

## ***HG-16 black Quick mode setup***

Mode connections and adjustments are listed shortly for each mode in the following. For more detailed instructions, please read the longer mode sections in the manual. The latest version is available at [www.audiospektri.com](http://www.audiospektri.com). Also note that instead of the external envelope generator outputs, the **D.C.out** voltage from the front panel plug can be connected to all the envelope inputs, if you just want to keep the corresponding control voltage constant. If left unconnected, several modes will not output any signal. Always first connect a patch cable to an input, and only after that to an output, in order to prevent shorts. Remember the virtual switchboard instructions: on power up, all sliders are connected to envelope input 1, and only if you toggle the switch to the "envelope select" position and back again, the previously stored connections are activated. Study the section "switchboard" in the manual for storing non-default linkage between the inputs and the sliders. Shortly, turning the toggle switch to "envelope select" allows programming each slider to connect to any of the four envelope inputs. Moving the desired slider up and down shifts the connection to the input that is shown by its led illumination. When the toggle switch is returned up, the selection is activated and stored.

### **Mode 0, 16 harmonics**

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the desired harmonic sliders.
  2. If you want to use the noise and/or PM modulation features, connect also envelope generator outputs to **modulation 1** and/or **modulation 2**.
  3. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- Noise modulation strength using **adjust 1**.
  - Phase modulation strength using **adjust 2**.

### **Mode 1, 8 harmonics, individual modulation control**

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the desired harmonic sliders. Only 8 harmonic sliders are used in this mode.
  2. If you want to use the noise and/or PM modulation features, connect also envelope generator outputs to **modulation 1** and/or **modulation 2**.
  3. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- Noise modulation strength using **adjust 1**.
  - Phase modulation strength using **adjust 2**.
  - Use sliders 9 – 16 to individually adjust the noise/PM modulation for the corresponding harmonics 1 – 8.

## Mode 2, comb filtered noise

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the desired harmonic sliders 1 to 15.
  2. If you want to have the noise modulation function, connect also envelope generator output to **modulation 1**.
  3. Connect the note determining control voltage to the **CV note** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- Adjust noise modulation strength using **adjust 2**.
  - Adjust comb filter feedback using **adjust 1**. This effectively determines the noise level.
  - When Slider 16 is fully down, increasing modulation amplitude increases the noise level, and when Slider 16 is up, increasing modulation amplitude decreases the noise level.
  - The gate signal is not usable in this mode.

## Mode 3, 7 intervals x 8 harmonics

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have selected for the desired sliders using the virtual switchboard. Note that both the 8 harmonics (sliders 1 to 8) and the 7 interval amplitude responses (sliders 9 to 15) can be modulated.
  2. Pull up the “key select” switch to select the key to be played.
  3. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- No function for **adjust 1**, **adjust 2**, **modulation 1**, nor **modulation 2**.

## Mode 4, Pseudo-VCF with noise control, Mode 13: Pseudo-VCF with PM control

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the desired harmonic sliders 1 – 8, and for the filter amplitude sliders 9 – 16.
  2. Connect envelope generator output to **modulation 2** to do the center frequency modulation of the pseudofilters.
  3. If you want to use the noise features (Mode 4), or PM (Mode 13), connect also envelope generator output to **modulation 1**.
  4. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- Use **adjust 2** to control of the pseudofilter center frequency modulation sensitivity.
  - Use **adjust 1** set the modulation level for noise (Mode 4) or PM (Mode 13).
  - Use Sliders 1 - 8 to set the harmonic spectra.
  - Use Sliders 9 – 16 to set the pseudofilter spectral response.
  - If you want to use the 4 highest bands, connect a signal source also to envelope input 3. Note the dual function control for sliders 9 – 12.

