

SCHAEFFER XXI

User Manual



Congratulations!

You have purchased the first all in one Sound Spatialiser, a small wonder of technology that fits in your hands!

This device was named after Pierre Schaeffer, who was experimenting with spatial sound in the 1950s with his 'space potentiometer'.

We took this same concept to the 21st Century, and the result is Schaeffer XXI, a digital spatialiser with 20 inputs and 8 outputs.

Be creative and have fun!

The Sonalux Team

Product Specifications

Model: SchaefferXXI-1.0

Material: Resin/FR4

Power: 5V via USB-C port

Dimensions: 15.8cm(w)x13.7cm(l)x22.15cm(h)

Number of Outputs: 8

Number of Inputs: 20 in total. 1 Unbalanced Stereo 3.5mm socket (Line) + 2 Balanced mono 6.35mm sockets + USB interface (8) + SD Card (8)

Input Impedance: 5K Ω

Output Impedance: 100 Ω

USB Interface: 2 Inputs (stereo 3.5mm) and 8 Outputs

Number of SD Card Files/Channels: 8

SD Card Type and Format: microSD FAT32

Audio File Type (SD Card): Audio files must be named 001.RAW to 008.RAW and set to MONO PCM, 44.1kHz Signed 16 BIT

USB Specification: 2.0

Operation

Note: The outputs must be connected to amplifiers or active speakers (e.g., PA systems or studio monitors) via balanced cables.

1. Input Select

- Use the toggle switch to select between USB Interface, SD Card and Line In. This will set the input LEDs that will be selected on the matrix.

2. Matrix

- The LED matrix shows inputs and outputs through LEDs, and this allows you to route your inputs to different speakers.
 - Use the joystick to move right/left/up/down and press the 'select' button to activate the desired connection. Quick patterns can also be obtained from a list of presets (see #3).
-

- Hold the select button and move the joystick for **'live mode'** (e.g., move 1 input to the desired output). In this case, the matrix shows the spatial position of the speaker depending on the number of speakers selected - 2 to 8, where speaker 1 is in front of you.
- The matrix can also be used for controlling input volume levels (see #5).

3. **Play/Stop and Pattern Selection**

- Press this button to play or stop SD Card files. Files must be named 001.RAW to 008.RAW, set to MONO PCM, 44.1kHz Signed 16 BIT and stored in the root folder. Do not remove the SD card while playing from it.
 - Holding this same button will change through different pre-programmed matrix presets. These patterns can be re-programmed by inserting a SD card carrying a config.ini file (see #6).
-

4. Sequencer

- Use the joystick to select the input line to be sequenced, then press the sequencer button. Multiple lines of sequencers are possible.
 - Hold the sequencer button to select all lines at once.
 - To change the direction, simply slide the joystick left or right.
 - As default, the sequencer is pre-programmed to go through 8 outputs. If a different number of outputs is used (e.g., 4 or 6), the number of sequencer outputs can be re-programmed. This can be done by selecting the maximum number of speakers on the matrix, then holding the select button and pressing the play button at the same time. Repeat this action to undo (defaults back to 8 speakers). Another way to define the maximum number of speakers is to insert an SD card carrying a config.ini file (see #6).
-

- The sequencer tempo can be changed by using the ‘tap tempo’ button (see #5).
- The panning law set for the sequencer (as well as for live mode) is a constant power law, which means panning is created with more stable loudness (the transition from one speaker to another speaker sounds more natural).
- You can activate the sequencer to start automatically on startup via the SD card (see #6).

5. Tap Tempo / Input Volume

- Tap the ‘tap tempo’ button on the tempo you would like to be selected for the sequencer mode.
 - Long press this button for accessing the input volume, which will show up on the matrix. The button will also light up. Use the joystick to adjust the volume. To exit this mode, just long press the button again.
-

- The input volume adjustments for IN3 and IN4 include a pre-amp (from volume level 5), so a dynamic microphone or guitar can be plugged directly. The stereo IN1/2 is a direct route.
- The initial tempo (BPM) can be reprogrammed by inserting a SD card carrying a config.ini file (see #6).

