ZZ Expert Sleepers

ES-9
Firmware v1.3
User Manual

Table of Contents

Introduction

Congratulations on your purchase of an Expert Sleepers ES-9. Please read this user manual before operating your new module.

Installation

House the module in a Eurorack case of your choosing. The power connector is [Doepfer standard](http://www.doepfer.de/a100_man/a100t_e.htm)[1]. If using the power cable supplied with the module, the red edge of the cable is closest to the bottom edge of the PCB, and carries -12V. ("-12V" is marked on the PCB itself next to this end of the connector.) Be sure to connect the other end of the power cable correctly, again so -12V corresponds to the red stripe on the cable.

The photos below show the back of the ES-9 with and without the power cable attached. The second, smaller cable is for the ES-5 expansion.

Power requirements

The ES-9 draws up to 451mA on the +12V rail, and 133mA on the -12V rail (at 96kHz, slightly less at 44.1/48kHz).

It does not use the 5V rail.

Connecting to a host (computer/tablet/etc.)

Connect the host via the ES-9's USB C socket. Note that this does not require the host to have a USB C socket, or to support USB 3.0. For hosts without a USB C socket, use a 'Type A to type C' cable, specified for USB 2.0 or USB 3.0.

The ES-9 does not draw power from the USB connection.

When a USB host is connected and successfully communicating with the ES-9, the LED immediately below the USB socket will light.

No driver is required for operation with macOS, iOS, or Linux. A Windows audio driver is available from the Expert Sleepers [downloads page](https://expert-sleepers.co.uk/downloads.html)[2].

---

1   http://www.doepfer.de/a100_man/a100t_e.htm
2   https://expert-sleepers.co.uk/downloads.html

Select the ES-9 in your DAW's preferences as required.

Connecting expansion modules

Connect an ES-5 module via the header on the back of the ES-9 marked "GT1 – To ES-5", using the 10-way cable provided. The red stripe should be oriented down on both modules, as shown in the photo above, and in the ES-5 user manual[3]. By default, the ES-5 will be controlled by channels 7-8 in your DAW.

Connect a MIDI breakout to the header on the back of the ES-9 marked "GT2 – MIDI". See the MIDI I/O section below.

Jumpers
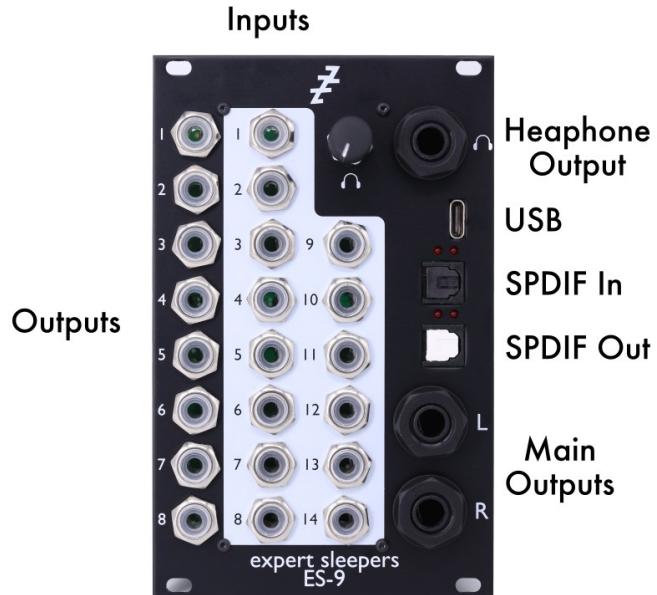
There is one jumper header on the ES-9 marked "JP1 – Fit jumper to force DFU boot".

Fitting a jumper here forces the module to boot up in DFU (Device Firmware Update) mode, in case the firmware has somehow become corrupt and it is impossible for the host computer to cooperatively get the module to boot into this mode. It should not be necessary in normal usage.

---

3   https://expert-sleepers.co.uk/es5usermanual.html

Inputs and Outputs

Inputs

Outputs

Heaphone
Output

USB

SPDIF In

SPDIF Out

Main
Outputs

expert sleepers
ES-9

The ES-9 has fourteen analogue inputs on 3.5mm TS jack sockets. These are designed to cope with any Eurorack signal, and are DC coupled, so can be used for CVs as well as audio. An input voltage of approximately ±10V will give a 0 dBFS level in your DAW.

The input ADCs (analogue to digital converters) have optional DC Blocking filters, which can be switched on or off in pairs. It is recommended to have these on if the input is being used for audio, to maximise dynamic range and to avoid pops due to DC offsets in the recorded audio. The filter must be turned off in order to use the input for CV.

The module has twelve analogue output channels. Eight of these are Eurorack-style 3.5mm TS jack sockets, with a maximum output voltage of approximately ±10V, and which are DC coupled. They can be used for audio or CVs.

In addition, the ES-9 has a pair of 1/4" TRS balanced outputs, and a 1/4" stereo headphone output. The balanced outputs are not DC coupled, and are designed to connect to monitor speakers or a mixing desk. The headphone output is DC coupled.

