USER MANUAL

KHE AUDIO ELECTRONICS **AMPLIFIER CABINET SELECTOR** ACS – Series



A Switching-System for Guitar Amplifiers, Speaker Cabinets and Load Boxes.

"... focus on your sound and creativity, instead of wasting your time with plugging cables and waiting for amps to heat-up!"

IMPORTANT: READ THIS MANUAL BEFORE USING THE SWITCHER !

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www.KHE-AudioElectronics.com

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 modifyed 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 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, speaker cabinets and load boxes, 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 ACS is a switching and routing system for guitar amplifiers, speaker cabinets and load boxes. Connect them to the ACS, power them up, and you are ready to go : Switch and play between all your amps, speakers and loadboxes by a single push of a button. Use stompboxes like boosts and overdrives with all amplifiers, and share effect pedals like delays or gates in the fx-loops of all amplifiers. No need to interrupt or stop playing - switch all amps and cabs on the fly !

The KHE ACS-Series is the ultimate solution for any situation where more than one amp or cab is available : recording studios, reampers & profilers, gear enthusiasts & collectors, music stores & showrooms, amp manufacturers, repair shops, gear reviews & comparisons and live musicians.

The KHE ACS-Series features an extensive product line-up with a total of 7 different switchers, providing the perfect switching configuration for any kind of setup or application. All switchers can be dasy-chained and linked together to create the most flexible switching system possible. This manual covers all 7 switchers and their use, functions and features.

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 the switcher. 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 questions or feedback, please contact us at <u>info@khe-audioelectronics.com</u>.

RULES OF OPERATION

NEVER change cable wiring while ACS, amps or load boxes are powerd ON.

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

NEVER unplug the amplifier input cable and never plug the guitar cable straight in the amp input.

NEVER exceed the maximum amplifier & load power rating.

NEVER unplug a power attenuator in the power attenuator insert while the ACS is ON.

ALWAYS power-on the ACS before the connected equipment.

BE CAREFUL when using built-in time-based effects in amps like reverb or delay. Always make sure to either

- A) turn the effect pedal off before disableing or changing an amp or
- B) let the effect completely ring out before disabeling / changing the amp.
- \Rightarrow These rules also apply to permanentely connected effect pedals in the fx-loop of a single amplifier.

Ignoring these rules can damage the ACS or the connected equipment.

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CONTROLS & DISPLAY



AMPLIFIER SWITCHES

Switches to enable, disable or change amplifiers. No need to disable an amplifier before activating a different one – the ACS manages the complete switching procedure! Amplifiers can not be enabled if no cabinet is activated. All amplifiers are protected by an internal load resistor. The leds shows the current status:

- RED: Amplifier activated
- OFF: Amplifier deactivated

CABINET SWITCHES

Switches to enable, disable and change cabinets and loads. Up to 2 load devices can be activated in parallel Cabinet jacks are supervised for a speaker cabinet or load box. Unused cabinet jacks are automatically excluded and locked from the switching operation, so amps can never be switched to an unused cabinet jack. In case a cabinet gets deactivated while an amp is still on, the ACS will disable the activated amp automatically before removing the load. The leds shows the current status of the cabinet output:

- RED: Cabinet activated
- DIM: Cabinet deactivated
- OFF: no load connected

FX SWITCH

Switches to bypass or activate connected fx-loops and effect pedals. The state of the fx-loop gets saved and recalled automatically when switching amplifiers. The leds shows the current status of the fx-loop:

- RED: FX-Loop activated
- OFF: FX-Loop deactivated

CTRL SWITCH

Switch to control System Functions & Midi Settings. The leds shows the current status of the ACS:

- RED: Standalone Mode
- GREEN: Link Mode
- OFF: Power Off
- RED / GREEN, blinking: Link Mode Setup Error
- RED, blinking: MIDI PC Preset Changed
- ORANGE, blinking: System Error

POWER SWITCH

Switch to power on the ACS. Amplifiers are always protected by an internal load resistor, even when the power-switch is off.

