as the previous recording, and then follow the erase procedure in the normal way.






**Please note:** once you have pressed the erase button, the recording is lost – there is no going back!





# music analysis



## *basic play controls*

**soundstretcher**<sup>®</sup>'s basic playback controls are designed to mimic the familiar controls first implemented on tape recorders, and since, for CD and MP3 players. These controls are intended to be used in conjunction with the buffer progress LEDs (see Figure 1), a row of eight green LEDs which roughly indicate the point in time, as a proportion of the total duration of the recorded sample, of the sound as it is being played. The basic play controls are:


-  - play forward
-  - play backward
-  - stop playback operation
-  - fast forward 1/8 of the duration of the recorded sample
-  - fast rewind 1/8 of the duration of the recorded sample


**Please note:**  and  have a slightly different function when a loop has been set up – see “Loop Control” section.

## ***tempo controls***

A key feature of **soundstretcher**<sup>®</sup> is its facility to slow down music which you have recorded. The  and  buttons give you the control to do this. By touching these buttons, the tempo of the music being played back will scroll between original tempo, ½ tempo, ¼ tempo and ⅛ tempo. An illuminated LED adjacent to one of the following musical

 - original tempo

 - quarter tempo

 - half tempo

 - eighth tempo

## ***pitch analyser – display basics***

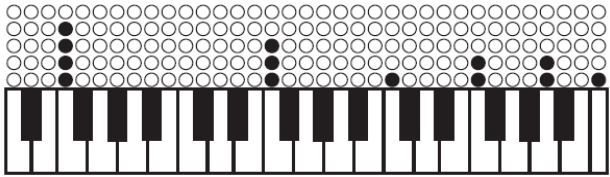
The primary function of the dot matrix display in the centre of **soundstretcher**<sup>®</sup>'s control panel is to provide a 'pitch analyser' function. You may be familiar with 'spectrum analyser' facilities built into certain pieces of audio equipment, giving indication of the frequency content of the music being played. **soundstretcher**<sup>®</sup>'s 'pitch analyser' is similar, except that the horizontal axis is scaled in pitch rather than frequency (logarithmically, rather than linearly, if you want a mathematical description) such that successive columns of the display represent an interval of precisely a semitone. When used in conjunction with the representation of a piano keyboard below the display, you are able to 'read off' pitch components of the music being played, as it is being played (you need to be familiar with the notes of a piano keyboard).

## ***pitch analyser – a note about ‘harmonics’***

When listening to the sound of a single instrument being played back on **soundstretcher**<sup>®</sup>, you will notice that, for a given note being played, there will generally be more than one vertical line illuminated on the display. This is because the pitch analyser is sensitive not only to the ‘fundamental’ pitch component (i.e. the note being played), but also to a series of “harmonics” generated by that note.

Every sound created by any instrument (with the exception of a pure ‘sine wave’, which may be produced by certain electronic keyboards) comprises a series of distinct frequency components known as ‘harmonics’. They are so-called because they are *harmonically* related to each other - specifically, the frequency of all are integer (non-fractional) multiples of the frequency of the note being played. The harmonics are individually named according to their relationship to the fundamental, e.g. the frequency of the “2<sup>nd</sup> harmonic” is twice that of the fundamental; the “3<sup>rd</sup> harmonic” is three times that of the fundamental, and so on. In general, the relative strength of each of the harmonics varies from note to note, and more so from instrument to instrument. Indeed, it is the relative strengths of the harmonic series generated by a particular instrument that defines its character, or “sound”.

As an example of how the harmonics of a single musical note appear on **soundstretcher**<sup>®</sup>’s display, please look at Figure 7, on the following page.



**Figure 7 - Dot matrix display in pitch analyser mode**

Referring to Figure 7, the left-most vertical line on the display is aligned with an 'F' key on the keyboard below. This represents the actual note being played. The 2<sup>nd</sup> harmonic, being twice the frequency, is visible at precisely an octave higher. (Note – a pitch interval of an octave represents a doubling in frequency, hence an interval of two octaves represents a quadrupling in frequency, and so on).