The ES-9's 3.5mm jack sockets are illuminated, lighting red for positive voltage and blue for negative voltage. (Audio appears purple, since it is a rapid alternation of positive and negative.)

Finally, the ES-9 has a pair of optical (TOSlink) sockets, which carry digital audio in S/PDIF format.

Channel numbering

The default channel numbering in your DAW will appear as follows, though this can be reconfigured as required.

- Main outputs: 1/2

- Headphone output: mix of 1/2 & 3/4

- S/PDIF output: 5/6

- ES-5 output: 7/8

- 3.5mm outputs: 9-16

- 3.5mm inputs: 1-14
- S/PDIF input: 15/16

Controls

The ES-9 has a single control, which is a volume knob for the headphone output.

The knob also has a push-button function. Holding in the knob for about one second toggles between the two configurations stored in flash – see below.

LEDs

There are four LEDs on the ES-9's panel. Refer to the image below:

LED A should be on constantly when the ES-9 is powered up.

LED B indicates a successful USB connection to a host.

LED C lights when MIDI is received from the host and output to the breakout.

LED D lights when MIDI is received from the breakout and output to the host.

At startup all four LEDs should flash twice rapidly, followed by them lighting one at a time in sequence D, C, B, A.

Configuration Tool

A GUI tool is provided to configure the ES-9. Please find the version appropriate to your firmware version on the [firmware download page](https://expert-sleepers.co.uk/es9firmware.html)[4].

A standalone version is provided for macOS and Windows, as well as a platform-independent browser-based version. This last uses the Web MIDI API, which at the time of writing will work only in browsers based on Google's Chromium (which includes Chrome).

All is well if the tool shows Web MIDI status: OK

If it shows Web MIDI status: No MIDI support in your browser then you need to use a different browser.

In general, changes made in the tool are reflected immediately in the hardware.

---

4   https://expert-sleepers.co.uk/es9firmware.html

Tool Setup

The tool needs a MIDI connection to the ES-9. It is most convenient to connect the ES-9 directly to the computer running the tool via its USB C port, but it will work just as well connected indirectly via the MIDI breakout.

At the top of the tool are these controls:

Send to MIDI port: [ES-9 MIDI Out ▾] Listen on MIDI port: [ES-9 MIDI In ▾] [Request ES-9 Version]

The Send to/Listen on MIDI port menus should say "ES-9 MIDI Out" (or "In") if the ES-9 is connected directly, or whichever MIDI device leads to the ES-9 if it is connected indirectly.

The Request ES-9 Version button sends and receives short SysEx messages to report the ES-9's firmware version. It is useful to quickly test the connection. It will look something like this, in the tool's status boxes:

```
11:58:31: sent config request to ES-9       11:58:49                      11:58:49
11:58:39: sent config request to ES-9       F0 00 21 27 19 22 F7          F0 00 21 27 19 32 31 2E 30 2E 30 00 F7
11:58:39: received sysex (267 bytes)                                      -----
11:58:49: sent version request to ES-9                                    1.0.0
11:58:49: received sysex (13 bytes)
```

The left box is a log of messages reported by the tool. The centre box shows the last SysEx message sent by the tool. The right box shows the last SysEx message received by the tool, and in the case of the Message SysEx message, the actual message as plain text ("1.0.0" in the example above).

Saving and restoring

The large buttons at the top deal with saving and restoring the ES-9's configuration.

[Save to Flash (Hosted slot)] [Save to Flash (Standalone slot)] [Load from Flash (Hosted slot)] [Load from Flash (Standalone slot)]

There are two 'slots' in flash memory for configurations. One is used when the module powers up without a USB connection. This is known as 'standalone' mode. The other is used when there is a USB connection to a host computer/iPad/etc., which is known as 'hosted' mode.

The automatic loading of the saved 'hosted' configuration only happens the first time the ES-9 makes a USB connection. This is so that if the USB cable is knocked out, or the computer crashes, the ES-9 doesn't swap back and forth, making a graceful recovery (heaven forbid, in a live situation) more likely.

The Save to Flash buttons store the ES-9's current configuration into flash memory, into the hosted or standalone slot.

The Load from Flash buttons manually recall one of the stored configurations. Note that if you want to edit the standalone configuration, and the configuration tool is connected to the ES-9 via USB, the ES-9 will have switched to hosted mode, so you will need to use this button to recall the standalone configuration first.

Resetting to defaults

There are two "Reset to defaults" buttons next to the save and load buttons.

[Reset to defaults suitable for hosted] [Reset to defaults suitable for standalone]

The first sets the current configuration to default settings most appropriate for hosted use – the mixer inputs are set to the USB channels, and the S/PDIF ports are enabled. The second sets defaults more appropriate for standalone use – the mixer inputs are set to the analogue inputs, and

the second mixer block is enabled.

