USER MANUAL

KHE AUDIO ELECTRONICS

Amplifier – Cabinet - Selector

ACS 4x2 | ACS 8x4

"…The KHE Amp-Cabinet-Selector is the most ergonomic way to setup your amplifier- and cabinet collection!"

www.KHE-AudioElectronics.ch
info@KHE-AudioElectronics.ch

SAFTEY PRECAUTIONS

For reasons of the product liability, we are obligated to make clear certain safety aspects which must not be ignored under any circumstances:

- Read, retain, and follow all instructions. Heed all warnings.
- To prevent damage, fire or shock hazard, do not expose this unit to rain or moisture. Do not use this product near water or any other liquids.
- This product should be located away from heat sources such as radiators, heat registers, etc.
- Unplug the power supply before cleaning the unit exterior. Use a dry cloth only. Wait until the unit is completely dry before reconnecting it to the power supply.
- Maintain unobstructed air space behind and above the unit for proper ventilation and cooling.
- Protect the power supply and all attached cables from being pinched or abraded.
- The power supply of this product should be unplugged from the outlet when left unused for a long period of time or during storm weather.
- Use only the power supply supplied with the unit.
- Install in accordance with the manufacturer's instructions
- Keep these instructions for future reference.

CAUTION: If the unit becomes physically damaged due to dropping or for other reasons, it should be returned to the factory for repair to avoid the risk of further damage to the unit or to attached units. No user serviceable parts inside. Warranty is void if device gets opened by unauthorized personal. In case of malfunction or mechanical damages, please contact KHE Audio Electronics for further assistance.

By purchasing and using this product, you clearly understand that you are taking full responsibility for the use of this product.

WARNING & LIABILITY NOTICE

KHE Audio Electronics accepts no responsibility (consequential or inconsequential) for damage or injury caused by improper connections, improperly grounded amplifiers, user error, or injury caused by failure of the ACS8x4 / ACS4x2 (short “ACS”) or any component inside the ACS. Use of the ACS implies that the owner/user clearly understands and agrees to all of the terms stated within this user manual, has decided to use the ACS under these terms, accepts full responsibility for any damage or injury, and waives his/her rights to a liability claim against KHE Audio Electronics (or associated companies or directors) for any damage or injury caused while using the ACS. As it is impossible for KHE Audio Electronics to ensure the user is following these instructions, the user must take full responsibility in the suitability of purchasing a KHE product for his or her use.

The device serves for routing guitar and amplifier signals as well as for controlling amplifiers and must be used exclusively for this purpose.

KHE AUDIO ELECTRONICS IS NOT RESPONSIBLE FOR ANY DAMAGE TO YOUR AMPLIFIER THAT MAY OCCUR IN CONNECTION WITH ANY USE OF THE ACS.

INTRODUCTION

Congratulations on your purchase of a **KHE Amplifier - Cabinet - Selector** !

The KHE Amplifier-Cabinet-Selector is a switching system for guitar amplifiers and speaker cabinets.
It allows you to switch between up to 8 amplifiers and up to 4 cabinets.
Connect all your amplifiers and cabinets to the ACS, power them up and plug your guitar into the ACS.
Enjoy the easy access to all of your amplifiers and cabinets in a split of a second.

Switching outputs of tube amplifiers is not an easy thing. As we all know, running tube amplifier without a load connected at the output is a bad idea - it would produce high voltage spikes at the output transformer, which damage the output transformer and output tubes.
To make a selector such as the KHE ACS, the amplifiers have to be protected from these voltage spikes.

To make the KHE ACS as safe as possible, it features a number of safety features:

- Each unused amplifier is connected to a dummy load, simulating a speaker cabinet / load
- Each unused amplifier input is muted, making sure no signals can reach the amplifier
- Each cabinet jack is supervised for the presence of a cabinet
- In case of power loss of the ACS, all amps are in a safe state
- Advanced digital switching logic to make sure no invalid combination is possible

A special mute circuit was developed to make the switching process as silent and as fast as possible.
The switching process is timed and supervised by a microcontroller for fast and precise switching times.
The use of the user interface (switches and leds) is optimized for maximal user comfort and safety.
All jacks are color coded to simplify the wiring setup and to make sure not wiring errors happen.