The 3<sup>rd</sup> harmonic is visible 7 semitones up from the 2<sup>nd</sup>, and the 4<sup>th</sup> a further 5 semitones higher. Note that the pitch of this harmonic is also an F since, being the 4<sup>th</sup> harmonic, is four times the frequency of the fundamental, and consequently two octaves higher. The fifth and sixth harmonics are also visible, at intervals of four and three semitones, respectively.

In this example, the continuous harmonic series of a single musical source is clearly visible, with individual components easily distinguishable. In practice, when using **soundstretcher**<sup>®</sup>, particularly when analysing music containing many sound sources, it may be difficult to distinguish the harmonics of a single instrument. However, with knowledge of the harmonic series (12, 7, 5,

etc.), and a little practice, you will soon get the hang of picking out individual notes.

## ***pitch analyser – shift left / shift right control***

The pitch analyser display spans a pitch interval of 35 semitones, i.e. one semitone less than three complete octaves. It is likely that the music you wish to analyse occasionally extends either above or below this range of pitch. Should this occur, it is possible to shift the display up or down in whole octaves using the following buttons:

➤ shifts the display one octave higher. The co-located LED indicates that the display has been shifted up by one or more octaves from its default range (initial range at power-up). By touching this button repeatedly, you can shift the display up by as much as three octaves higher than the default range.

◀ shifts the display one octave lower. The co-located LED indicates that the display has been shifted down by one or more octaves from its default range. By touching this button repeatedly, you can shift the display down by as much as two octaves lower than the default range.

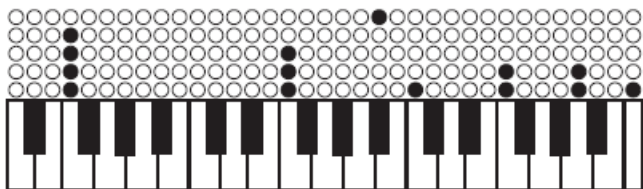
These buttons therefore allow you to view a pitch range of nearly eight octaves. You will note that, since the ◀ and ➤ buttons shift the display in whole octaves, the keyboard representation of the notes being played is still

correct after shifting up or down — the difference is simply that the keys represent notes in a different octave.

## ***pitch analyser – transposition***

In **soundstretcher**<sup>®</sup>'s initial (default) state, the notes you “read” from the Pitch Analyser display correspond to the actual notes on a piano (or other keyboard with standard tuning) – you can verify this if you happen to have a keyboard handy! In other words, the display is calibrated to “concert” pitch. This is appropriate if you are analysing music produced by a concert pitch instrument, such as a piano, or a guitar. However, if the source of the music is a brass or woodwind instrument, then it is likely that you’ll want to know the notes being played in the key of that particular instrument (normally Eb or Bb). You can, of course, transpose in your head by adding or subtracting the appropriate number of semitones (-3 for Eb, +2 for Bb), but to make it easier for you, **soundstretcher**<sup>®</sup> has a built-in transposition function.

**soundstretcher**<sup>®</sup> allows you to switch between three transposition modes, in addition to the default “Concert” mode. This is done by repeatedly touching, as appropriate, the ●/± button, causing the transposition key to cycle through the following sequence: Concert, Eb, F, Bb, concert, etc. The transposition mode selected is indicated by a single dot illuminated in the top row of the Pitch Analyser display. For example, see Figure 8. Here, the transposition mode is Bb, indicated by the presence of a single dot on the top row of the display column above the Bb key on the keyboard



**Figure 8 - Pitch analyser display in transposition mode Bb**

**please note** — the transposition function does not change the pitch of the music being played, it simply alters the alignment between the dot matrix display and the keyboard.

## ***loop control***

In order to analyse a complex solo, it is generally advisable to work on a single phrase, or perhaps even a small part of a phrase, at a time. To make this easy for you, **soundstretcher**<sup>®</sup> offers a comprehensive, and intuitive, 'looping' facility, by which you can isolate a short section of music selected from the piece you have recorded.

A loop is defined using the [A] and [B] buttons during playback. Following definition, the looped section of music repeats over and over. The [A] and [B] buttons now take on different functions, allowing you to contract and expand the loop, respectively. Additionally, a defined loop can be shifted back and forth across the entirety of the recording using the and buttons. All buttons used for Loop Control are dual function, depending on whether a loop has

been defined or not. Their operation is described as follows:

[A]

*Before loop definition:* defines the starting point of the loop. When this button is touched during forwards play, a co-located LED indicates that the starting point of the loop has been defined. On reaching the end of the sample buffer, the playback point will now roll back to the defined loop start, rather than the start of the buffer.