GUITAR INPUT



The KHE Amp Switchers features two guitar inputs, one on the front panel and one on the rear panel. The front input has higher priority than the rear input.

The KHE ACS guitar input works perfectly with reamping boxes, stomboxes like overdrives, boosts and distortions and effect pedals like delays or reverb.

AMPLIFIER SWITCHING

The KHE Amp Switchers let you switch between mono guitar amplifiers. Instantly, by the single push of a button. No need to stop or interrupt playing. The signal path of the ACS is completely transparent and extremely low-noise. It does not color the sound of your amplifiers in any way.

WIRING

- Connect the guitar inputs of the amplifier to the black **AMP INPUT** jacks. Use high-quality shielded unbalanced instrument cables only.
- Connect the speaker outputs of the amplifier to the blue **AMP OUTPUT** jacks. Use high-quality speaker cable only (we recommend 1,5mm2).



NOTES

- The KHE ACS is compatible with any kind of mono amplifier, up to 150 watts per channel : Tube, solid-state, (bridged) class-d, heads and combos.
- Amplifiers can not be activated if no cabinet ouput is activated.
- All amplifiers are protected by an internal load resistor and the unused amps are muted at their input, so no signals can reach the power amp.
- A special mute circuit removes all switching noise like clicks and pops switching between amps or loads is more silent than most amps channel switching!

CABINET & LOAD SWITCHING

The KHE Amp Switchers let you switch between load devices like speaker cabinets and load boxes. Instantly by the single push of a button. No need to stop or interrupt playing.

WIRING

- Connect the load devices to the red **CABINET** jacks. Use high-quality speaker cable only (we recommend 1,5mm2).
- ⇒ Once a load gets connected, the corresponding LED on the front panel will light up in a dimmed red state. This indicates a load got detected and the output can now be activated.



NOTES

- The KHE ACS is compatible with any kind of load device up to 150 Watts per channel : Speaker Cabinets, reactive and resistive Load Boxes, active Load Boxes and Combo Speakers.
- The **Dual Cab Mode** lets you activate and play two speaker cabinets or load boxes in parallel. Activate the Dual Cab Mode by entering the **SETUP MENU** and push **AMP-SWITCH 2**. See « **SETUP MENU** » for more details.
- The load switching is completly passive with no active components. High-quality relays were used for the switching procedure.

ATTENUATOR INSERT

The Attenuator Insert is an post-amplifier pre-speaker insert loop. It lets you use an power attenuator across all amps and attenuate the volume of all amps simuntaneously, and switch the attenuated output signal to all connected cabinets or loads. **The Attenuator Insert feautre is disabled by default** (both S-LINE send and S-LINE jacks are wired in parallel). By activating the Attenuator Insert Loop, the parallel connection of these jacks will be removed so they can be used as a serial insert loop.

WIRING & SETUP

To activate the Attenuator Insert, follow this setup procedure:

- 1) Turn off the ACS and all amps and attenuators.
- 2) Connect the Input of the Attenuator to the white **S-LINE SEND** jack of the ACS. This connection sends the speaker-signal from the amplifier to the input of the power attenuator device.
- 3) Connect the Output of the Attenuator to the white **S-LINE RETURN** jack of the ACS. This connection sends the attenuated speaker signal back to the ACS to be switched to a speaker cabinet.
- 4) Power on the ACS and activate the Attenuator Insert function by entering the SETUP MENU and push AMP-SWITCH 4. In case no attenuator is connected, the insert loop won't be activated (AMP-LED 4 will blink four times). See « SETUP MENU » for more details. Don't miss this step!

WARNING

- ➡ Connecting an attenuator without having the Attenuator Insert activated may damage your amps and attenuators!
- ⇒ Never change the wiring of the S-Line Jacks while the ACS, the attenuator and the amps are powerd on! Removing the connected attenuator while the ACS is on can lead to no-load scenarios !
- ⇒ When using active attenuators, such as Boss Waza TAE, make sure to power-on the ACS before the attenuator or turn the ouput volume down while the ACS is powerd off. Otherwhise oscillations may happen on the attenuator.