Note that the reset buttons do not affect the saved configurations. If you want to reset one of the saved configurations to defaults you need to 'Reset to defaults' and then 'Save to Flash'.

Switching configurations with the button

Pressing the headphone volume knob lights one of the ES-9's LEDs to indicate which was the last loaded configuration – the left one (LED C) for the hosted slot, and the right one (LED D) for the standalone slot.

Holding in the knob for more than a second toggles to the other configuration i.e. if the hosted configuration was loaded last, the module loads the standalone configuration, and *vice versa*.

Configuration upload/download

Configurations can be downloaded to your computer as SysEx dumps, and uploaded to the ES-9 at later date. The UI for this is below the MIDI port section:

Choose Config to Upload: [Choose file] config.syx   [Upload] [Download Config] [Click to Save Config]

The "Click to Save Config" link saves the current configuration from the tool to your computer. Note that this is a browser link, so like any other link you can simply click it, or right-click it to save to a different file name or in a location other than your downloads folder.

If the "Click to Save Config" link is not visible, click the "Download Config" button to download a fresh copy of the configuration from the ES-9 to the tool.

To upload a configuration back to the ES-9, first click "Choose file" and locate the file on your computer. Then click the "Upload" button.

Input DC Blocking

This section controls the DC-blocking filters on the analogue inputs.

Input DC Blocking						
Inputs 1/2 ☑	Inputs 3/8 ☑	Inputs 4/5 ☑	Inputs 6/7 ☑	Inputs 9/10 ☑	Inputs 11/12 ☑	Inputs 13/14 ☑

The filters are turned on and off in pairs. A check mark in the UI indicates that the filter is on (appropriate for audio usage).

Options

There are a small number of global options.

Options	Options	Mixer MIDI channels	Sample rate
◉ S/PDIF ○ Mixer 2	MIDI Thru: ☐	USB: [Off ▾] DIN: [Off ▾]	44100Hz

The "S/PDIF or Mixer 2" radio buttons let you choose whether to enable S/PDIF functionality or a second mixer. More on this below.

The "MIDI Thru" checkbox, when enabled, turns the ES-9's MIDI output into a MIDI thru when in standalone mode. (It has no effect in hosted mode.)

The "Mixer MIDI channels" section lets you specify MIDI channels on which to control the ES-9's

mixer with MIDI CC messages. You can specify different MIDI channels for the USB and DIN (breakout) ports, or disable CC control (MIDI channel set to 'Off').

The final box in this section displays the sample rate at which the ES-9 is operating. You cannot change this here – it is purely for information.

Routing
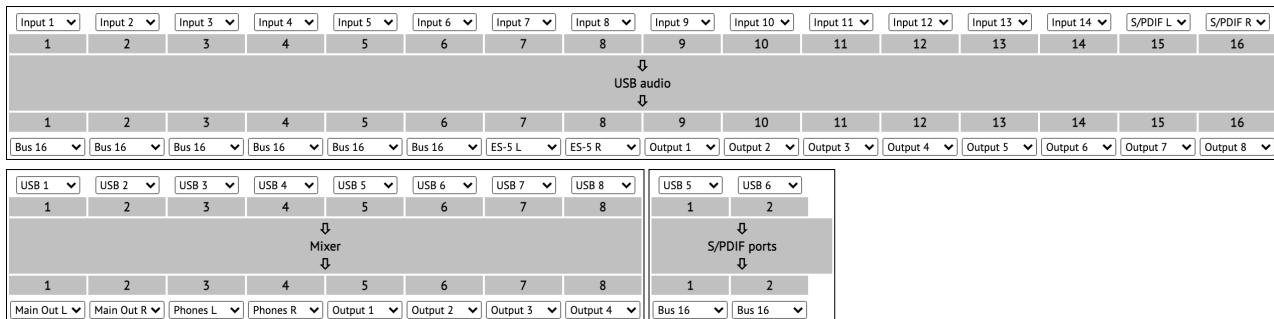
This section controls the routing of audio signals into, out of, and within the module. **It is worth taking the time to understand this before attempting to make changes, as you can easily end up with audio going nowhere**, and there is often more than one way to achieve the same goal.

Conceptually the ES-9 contains three "processing blocks", which are:
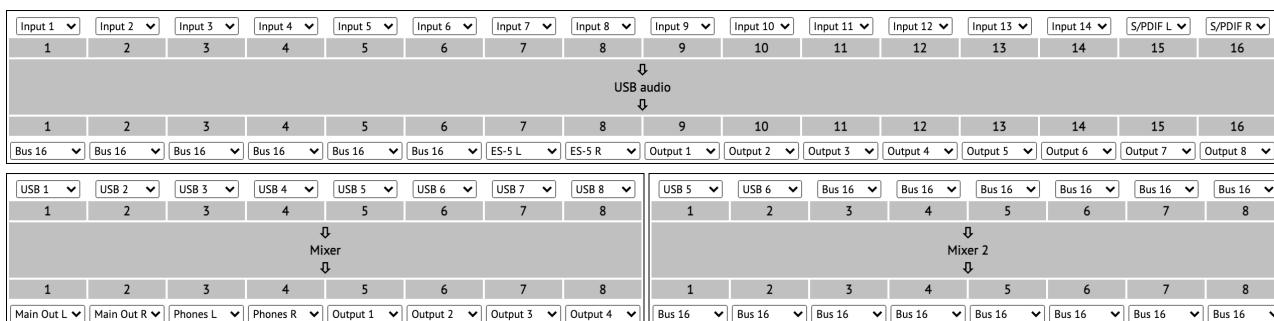
1. USB audio – the part that sends and receives audio to/from the DAW (16 inputs and 16 outputs).