*Following loop definition:* causes the width of the loop to halve, each time this button is touched.

[B]

*Before loop definition:* defines the end point of the loop. When this button is touched, provided the loop start has previously been defined, a co-located LED indicates that the loop has now been completely defined (both LEDs co-located with [A] and [B] buttons will now be illuminated). Music played back is now restricted to the extents of the defined loop.

*Following loop definition:* causes the width of the loop to double, each time this button is touched.





*Before loop definition:* The ‘fast forward’ function described in *basic play controls*.

*Following loop definition:* shifts the loop forward through the sample buffer by a quarter of the loop width.



*Before loop definition:* The “fast rewind” function described in *Basic play controls*.



*Following loop definition:* shifts the loop backward through the sample buffer by a quarter of the loop width.

[demo/loop cancel]

*Before loop definition:* The “demo mode” function described in *quick start guide*

*Following loop definition:* cancels the defined loop.

### **please note:**


- A loop can only be defined during forwards playback.
- When shifting a loop back and forth, using the  and  buttons, the minimum shift is approximately 1.4s. Hence, if a loop is defined to be shorter than this period, then shifting the loop may result in ‘skipping over’ short sections.

## ***dynamic filter***

Picking out the sound of just one instrument in the presence of many can be challenging. To make the task a little easier **soundstretcher**<sup>®</sup> includes a 'dynamic filter' option. This facility isolates a portion of the audio spectrum according to how you have positioned the pitch analyser display.

Specifically, when the 'dynamic filter' is switched on, the sound that you hear during playback is restricted to the portion of the audio spectrum being displayed. In other words, sound which is lower in pitch than that represented by bottom D on the Pitch Analyser display, and higher in pitch than that represented by top C, is masked out.

The filter 'moves' as you use the ◀ and ▶ buttons to shift the display up and down in pitch.

The  button is used to toggle on/off the Dynamic Filter. A co-located LED, when lit, indicates that it is on.

# specification

## Inputs:

- 1x3.5mm stereo jack socket microphone input
- 1x3.5mm stereo jack socket line input

**Please note:** the left and right channels of both inputs are internally combined and processed as a single monophonic signal.

## Outputs:

- 1x3.5mm stereo jack line output
- 1x3.5mm stereo jack headphone output

**Please note:** the left and right channels of both outputs are sourced from the same monophonic signal.

## Capacity:

128Mbit non-volatile flash memory providing:

User buffer – 7.34Mx16 bits, giving 5 minutes recording time (sample rate fixed at 24kHz)

Demo buffer 524Kx16 bits, giving 20 seconds of non-erasable demo sample (sample rate fixed at 24kHz)

## Controls:

- 14 touch-sensitive buttons
- 1 concealed push-button (erase function)
- 2 rotary controls – input gain and output volume

Display/indicators:

5x35 dot matrix display — 'pitch analyser'  
1x8 row of LEDs — 'buffer progress' display  
13 discrete LEDs, most co-located with touch-sensitive buttons

Power supply:

230V AC to 9V DC linear mains adaptor (included)

Dimensions:

170mm x 161mm x 23mm

Environmental:

Operational temperature range: 10 to 40°C  
Storage temperature range: 0 to 70°C

Approvals:

CE marked. Compliant with the EMC and Low Voltage Directives (89/336/EEC and 73/23/EEC).

# warranty information

Stretch Audio Limited warrants to the end user that this product will be free from defects in materials and workmanship in the course of normal use for a period of two years from the date of purchase. This guarantee covers breakdowns due to manufacturing or design faults; it does not apply in cases such as accidental damage, however caused, wear and tear, negligence, adjustment, modification or repair not authorised by us. Should you have a problem with your unit please contact your supplier or contact Stretch Audio Ltd at the address shown on the rear of this manual. If you need to return your product please use the original packaging and include all parts and accessories. We reserve the right to refuse incomplete or badly packaged returns.

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