6. Config File

- More advanced settings can be selected through a config file saved in a SD card (microSD). You can download an example from our website, or you can create your own by creating a config.ini file. The file must be encoded to UTF-8. The content of the file should look like this:

```
[general]
nbspeakers = 6
```

This will change the default number of outputs to 6. More commands can be added. Below is an example file with all

possible commands. Comments are shown as # (if needed, remove this hash to activate a function).

```
[general]
# Number of speakers to use from 3 to 8
nbspeakers = 8
# Number of milliseconds for the sequencer
between each step
sequencerSpeedMs = 1000
# Set last speaker as a static track that
doesn't change with sequencer, e.g track 8 if
8 speakers (0 disabled / 1 enabled)
staticTrack = 0

[input]
# volume of each file input gain, up to 8
comma separated - values from 0 (min) to 8
(max)
volumeFiles = 8,8,8,8,8,8,8,8
# volume of each line in input gain, up to 4
comma separated - values from 0 (min) to 8
(max)
volumeLineIn = 8,8,8,8

# Patterns up to 10, can set outputs for each
file / line in, comma separated list of
speakers to send to from 1 to 8. This
overwrites the default patterns.
#[pattern1]
#file1Outputs = 1,3,5
#file2Outputs = 2,4,6
#file5Outputs = 7,8
#lineIn1Outputs = 7,8
#lineIn2Outputs = 4,5,6
#lineIn3Outputs = 1,2,3
```

```
#[pattern2]
#file1Outputs = 2,3,4
#file2Outputs = 5,6,7
#file8Outputs = 8
#lineIn1Outputs = 1,3,5
#lineIn3Outputs = 2,4,6
```

#Activate Sequencer on startup, R for right direction and L for left direction

```
[sequencer]
seq1 = R
seq3 = L
```

#Song Mode: A song has up to 8 outputs with 8 tracks each, and for each track the positions in Ms where it goes on or off.

```
[songTrack1]
output1 = 0,5000,10000
output2 = 0,5000,10000
output7 = 5000,10000
output8 = 5000,10000
```

```
[songTrack2]
output4 = 0,4000
output5 = 0,4000
```

- You can use our software to generate pre-programmed sequences that can accompany audio files from an SD Card (Song mode). The sequences are saved as data in the config.ini file. Please see our website for more information:

www.sonalux.co.uk/schaefferXXI/

7. Recording

The USB interface can also be used for recording, but it only supports stereo currently.

8. USB-MIDI

Schaeffer XXI can be controlled via USB-MIDI.

SEND MIDI TO SCHAEFFER

• MIDI Notes

Note latch mode: **C#3**

Select USB matrix: **D#3**

Select SD matrix: **F#3**

Select Line matrix: **G#3**

Matrix inputs: **C3, D3, E3, F3, G3, A3, Bb3, B3**

Matrix outputs: **C4, D4, E4, F4, G4, A4, B4, C5**

• Control Change (CC)

CC24: deactivates latch mode

CC25: volume USB (val 1 to 8 for output, MIDI channel 1 to 8 for input)

CC26: volume SD (same as above)

CC27: volume LINE (same as above)

CC28: live data toggle to enable MIDI transmission (0/1)

CC29: change number of speakers (2-8)

CC30: joystick computer control: in this mode the joystick no longer controls the matrix but can be used by the computer as it sends the joystick values (0/1)

CC31: play/stop SD card (0/1)

CC64: sustain pedal activates note latch mode

RECEIVE MIDI FROM SCHAEFFER

Note: For this mode to work, the live data toggle must be active. This is turned off by default to prevent impact on performance. You can activate it by sending 1 to CC28 or by pressing **SELECT + SEQUENCER**.