2. Mixer – an internal 8x8 crosspoint mixer (8 inputs and 8 outputs).

3. **Either** S/PDIF ports – the part that handles the S/PDIF connectors (2 inputs and outputs).
   Or A second mixer (8 inputs and 8 outputs).

The function of the third block is changed in the Options section, as shown above.

With S/PDIF enabled, the routing section looks like this:

Input 1	Input 2	Input 3	Input 4	Input 5	Input 6	Input 7	Input 8	Input 9	Input 10	Input 11	Input 12	Input 13	Input 14	S/PDIF L	S/PDIF R
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
⇩ USB audio ⇩															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	ES-5 L	ES-5 R	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7	Output 8

USB 1	USB 2	USB 3	USB 4	USB 5	USB 6	USB 7	USB 8		USB 5	USB 6
1	2	3	4	5	6	7	8		1	2
⇩ Mixer ⇩									⇩ S/PDIF ports ⇩	
1	2	3	4	5	6	7	8		1	2
Main Out L	Main Out R	Phones L	Phones R	Output 1	Output 2	Output 3	Output 4		Bus 16	Bus 16

With the second mixer enabled, it looks like this:

Input 1	Input 2	Input 3	Input 4	Input 5	Input 6	Input 7	Input 8	Input 9	Input 10	Input 11	Input 12	Input 13	Input 14	S/PDIF L	S/PDIF R
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
⇩ USB audio ⇩															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	ES-5 L	ES-5 R	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7	Output 8

USB 1	USB 2	USB 3	USB 4	USB 5	USB 6	USB 7	USB 8		USB 5	USB 6	Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	Bus 16
1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
⇩ Mixer ⇩									⇩ Mixer 2 ⇩							
1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
Main Out L	Main Out R	Phones L	Phones R	Output 1	Output 2	Output 3	Output 4		Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	Bus 16	Bus 16

All inputs to the processing blocks can be chosen from the following:

- Hardware inputs 1-14

- Internal bus 1-16

- USB (DAW) outputs 1-16

- Mixer outputs 1-8

- S/PDIF processor outputs 1-2 (i.e. the signal from the hardware S/PDIF input).

There are 16 internal mono summing busses available for passing audio between blocks, though because each block can directly read the outputs of other blocks, these are often not required. In the default configuration, only bus 16 is used as a kind of 'dummy' destination.

All outputs from the processing blocks can be chosen from the following:

- Main Out L/R

- Phones L/R

- ES-5 L/R

- Hardware (3.5mm) outputs 1-8

- Internal bus 1-16

Multiple outputs can be assigned to the same destination, in which case the outputs are summed. For example, with both mixers enabled, mixes from both mixers can be routed to the same outputs. This is how you would, say, mix all 14 analogue inputs directly to the main outputs or headphones.

It is instructive to look at how the default channel routings are achieved. Starting with the USB audio block, its inputs 1-14 are set to the 14 hardware inputs, so the hardware inputs are routed directly to the USB section and sent to the DAW. Likewise inputs 15-16 are set to the outputs of the S/PDIF processor (i.e. the hardware S/PDIF input is routed to DAW inputs 15-16).