The KHE ACS is built in Switzerland, using highest quality parts such as OMRON relays, NEUTRIK connectors, TI semiconductors, PANASONIC capacitors and AVR microcontrollers. Advanced shielding techniques are used inside the ACS to shield the sensitive input lines from the powerful output lines.

To take advantages of all the features that have been implemented into the ACS, please take your time to read through this manual before you use it.

If you have any questions that are not answered in this manual, please refer to the FAQ section on our website.
If you have any further questions, please contact us at
info@khe-audioelectronics.com.

FRONTPANEL

GUITAR INPUT JACK

Front input for guitars and instruments. Front input has higher priority than the back instrument input.

AMPLIFIER LEDs & SWITCHES

Switches to enable, disable and change amplifiers. The leds shows the current status of the amplifier.

CABINET LEDs & SWITCHES

Switches to enable, disable and change cabinets. The leds shows the current status of the cabinet.

- ⇨ **To change an amplifiers and cabinets, it is not needed to manually disable the current activated amp or cab before enabling the next one. The switching logic of the unit takes care of this.**
- ⇨ **For additional functions of these switches and leds, please refer to section "SETUP MENU".**

CTRL LED & SWITCH

Switch to save Midi presets and to control the system functions. The led to show the status of the ACS.

POWER SWITCH

Power switch to power on the ACS.

LED STATES

LED	COLOR	STATE	FUNCTION
AMP-LED	red	off	AMP DISABLED
AMP-LED	red	blink dimmed	AMP STANDBY (disabled)
AMP-LED	red	on	AMP ENABLED
CAB-LED	red	off	CAB DISABLED / NO CAB CONNECTED
CAB-LED	red	on dimmed	CAB DISABLED / CAB CONNECTED
CAB-LED	red	on	CAB ENABLED
CTRL-LED	red	off	POWER OFF
CTRL-LED	red	on	POWER ON
CTRL-LED	red	blink fast	MIDI-PRESET CHANGED
CTRL-LED	green	flash short 1x / 2x	SETUP-MENU ACTIVE

BACKPANEL

GUITAR INPUT JACK

Back input for guitars and instruments. Back input has lower priority than the front instrument input.
If a cable is connected to the back input and another cable gets connected to the front input, the back input gets disabled and only the front input is active.

TUNER OUTPUT JACK

Output to connect an external tuner. The buffered input signal is continuously preset at the tuner output.

AMPLIFIER INPUT JACKS (black)

Outputs to connect the inputs of the amplifiers (where you normally plug your guitar in).

- ⇨ Only use high quality instrument cables at these jacks (low capacitance, as short as possible)

AMPLIFIER OUTPUT JACKS (blue)

Inputs to connect the speaker outputs of the amplifiers (where you normally plug your cabinet in).

- ⇨ Only use high quality speaker cables at these jacks (2x 1,5mm^2 min. , as short as possible)

CABINET JACKS (red)

Outputs to connect the speaker cabinets.

- ⇨ Only use high quality speaker cables at these jacks (2x 1,5mm^2 min. , as short as possible)

POWER JACK

Power switch to power on the ACS. Connect the included 15 Volt AC / 15 Watt linear power supply to this jack.

MIDI-IN & MIDI-THRU

Connect midi devices at these jacks. See “MIDI OPERATION” for more informations on how to use the midi functions. Unfortunately there was no space left for a Midi Thru jack on the ACS4x2.

OPERATION WARNINGS

NEVER unplug any connections of an amplifier that is connected to the ACS while the amplifier is on.

NEVER change connections on an amplifier while the amplifiers power switch is ON.