**Mode 5, True chorus with 10 chorus members, each having maximum of 8 harmonics. Also the possibility to generate non-harmonic overtones.**

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the desired harmonic sliders 1 – 8.
  2. Correspondingly, Connect envelope generator outputs to to all those of the **envelope inputs** you have activated for sliders 9 - 16 to control the chorus member amplitudes.
  3. Connect an envelope output to **modulation 1** if you want to activate/modulate the frequency deviation between the chorus members. Modulation 2 has no function
  4. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- Set the chorus member spectra by sliders 1 - 8 (all members have identical spectra) and relative chorus member amplitudes using sliders 9-16. Slider 9 controls 3, the rest single chorus members.
  - Use **adjust 1** to control the sensitivity to the signal at **modulation 1**.
  - Use **adjust 2** to shift the overtones out of harmony, if desired.

**Mode 10, 30 harmonics with two parameter noise control , Mode 11: 15 harmonics with individual two parameter noise control.**

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the desired harmonic sliders.
  2. Connect envelope generator outputs to **modulation 1** and **modulation 2**.
  3. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- **modulation 1** is used for modulating the setting of **adjust 1**.
  - **modulation 2** is used for modulating the setting of **adjust 2** .
  - **adjust 1** and **adjust 2** are both used for noise adjustment. **adjust 1** controls the noise amplitude, and **adjust 2** the noise injection period.
  - Mode 10 has identical control for all the 16 harmonics, while Mode 11 has individually adjustable strength for the 8 harmonics using sliders 9 – 16.

**Mode 12, Harmonic generator with built-in sequenced envelope generator**

1. Connect external envelope generator output to **modulation 2** (no adjustment, its amplitude directly makes the PM modulation, so use a well adjustable external generator or leave open). No other external envelopes needed.
  2. Use the virtual switchboard to link the 15 harmonics to one of the **envelope inputs 1 – 4** to determine their internal envelope trigger delay.
  3. Turn **gate on**, now the gate signal triggers the internal envelope generators. Alternatively use **modulation 1** as the trigger input, but leave it open if gate is used.
  4. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.
- use **adjust 1** to control the envelope shape (see Figure 12.1. in the manual)
  - use **slider 16** and **adjust 2** to control the relative delays in between, and envelope duration for the 4 possible events.

## Mode 14, Frequency modulated harmonic generator.

1. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the desired base note harmonic sliders. Only 6 harmonics are used in this mode, i.e. sliders 1 to 6 are usable for the base signal spectrum setting. Remember that on power up, all are connected to **envelope input 1**, and only if you toggle the switch to **envelope select** position and back again, the previously stored connections are activated.
2. For modulating signal harmonic amplitude control, connect envelope generator outputs to those **envelope inputs** that you have linked for the sliders 7 and 8. Adjust these sliders to set the relative amplitudes for the two modulator harmonics.
3. Connect envelope generator outputs to all those of the **envelope inputs** that you have activated for the individual harmonic frequency modulating signal amplitude defining sliders 9 - 14. Check the correspondence of sliders 1 – 6 and 9 – 14.
4. For modulating signal frequency control, connect an envelope generator output to **modulation 1** and adjust the modulation offset frequency to a desired level using **adjust 1**, and gain using **adjust 2**.
5. Define downward or upward modulation by setting slider 16 down or up, correspondingly.
6. Connect global modulation amplitude control envelope to **modulation 2**.
7. Use slider 15 to remove (slider off) or allow (slider up) possible aliased, folded frequencies.
8. Connect the note determining control voltage to the **CV note** input and the gate trigger signal to the **gate** input, and optionally connect the **CV pitch** and **CV velocity** inputs.

## The vocoder modes 6-9

### Mode 6: Single channel vocoder

Input signals:

**mic:** Microphone input, balanced 3.5mm TRS plug

**modulation 1:** No function

**modulation 2:** No function

**envelope inputs:**

**envelope 1:** base note spectral shift

**envelope 2:** No function

**envelope 3:** No function

**envelope 4:** No function (optionally CV note input, if the PCB switch is closed)

Notes: A vocoder is typically used without external envelope modulation; in that case connect the envelope input 1 to the **D.C. out** output for enabling the spectral shift with **adjust 1**.

Outputs:

Output is normally from the **out** TRS jack.