The outputs of the USB audio block might at first glance appear confusing. Outputs 9-16 are straightforward, since they're set to hardware outputs 1-8 i.e. DAW channels 9-16 drive the 3.5mm outputs. Likewise DAW 7-8 goes to the ES-5. However outputs 1-6 of the USB audio block are all set to Bus 16. This is because USB (DAW) channels 1-6 are handled by the mixer and S/PDIF processor, and so are not directly driven by the USB audio block. The outputs have to go somewhere though, so we set them to Bus 16 as a kind of 'dead end'.
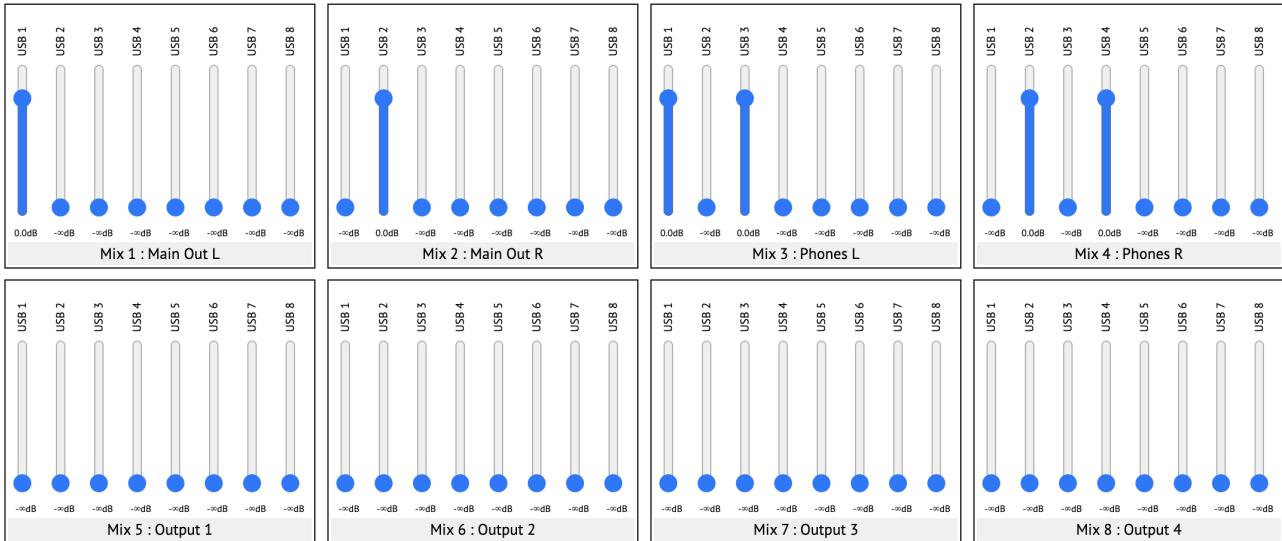
The eight inputs of the mixer block are by default set to USB 1-8 i.e. the first eight outputs of the USB audio block, that is DAW outputs 1-8. The mixer outputs are set to Main Out L/R, Phones L/R, and 3.5mm outputs 1-4. Note it is fine to have both the mixer block and the USB audio block output to outputs 1-4. If both blocks output a signal to the same output they will simply be summed.

The S/PDIF block has its inputs set to USB 5-6 i.e. DAW outputs 5-6 get sent out to the S/PDIF output. The outputs of this block are set to Bus 16 – again, this is being used as a dummy output, since the actual routing of the S/PDIF input to the USB block is handled by the USB block's input routing.

Mixers

Everything below applies equally to mixer 1 (always enabled) and mixer 2 (if enabled instead of S/PDIF).

The internal mixer can form eight individual mono mixes from eight inputs (that is, all eight mixes share the same eight possible inputs). In the default configuration, the mixer is used simply as a means of controlling the main output volume, and of providing a headphone mix of channels 1-2 with 3-4.
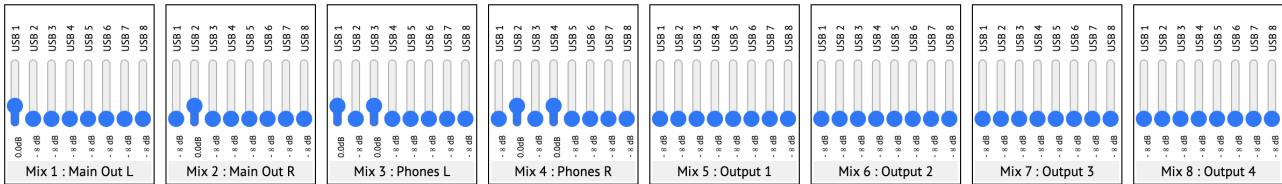
The eight 'Mix' boxes correspond to the eight outputs of the Mixer processing block above. Each mix, and each fader, is labelled with the input or output name as set in the routing controls.

In the default configuration, mixes 1 & 2 simply send USB channels 1-2 to the main outputs. Mixes 3 & 4 mix USB channels 1-2 with 3-4 and send them to the headphone outputs. Mixes 5-8 are silent (every fader is down).

Macro mix vs the raw mix

Below the main mixer interface in the configuration tool, you will see the 'raw mix':

This is the actual mix running on the hardware, and is always 8 mono mixes of 8 mono inputs. The 'macro mix' provides higher level control, taking into account stereo links, if active. The module translates the macro mix controls into the raw mix.