NEVER use fx-pedals such as Delay, Echo, Reverb etc. in the effect loops of the connected amplifiers.

NEVER exceed the maximum amplifier & load power rating! Refer to the specifications section for details.

NEVER connect an amplifier with a 2-prong AC power-cord plug to the ACS.

NEVER defeat, remove or "lift" an amplifier's safety ground, which is provided by the 3-prong AC power-cord plug! Doing so may not only be ILLEGAL, but it may also pose a SHOCK or ELECTROCUTION HAZARD.

GETTING STARTED

1) Ensure all amplifiers are turned off and the volume controls are set to zero.
2) Connect the powersupply to the ACS and engage the ON/OFF switch.
   The CTRL led on the frontpanel should now light up red.
3) Connect all speaker cabinets to the red CAB jacks on the back of the ACS.
   The CABINET-Leds on the front of the unit should now light up slightly dimmed (means cabinet is detected but not activated).
4) Connect the amplifiers one by one to the ACS :
   From the ACS, connect the black AMP-IN x Jacks to the amplifiers guitar input (instrument cable).
   From the ACS, connect the blue AMP-OUT x jacks to the amplifiers speaker output (speaker cable).
5) Verify the cabeling once again, make 100% sure there is no misrouting or cable mixup.
   A misrouting could damage the connected amplifiers and the ACS.
6) Set all your tube amplifiers to POWER ON – STANDBY mode and let them heat up for 30 seconds.
7) Activate one cabinet by pressing the designated switch on the front of the unit.
   The LED of the activated cabinet should now light up brightly.
8) Power-on the first amplifier and activate the amp by pressing the designated switch on the front of the unit. Turn up the volume control on the selected amp.
   ⇨ in case there is no sound , noise or other irregularities from your amplifier, imediately turn off the amplifier and verify the wiring and the settings on the amplifier (volume gain etc).
9) repeat step 8) for all amplifiers
10) enjoy!

ADDITIONAL FUNCTIONS

DUAL-CAB-MODE
DUAL-CAB-MODE enables the use of up to two cabinets at the same time.

RECALL-MODE
RECALL-MODE automatically recalls the last activated configuration on start up of the ACS.
This function is very useful in the studio. It makes sure you start the day with the same amp-cab-configuration as the day before. (« was it 7-2 or 4-3… ?? »). In case a configuration cannot be loaded (due missing or removed cabinet), the amplifier won't be enabled. It will remain in standby (blinking amp led). The CTRL LED is flashing to indicate a configuration mis-match (until any key is pressed).

GROUND-LIFT
GROUND-LIFT removes the internal ground connection the the enclosure.

To enable / disable these functions,please refere to the section "SETUP-MENU" in this manual.

During startup, the last active state of these functions will be recalled.

SETUP - MENU

In the setup menu, system configurations can be made, such as:

- enabling and disabling RECALL-MODE, DUAL-CAB-MODE and GROUND-LIFT
- setting the MIDI-CHANNEL of the device

To enter the setup menu, push and hold the CTRL-SWITCH more than 2 seconds.
The setup menu is active when the CTRL-LED starts to blink green.

The setup menu structure is built with multiple pages. Each page controls different functions. The current activated menu page gets shown by the blink interval of the green CTRL-LED. Functions can be set by toggling the amplifier switches.

To flip between the menu pages, push the CTRL-SWITCH short.

MENU PAGE 1: (CTRL-LED 1x blink green)

Switch / Led:	**AMP 1**	**AMP 2**	**AMP 3**	**AMP 4**
Function:	Recall-Mode	Dual-Cab-Mode	Ground-Lift	x

⇨ see "Additional Features" for description of these functions

MENU PAGE 2: (CTRL-LED 2x blink green)

Switch / Led:	**AMP 1**		**AMP 2**		**AMP 3**		**AMP 4**
Midi-Channel #:	$n * 2^0$	+	$n * 2^1$	+	$n * 2^2$	+	$n * 2^3$

⇨ see "Midi Operation: Set Midi-Channel" for description of how to set the midi-channel

Amp 5-8 and Cab 1-4 have no function in the setup menu.