• Control Change (CC)

CC1: joystick X

CC7: master volume

CC10: joystick Y

CC14: play/stop (0/1)

CC15: receive the current number of max speaker set on the device

CC16: tap tempo press

CC17: note latch status after C#3 is pressed (0/1)

CC18: current volume set for USB

CC19: current volume set for SD card

CC20: current volume set for LINE

CC21: joystick selected position (1 = U, 2 = D, 3 = R, 4 = L, 5 = UR, 6 = DR, 7 = UL, 8 = DL)

9. JOYSTICK MODE AND CALIBRATION

The joystick mode allows you to calibrate the joystick or to use it as a MIDI controller (e.g., for controlling faders or live automations in DAWs). When the Input Select toggle is on USB (top), it provides the joystick data in the X-axis only. The SD card (middle) toggle position provides the X-axis and Y-axis altogether, and the Line in (bottom) position provides the Y-axis only. The Live Data toggle must be active to output MIDI (see the note above on 8, Receive MIDI from Schaeffer).

For calibration, set the joystick to its maximum position to the right and press Sequencer. The lights will flash. Repeat for left, up and down positions.

10. INSTRUMENT MODE

Since our system allows multiple inputs to operate together, ultra-low latency through all the inputs goes beyond the capacity of our current system. For this reason, the line inputs have about 70ms latency. If this issue affects your performance (e.g., in the case of live instruments or DJing), you can set Schaeffer XXI to Instrument Mode, which allows ultra-low latency in the line inputs, albeit limiting the channels for USB input to 2, and SD card input to 4.

To switch mode:

- 1) Hold the **Play/Stop** button during the startup.
- 2) Release the button when you see a square flashing. If you see a question mark, the SD card is missing the necessary files for this operation.
- 3) Wait until the device starts up as usual.

⚠ **Important:** do not unplug the device or remove the SD card during the process, otherwise the device will be damaged.

To switch back to Standard Mode, repeat the action. The mode will stay permanently activated until this operation is repeated. Please note that the original SD card that comes with the unit must be inserted for this operation to work. In case you need a replacement, please contact us. Another important factor for using instruments (e.g., guitar or microphone) is impedance. For better results, it is essential to pass instrument signals through a DI box.

Instrument Mode Limitations

Max number of USB channels: 2

Max number of SD card channels: 4

Software

We provide in our website free software to be used with Schaeffer XXI.

Sonalux's Spatial Sequence Generator is a user-friendly interface for creating spatial cues alongside song tracks. It supports up to 8 tracks. The data is saved in a text file to be used in a SD card.

Sonalux's Schaeffer XXI Control Room is a USB-MIDI software that allows you to take control of the interface from your computer. It features more options for the sequencer (various sequencing speeds) and a multichannel file player.

Please see our website to download the software:

www.sonalux.co.uk/schaefferXXI/

Troubleshooting

1. No sound comes out.

Make sure the speakers are not passive. The outputs need to connect to speakers through an amplifier or active speakers (e.g., PA systems or studio monitors). Cables must be balanced. Also, be sure that you have selected the correct input/output in the matrix. Sometimes it may happen that the interface has not initialised correctly. In this case, restart the device.

2. Audio file from SD Card is not playing.

If there are no files to play, the matrix should show an exclamation mark when pressing the play button. Make sure you are using the following settings: Audio files must be named 001.RAW to 008.RAW and set to MONO PCM, 44.1kHz Signed 16 BIT. Files must be in the root folder. If you use Audacity to convert the files, make sure the project rate is set to 44.1kHz, as Audacity's default is 48kHz.

3. There is a 'hissing sound' in the outputs.

This could be the pre-amp for IN3 and IN4. Reduce volume levels for IN3 and IN4 (see above Operation #5). If you require these inputs to have a cleaner sound, try using an external pre-amp.

4. There is delay/latency in the line inputs.

Try using the 'instrument mode'. See #10.

5. There is a high pitch noise in the outputs.

This could be a ground loop noise. This may happen if you power Schaeffer XXI through the USB port of a computer and connect audio from this same computer's line out socket. Please use the USB interface to avoid this issue or purchase a USB isolator that supports high speed (480mbps).

For more support, please contact us on:
contact@sonalux.co.uk



RoHS



Made in Liverpool, UK

The Sonalux logo, featuring a grid of colored squares (blue and purple) to the left of the brand name.

Sonalux