Stereo Links
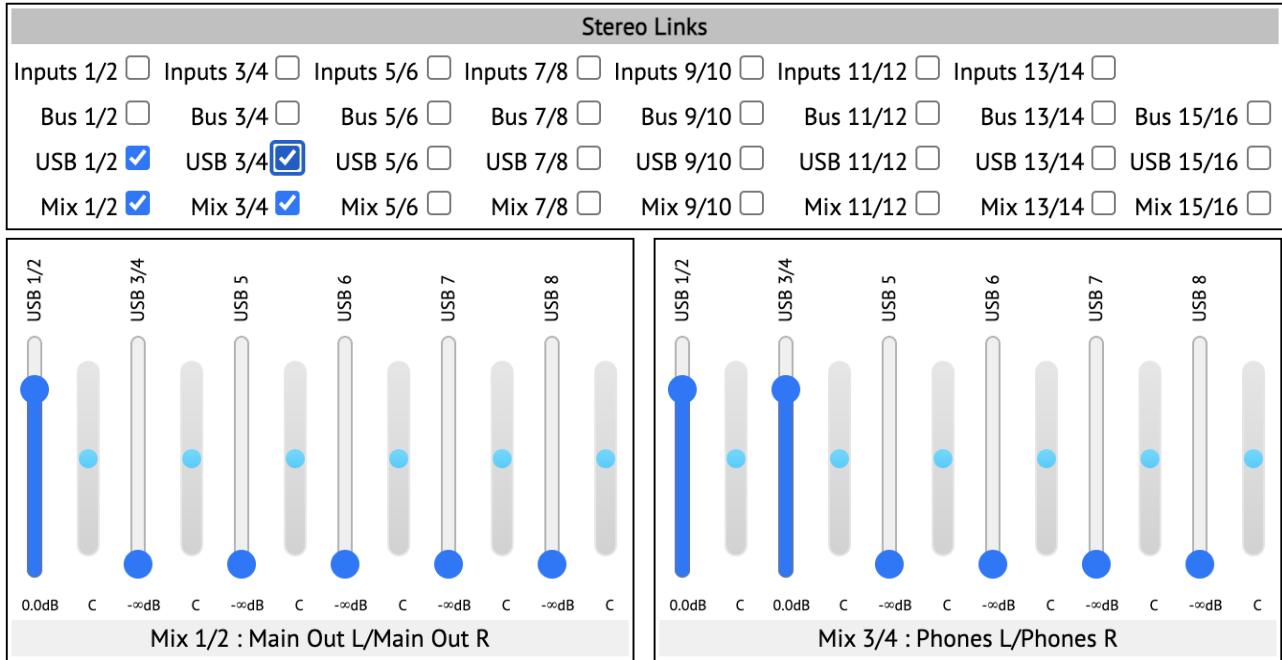
The Stereo Links section informs the hardware about which inputs and outputs you want to treat as stereo pairs in the mixer. This is purely for convenience; there is no additional functionality in terms of the underlying mix.

You can form stereo links from adjacent channels of the analogue inputs, the busses, the USB channels, and the mixer outputs. When you do so, the appearance of the (macro) mix changes.

As an example, this is how the default mix setup changes if we enable stereo linking on USB
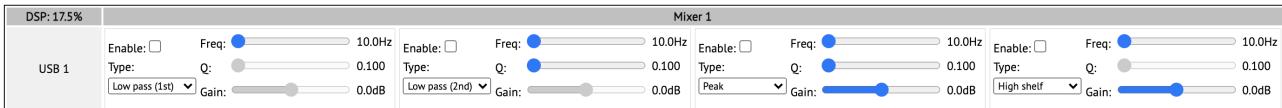
channels 1/2 and 3/4, and on mixes 1/2 and 3/4:

Note that we now have a single mixer shown for Mix 1/2, and a single mixer for Mix 3/4. Also, in the mixers, USB 1/2 and USB 3/4 each have a single fader controlling the two channels. Finally, since the mixers are now stereo, each channel has a pan control.

Input EQ

Each mixer input can have up to four bands of EQ applied.
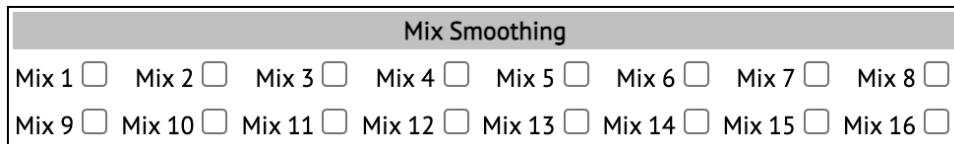
To use a band of EQ, first enable it with the Enable checkbox. Then choose the filter type – Low pass (1st order), High pass (1st order), Low pass (2nd order), High pass (2nd order), Low shelf, High shelf, Peak, or Invert phase. Depending on the filter type, you can then adjust the filter frequency, Q (bandwidth), and gain.

At the top left of the EQ section, you will see the current DSP load in percent. The more filters you enable, the higher this figure will be. Do not exceed 100%.

Mix Smoothing

The Mix Smoothing section enables slew limiting and interpolation when converting from the macro mix (which uses 7 bit, MIDI compatible, resolution) and the raw mix (which is 16 bit).

This is not necessary when setting up a static mix, but you may find it useful when using the ES-9 for dynamic, live mixing e.g. when using a MIDI controller as a mixer.

Note that smoothing consumes the same DSP resource as the EQ, and this is reflected in the DSP

usage indicator.

Output DC offsets

This section allows you to compensate for any DC offsets on the ES-9's eight 3.5mm analogue outputs.