To end the setup menu, push CTRL-SWITCH for more than 2 seconds.
The setup menu ended when the CTRL-LED is continuously on RED.

MIDI OPERATION

SET MIDI-CHANNEL

By default, the Midi channel of the ACS is set to channel 0 (OMNI = receiving on all channels).
In the setup menu, the midi channel can be changed:
Amplifier switch and led # 1 – 4 represent the MIDI-CHANNEL of the ACS.
The midi channel value is binary coded with these four switches and s:

switch	AMP 1		AMP 2		AMP 3		AMP 4
value ON	1	+	2	+	4	+	8
value OFF	0		0		0		0

CONTROL CHANGE

When sending Midi Control Change instructions (0xB0), you can enable / disable all amps and cabs individually.
Send the value of 127 / 0xFE to enable / disable / change a amp or cab.
Midi CC instructions get filterd by the same advanced switching logic as the amp/cab switches.

Device	Function	Midi-CC Command
Amp 1	enable / disable	0x66 102d
Amp 2	enable / disable	0x67 103d
Amp 3	enable / disable	0x68 104d
Amp 4	enable / disable	0x69 105d
Amp 5	enable / disable	0x6A 106d
Amp 6	enable / disable	0x6B 107d
Amp 7	enable / disable	0x6C 108d
Amp 8	enable / disable	0x6D 109d
Cab 1	enable / disable	0x6E 110d
Cab 2	enable / disable	0x6F 111d
Cab 3	enable / disable	0x70 112d
Cab 4	enable / disable	0x71 113d

PROGRAM CHANGE

When sending Midi Program Change instructions (0xC0), you can load presets of combinations of amps and cabs. There are 100 presets avaiable, 0-99 or 0x00 – 0x63. To save a preset, activate the blank preset by sending the PC instructions with your Midi controller. Enable the required amp-cab combination. Now the CTRL led starts to blink, which means that the (blank) preset got changed. To save the preset, simply push the CTLR switch short. Now the CTRL led is continously on and the preset is saved.

THINGS TO KNOW

INPUT BUFFER

After the guitar input jacks, there is a high quality impedance converter («buffer») built into the ACS. This buffer converts the high-impedance guitar signal into a low-impedance signal, which makes the signal more powerful and less sensitive to noise. With this buffer, the length of cables connected to the ACS outputs doesn't matter anymore (no signal- or high-end-loss). The buffer circuit is high-end studio-grade quality, capable to swing output-voltages up to 15Vpp without any distortion or coloration. The input characteristics of the buffer reproduce a classic tube input stage. This buffer circuit is an essential ingredient of the ACS and cannot be disabled.

TUNER OUTPUT

In case the connected device at the tuner output doesen't have a power supply with galvanic isolation (such as SMPS power supplies), use a di-box with a groundlift between the tuner output and the device to isolate the ACS from the connected device. Otherwise, malfunctions at the ACS and / or the connected device may occur, such as ground loops and other noise.
You can also use the tuner out to record a clean DI track of your guitar simultaneously to the amplified track. Use a high quality DI box with galvanic isolation between the tuner out and your DAW / interface / micpre.

CABINET DETECTION

Each cabinet jack has a detection circuit which monitors the state of the cabinet jack. If there is no valid speaker cabinet connected, it is not possible to enable the cabinet slot. The detection circuit measures the actual cabinet, not just the switch contact on the jack, which makes it way more safe.

USE OF FX-LOOPS w. THE ACS

Do not use any time- or modulation based effects in the effect loop the amplifiers (delay, echo, reverb etc).

CASCADING MULTIPLE ACS

Do not cascade (dasy chain) multiple ACS.