Adjustments:

**adjust 1:** spectral shift (“big speaker”/”small speaker” effect)

**Slider 1:** On/off, automatic/manual noise control. If off, or fully down, the noise characteristics can be adjusted using sliders 2 - 5, otherwise an automatic noisiness decision is made in the vocoder.

**Slider 2:** If Slider 1 is off, adjusts the noise level at the frequency band corresponding to the fundamental, otherwise it adjusts the sensitivity for automatic noise generation for the fundamental.

**Slider 3:** Corresponding noise adjustment for harmonics 2&3.

**Slider 4:** Corresponding noise adjustment for harmonics 4&5.

**Slider 5:** Corresponding noise adjustment for all the remaining harmonics.

**Slider 6:** Noise gate: clips the bottom of the analyzed speech spectrum which typically is noisy; increased clipping also removes lower spectral contents for possibly desired sound coloring.

**Slider 7:** Spectral shaping; exaggerates the differences of spectral peaks and valleys when shifted upwards from the default off-position.

**Slider 8:** Control of the interpolation between the analyzed spectral bands. This is an on-off control and its change only comes into effect after system reset or mode change. When slider 8 is off at the minimum position, the interpolation is maximally smooth. This results in decreased spectral resolution, but minimizes possibly unwanted effects with rapid note changes that vary the spectrum. Pulling slider 8 up will improve spectral resolution. The audible differences are quite small, though, in most cases.

**Sliders 15 and 16:** Microphone digitizer noise gate. In addition to the spectral noise gate adjustment with Slider 6, also the input microphone A/D has noise gating. The default gating from system reset can be varied using these sliders. If you want to increase the gating threshold, move Slider 15 to the maximum position and move Slider 16 up and down between the minimum and maximum positions. Each sweep up or down increases the threshold by 3dB. Correspondingly, when Slider 15 is at the minimum position, each sweep decreases it by -3dB. Overload led blinking shows reaching of the minimum or maximum threshold.

### **Mode 7: Single channel freeze spectrum/capture transient vocoder**

Mode 7 has three different operations:

1. Freeze spectrum: When turning the mode selector either from Mode 6 or Mode 8 to Mode 7, the instantaneous spectrum is frozen and can then be played and modified using mostly the same controls as in Mode 6.
2. Transient capture: a duration of 1.1 seconds of the input signal can be captured, vocoded, and then played back using the live vocoder controls, and additionally with variable playback speed.
3. Some typical vocal and special effect transients are stored in the non-volatile memory and can be played readily.

In this mode, the controls and **envelope input** functions are equal to the ones in Mode 6, with three exceptions:

1. Because we now have stored data, its replay speed can be varied. The replay speed is controlled using sliders 9 and 10. When **Slider 9** is fully down, raising **Slider 10** will slow down the replay, and when **Slider 9** is up, raising **Slider 10** will speed up the replay. As you can hear, because in the vocoder the sound parameters are isolated, the replay speed does not change either the pitch or the spectral envelope.
2. **Slider 1** is used for controlling the capture and storage operations. Thereby the automatic/manual noise control stays only manual in this mode.
3. **Envelope input 3** is used for determining if a stored transient is played or a new transient is captured.

The following instructions explain the three use cases:

1. **Freeze spectrum:** If you want to freeze a spectrum coming from Mode 6 or 8, then keep Slider 1 at the middle position. Sing a desired vowel continuously while simultaneously switching the mode selector from 6 or 8 to 7. Now the spectrum at the switching moment will be frozen and you can continue playing in the same way as in Mode 6 (except that no microphone is needed any more). Keep **envelope input 3** open or grounded.
2. **Transient capture:** Keep the three position toggle switch in the middle position ( **gate off** ) and leave **envelope input 3** open or grounded. Then move Slider 1 to its lowest position. Now the vocoder works in the real time mode, as explained in Mode 6, and you can listen to the signal from the output jack. The transient capture starts when raising Slider 1 upwards. The distance from the “off” position now determines the capture sensitivity. Playing the transient needs to have the toggle switch returned in the **gate on** position, so that each keyboard key activation starts the transient.
3. **Stored vocoder transient playback:** The vocoder has 26 fixed transients stored in the nonvolatile memory, containing both human voice and musical instrument spectra. These are 1.1s each. Reading the transients is done in the following way:

Keep the toggle switch in the **gate on** position. Connect **envelope input 3** to **D.C. Out**. Now rotating **adjust 1** CW causes the transients toggle one item forward each time the gate signal rises, i.e. when any keyboard key is pressed. Correspondingly rotating it CCW toggles them backward. The overload led blinks when either the maximum or minimum is reached. The rotated angle is irrelevant, always the next transient in list is found for one key activation. When you have found a suitable one, keep **slider 1** up, disconnect **envelope input 3** and play the sample. Now **adjust 1** comes back to its default function, i.e. big singer/small singer adjustment. Use sliders **9** and **10** to control the playback speed as described above. The list of stored transient is shown in the manual.

## Mode 8: Two channel vocoder

Input signals:

**mic:** Microphone input, balanced 3.5mm TRS plug

**modulation 1:** No function

**modulation 2:** No function

**envelope inputs:**

**envelope 1:** base note spectral shift

**envelope 2:** 2nd note spectral shift

**envelope 3:**

**envelope 4:** No function (optionally CV note input, if the PCB switch is closed)

Notes: Vocoder is typically used without external envelope modulation; in that case connect the **envelope inputs 1 - 2** to the **D.C. out** output for enabling the corresponding functions.

Outputs:

Output is normally from the **out** TRS jack.

Adjustments:

**adjust 1:** spectral shift for base note (big speaker/small speaker)

**adjust 2:** spectral shift for second note (big speaker/small speaker)

**Slider 2:** If Slider 1 is off, adjusts the noise level at the frequency band corresponding to the fundamental, otherwise it adjusts the sensitivity for automatic noise generation for the fundamental.

**Slider 3:** Corresponding noise adjustment for harmonics 2&3.

**Slider 4:** Corresponding noise adjustment for harmonics 4&5.

**Slider 5:** Corresponding noise adjustment for all the remaining harmonics.

**Slider 6:** Noise gate: clips the bottom of the analyzed speech spectrum which typically is noisy; increased clipping also removes lower spectral contents for possibly desired sound coloring.

**Slider 7:** Spectral shaping; exaggerates the differences of spectral peaks and valleys when shifted upwards from the default off-position.

**Slider 8:** Control of the interpolation between the analyzed spectral bands. This is an on-off control and its change only comes into effect after system reset or mode change. When slider 8 is off at the minimum position, the interpolation is maximally smooth. This results in decreased spectral resolution, but minimizes possibly unwanted effects with rapid note changes that vary the spectrum. Pulling slider 8 up will improve spectral resolution. The audible differences are quite small, though, in most cases.

**Sliders 11 to 15** define the pitch difference between the two vocoder output channels or notes. The numbers below the upper ones clarify the intervals, i.e. 3 (below 11) for the third, etc, up to the seventh.

**key select** The key selection is made by pulling the spring loaded “key select” switch up, simultaneously when pushing down the desired major key in the keyboard. The dual keys naturally follow this setting, i.e. A minor also is selected when the C key is pressed, Bb minor also results when the C# key is pressed, etc. The default key at power up is C major/A minor.

**Sliders 15 and 16:** Microphone digitizer noise gate. In addition to the spectral noise gate adjustment with Slider 6, also the input microphone A/D has noise gating. The default gating from system reset can be varied using these sliders. If you want to increase the gating threshold, move Slider 15 to the maximum position and move Slider 16 up and down between the minimum and maximum positions. Each sweep up or down increases the threshold by 3dB. Correspondingly, when Slider 15 is at the minimum position, each sweep decreases it by -3dB. Overload led blinking shows reaching of the minimum or maximum threshold.

### **Mode 9: Two channel freeze spectrum/capture transient vocoder**

Mode 9 is similar to Mode 7 for the dual channel vocoder case, so please follow its instructions for use of **Slider 1, Slider 9, Slider 10, envelope input 3**, and the toggle switch, and otherwise follow Mode 8 instructions.