Output 1	o		●
Output 2	o		●
Output 3	o		●
Output 4	o		●
Output 5	o		●
Output 6	o		●
Output 7	o		●
Output 8	o		●

Internally this is implemented using the mixer hardware, so a mixer needs to be routed to any output to which you want to apply a DC offset.

Mixer control via MIDI CC

The configuration tool controls the ES-9 entirely via MIDI SysEx, but it is also possible to control the mixer(s) via MIDI CC, if enabled in the "Mixer MIDI channels" section.

Note that this controls the macro mix, not the raw mix.

The CC numbers are fixed, according to the following scheme.

The mix faders start at CC 0 for mix 1, channel 1 and increment first by channel, then by mixer. So for example: mix 1 channel 8 is CC 7; mix 2 channel 1 is CC 8; mix 8 channel 8 is CC 63.

When the mixer input or mixer channel is stereo, the rule is to always use the lower-numbered CC of the two that would apply. So for example: if mix 1/2 is stereo, then for mixer channel 1 use CC 0 (the CC for mix 1) not CC 8 (the CC that would apply for channel 1 of mix 2). Similarly, if USB 1/2 is stereo and these channels are inputs 1 & 2 of mixer 1, the use CC 0 (the CC for input 1) not CC 1 (the CC for input 2).

If the mixer is stereo, the pan control uses the CC that would have been used by the right channel mixer. E.g in the example above, where mix 1/2 is stereo, the pan control for channel 1 is CC 8.

If in doubt, watch the SysEx messages sent when you operate the macro mix in the configuration tool:

```
14:31:06
F0 00 21 27 19 34 08 47 F7
```

The byte that follows the '34' is the CC number that corresponds to the control you just moved.

5-pin DIN MIDI I/O

The ES-9 has an expansion header on the PCB which can be used to add a pair of traditional 5-pin DIN MIDI ports to the module (one input/one output). This is compatible with the Expert Sleepers MIDI breakout[5].

---

5   http://expert-sleepers.co.uk/dm4midibreakout.html

Connections

The MIDI ports are exposed on a 4-pin expansion header (labelled GT2) on the rear of the module. All of the necessary electronics are on the PCB; all that needs to be added is the actual sockets.

The header pin-out is as follows (pin 1 is closest to the 'GT2' text):

Pin	Function
1	OUT pin 4
2	OUT pin 5
3	IN pin 5
4	IN pin 4

Pin numbers refer to the 5-pin DIN socket as in the MIDI standard[6].

The header is a standard 0.1" pitch header compatible with e.g. typical IDC cable sockets.

When using the Expert Sleepers MIDI breakout, pin 1 of the breakout's header (GT1) corresponds to pin 1 of the ES-9's header (GT2). Orient the ribbon cable to match up these pins.

MIDI "Low-Voltage Signaling"

When MIDI was first conceived, standard logic circuits ran at 5V, and the initial hardware reference designs worked on this assumption. However, there is nothing in the MIDI standard that actually requires a specific voltage, since it operates as a current loop via an opto-isolator.

Nowadays it is much more common for logic to run at 3.3V or lower. The MIDI Manufacturers Association has now released a reference hardware design based on 3.3V, which they call the "Low-Voltage Signaling" standard, and it is this that the ES-9 uses.

The ES-9 is therefore fully compatible with any device that adheres strictly to the MIDI specification, but may not be with devices that play fast and loose with the spec and assume 5V.

Download the full MIDI electrical specification here[7].

---

6 https://www.midi.org/specifications/item/midi-din-electrical-specification
7 https://www.midi.org/specifications/item/midi-din-electrical-specification

MIDI System Exclusive (SysEx)

The ES-9 supports a variety of features via MIDI System Exclusive messages. Mostly these are intended for use by the config tool.

SysEx Header

All SysEx messages are prefixed with a manufacturer's ID, which is a unique series of hex bytes assigned by the MIDI Manufacturers Association. The Expert Sleepers ID is 00H 21H 27H, so all SysEx messages relating to Expert Sleepers hardware will begin

```
F0 00 21 27
```

Messages for the ES-9 follow this with 19H:

```
F0 00 21 27 19
```

and then with a byte to identify the specific type of message e.g.

```
F0 00 21 27 19 10
```

Received SysEx messages

09H – Configuration dump

```
F0 00 21 27 19 09 <chunk> 0 <configuration data> F7
```

Used to send complete configuration dumps from the config tool to the module.

22H – Request version string

```
F0 00 21 27 19 22 F7
```

This causes the ES-9 to respond with a SysEx message containing the module's version string as text, using the '32H – Message' format, below.

23H – Request configuration dump

```
F0 00 21 27 19 23 F7
```

This causes the ES-9 to respond with a SysEx message containing its current state (using message 10H, below).

24H – Request save

```
F0 00 21 27 19 24 <n> F7
```

This causes the ES-9 to save its current state to flash. <n> is 0 for the standalone slot or 1 for the hosted slot. Responds with a SysEx message in '32H – Message' format, containing "OK".