CABLE TYPES

For all BLACK jacks, use high quality shielded unbalanced instrument cables only.
For all BLUE and RED jacks, use high quality unshielded unbalanced speaker cable (2x 1,5mm2 or higher)

CABLE LABELING

It's useful to equip all cables with numbered labels on both ends for easy identification of the connected amplifier to avoid wiring faults. Use painters tape or such.

PLACEMENT OF THE ACS

Do not place the ACS on top of power amplifiers, The ACS ist sensitive to strom magnetic fields, like those radiated from large power transformers. Low frequency hum will result from placing the ACS too close to any large transformers.

POWER SOURCE

Use the same power source (outlet, plug strip) for the ACS as for the connected amplifiers. Otherwise, ground loops may occur.

POWER SUPPLY

Only use the included linear power supply. Other types of power supplies will not work with the ACS (such as power supplies with DC voltage or SMPS power supplies).

PE / EARTH CONNECTION

All amps must have a 3 prong power chord, grounded to PE für stability and saftey. Do not use 3-to-2 prong AC ground lift adapters of any of the connected devices. Do not remove or modify any of the ground connections of the connected devices. This could potentially damage your devices an/ or the ACS.

SYSTEM RESET

To perform a system reset (delete presets, reset Midi-Channel), disable the power of the unit, wait 10 seconds, push-and-hold the CTRL-SWITCH and enable the power switch again. Now the ACS resets itself to factory state.

F.A.Q.

For FAQ, please refere to the FAQ section on our website: www.khe-audioelectronics.ch/faq

TECHNICAL SPECIFICATIONS

Dimensions & Weight	ACS4x2:	1/2 19" |1 HE
		approx. 170mm x 180mm x 40mm | 1.5kg
	ACS8x4:	19" |1 HE
		approx. 483mm x 240mm x 40mm | 2.5kg
Power supply :	Input :	115V AC or 230V AC (depending on model)
	Output :	15V AC, 1A, 15W
Power consumption :	10 Watt max.	
Amplifier and Load Rating :	150 Watt max.	
Instrument Input Impedance :	2,2Mohm	
Instrument Output Impedance :	1kOhm	

Note: device specifications are subject to change without notice.

WARRANTY

All KHE ACS units are covered by a 2-year warranty. KHE Audio Electronics shall not be liable if the damage was caused by inappropriate use or if the units are not connected as described in this user manual. Damage to this device by improperly connected and/or grounded equipment is not covered under warranty. There are no user serviceable parts inside the unit. The detailed terms of the warranty can be downloaded on the KHE website. If you need technical support, please contact your local dealer or email info@khe-audioelectronics.com

DECLARATION OF CONFORMITY

Company : KHE Audio Electronics
Markus Hospenthal
Oberdorfstrasse 2
CH - 6222 Gunzwil
Switzerland

Type of equipment : KHE ACS Series

Trademarks : KHE Audio Electronics / Amplifier-Cabinet-Selector / ACS 4x2 / ACS 8x4

Models : ACS 4x2, ACS 8x4

The products meet the requirements of the following standards:

EMC : EN 55103-2 | EN 55103-1:2009 | EN 55103-2:2009
EN 61000-3-2
EN 61000-4-2 | EN 61000-4-3 | EN 61000-4-4 | EN 61000-4-5 |
EN 61000-4-3 | EN 61000-4-11

Safety : IEC 60065:2001 | EN 60065:2002 / A1:2006 / Cor.:2007 / A11:2008

Year : 2018

Nottwil, May 2018 Markus Hospenthal, CEO

Class B Statement:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Disposal of Old Devices
The KHE ACS products are subject to the European guideline 2002/96/EC. All old electric and electronic devices must be disposed separately from the domestic waste, using the collection points provided by the government. The devices must not be disposed with domestic or skip refuse. Information about collecting points or collection dates, can be asked from the local administration or the local waste management company.
Please also carry the packing to an environmentally fair disposal. Cardboard boxes can be transferred with wastepaper collections or to the public collecting stations for recycling. Foils of the shipment are collected by the local waste management company and are forwarded to environmentally fair disposal.