25H – Request restore

```
F0 00 21 27 19 25 <n> F7
```

This causes the ES-9 to restore its state from flash. <n> is 0 for the standalone slot or 1 for the hosted slot.

26H – Request reset

```
F0 00 21 27 19 26 F7
```

This causes the ES-9 to reset its current state to defaults. (It does not affect the states stored in flash.)

2AH – Request mix

```
F0 00 21 27 19 2A F7
```

This causes the ES-9 to respond with a dump of its mix state using a format '11H – Mix' message.

2BH – Request usage

```
F0 00 21 27 19 2B F7
```

This causes the ES-9 to report its DSP usage using a format '12H – Usage' message.

2CH – Request sample rate

```
F0 00 21 27 19 2C F7
```

This causes the ES-9 to report its current sample rate using a format '14H – Sample rate' message.

31H – Set HPF

```
F0 00 21 27 19 31 <hpf> F7
```

Sets the current state of the DC-blocking filters.

32H – Set Options

```
F0 00 21 27 19 32 <options> F7
```

Sets the configuration options. Bit 0 – use mixer 2, not S/PDIF. Bit 1 – use MIDI thru.

33H – Set Links

```
F0 00 21 27 19 33 <link> <state> F7
```

Enables or disables a mixer link.

34H – Set Virtual Mix

```
F0 00 21 27 19 34 <mix> <level> F7
```

Sets a virtual mix fader.

35H – Set MIDI Channels

```
F0 00 21 27 19 35 <USB MIDI channel> <DIN MIDI channel> F7
```

Sets the MIDI channels used by the mixers.

36H – Set DC Offset

```
F0 00 21 27 19 36 <channel> <3 bytes of offset> F7
```

Sets an output DC offset.

39H – Set Filter

```
F0 00 21 27 19 39 <mixer> <filter> <type> <3 bytes of frequency> <3
bytes of Q> <3 bytes of gain> F7
```

Sets the parameters of a mixer filter.

3AH – Set Smoothing

```
F0 00 21 27 19 3A <mix> <state> F7
```

Enables or disables smoothing for a mix.

40H to 43H – Set Inputs

```
F0 00 21 27 19 <40 + dsp ID 0-3> <8 bytes of input routing> F7
```

Sets the input routing of the four DSP blocks.

50H to 53H – Set Outputs

```
F0 00 21 27 19 <50 + dsp ID 0-3> <8 bytes of output routing> F7
```

Sets the output routing of the four DSP blocks.

60H to 6FH – Set Mix

```
F0 00 21 27 19 <60 + mix ID 0-15> <channel 0-7> <3 bytes of value> F7
```

Sets a mixer fader.

Sent SysEx messages

08H – Configuration dump

```
F0 00 21 27 19 08 00 00 <configuration data> F7
```

Contains the ES-9's complete configuration. Used to initialise the config tool with the module's current state.

11H – Mix

```
F0 00 21 27 19 11 <128 x 3 bytes of mix> <128 x virtual mix/pan> F7
```

Contains the ES-9's complete mix state.

12H – Usage

```
F0 00 21 27 19 12 <4 x 2 bytes of usage info> F7
```

Contains raw data from which the ES-9's DSP usage can be computed.

14H – Sample rate

```
F0 00 21 27 19 14 <3 bytes of sample rate> F7
```

Contains the sample rate at which the ES-9 is operating.

32H – Message

```
F0 00 21 27 19 32 <NULL terminated ASCII string> F7
```

This message is transmitted in response to any request for a string e.g the version string, and also to give feedback on the success or otherwise of an operation e.g. saving the state to flash.

Firmware Updates

The ES-9's firmware can be updated over USB.

You will need the 'ExpertSleepersDFU' tool, which you can download from the [ES-9 firmware update page](#)[8].

You can go directly to any firmware version. You do not have to install them incrementally.

At the time of writing, Windows users will find it necessary to uninstall the custom Expert Sleepers audio driver before proceeding with the firmware update.

The process is as follows:

- Download the firmware from the Expert Sleepers website.

- Unzip the download. You should now have a file called 'es9_v<*version*>.dfu'.

- Run the ExpertSleepersDFU tool.

- It will prompt you to locate the .dfu file. Find the file, select it and click 'Open'.

- All being well, the tool will say "Expert Sleepers Ltd: ES-9" and "Device in Runtime Mode...".

- Click the 'REBOOT DEVICE' button.

- This will cause the ES-9 to reboot into DFU (Device Firmware Update) mode. The tool will now say "Expert Sleepers Ltd: ES-9 DFU" and "Device in DFU Mode...".

- Click the 'UPDATE DEVICE' button.

- This will now install the firmware. The ES-9 will reboot again, and the tool will show it being back in Runtime Mode.

Where to get help

Email, forum, and social media links can be found at the bottom of every page on [our website](#)[9].

---

8   https://expert-sleepers.co.uk/es9firmware.html
9   https://www.expert-sleepers.co.uk