NOTES

• The KHE ACS is compatible with all type of attenuators : Boss Waza Tube Expander, UA OX Top Box, Palmer Power Pad, SPL Reducer, Harley Benton PA-100, Bugera PS1, TAD Silencer, Jet City Attenuator, Weber Attenuators, Koch Attenuators, THD Hotplate, Rivera Attenuators and many more.

- Like the cabinet jacks, the Attenuator Insert gets supervised for a proper load. If no attenuator is connected, it wont get activated (error shown by 5x blinking the Amp4-Led).
- The state of the attenuator insert function gets saved and recalled when powering up the ACS.
- When linking multiple ACS together, the Attenuator Insert feature will be limited, as the S-LINE jacks will used for the linking of the speaker lines. If you want to use the Attenuator Insert in Link Mode, shoot us a message to discuss setup possibilities.

FX-LOOP SWITCHING

The FX-LOOP SWITCHING is an optional feature for the KHE ACS:

Route your pedal board and all the amplifiers fx-loops thru the ACS and share effect pedals like delays, gates, reverb, chorus, eq and multi-fx pedals with all amps. You can even hook up a dedicated pedal-switching system and create the most flexible setup possible.

CONTROL

The FX-Loops can be true-bypassed on the ACS: Push the **FX** button on the frontpanel short to toggle the FX state. The ON/OFF state gets saved and automatically recalled when switching amps. All fx-switching functions can be controlled via MIDI.

WIRING: FX-Loop

- Connect the fx-send jack of the amplifiers to the black **FX-LOOP SEND** jacks of the ACS.
- Connect the fx-return jack of the amplifiers to the black FX-LOOP RETURN jacks of the ACS

WIRING: Effect Pedals

- Connect the input jack of the effect pedals to the black **FX-INPUT** jack of the ACS.
- Connect the output jack of the effects pedals to the black **FX-OUTPUT** jack of the ACS.



NOTES

• Proper gain-staging of the amps is very important when using delay pedals: make sure all the amps send a similar signal level out of the fx-loop send. Otherwise, there is a change of nasty sounds while switching amps, because of the different signal levels saved in the delay. This is highly dependent on

the construction of the amp (channel-volume, master volume, fx-level) and probably needs some trial and error.

- Clean power sources & wiring is needed to make the fx-loop switching work without noise, hum, or clicking.
- Gates in the fx-loops can be side-chained from the tuner output of the ACS. Make sure to use a isolated power-source with only the gate powerd by this power output. Depending on the gate circuit, this may can cause a slight hum (ground-loop). If this is the case, it's best to use an isolation transformer at the key-input to remove any ground-loops.
- When setting everything up, start small with only 1 pedal, test, add another pedal, test, and so on. This way it's easy to identify problems with wiring / pedals / power sources.
- The switching path is completly passive with no active components in the signal path. High-quality relays were used for the switching procedure.
- The FX-Loop switching feature does not add fx-loops to amplifiers without one!

TUNER OUTPUT

The **TUNER OUTPUT** lets you feed a guitar tuner in parallel to the input signal. The buffered input signal is always present at the tuner output jack.

The tuner output can also be used to record a clean di-track of your guitar, simultaneously to the amplified track. The tuner output can also be used to side-chain a key input of a gate pedal in the fx-loops of the amplifiers.

RE-AMPING

The KHE ACS plays very nicely along with re-amping setups. Connect the DI output signal from your DAW to the **GUITAR INPUT** on the rear of the ACS by a reamping box to feed your entire amp collection. You can override and disable the rear input signal by plugging in the guitar directly into the front guitar input of the ACS.

GROUND LIFT

The **GROUND LIFT** helps to eliminate hum and buzz from sub-optimal grounding schemes. Activate the GROUND LIFT by entering the **SETUP MENU** and push **AMP-SWITCH 3**. See « **SETUP MENU** » for more details.

In case ground loops occur, NEVER defeat or remove or an amplifiers safety ground, PROTECTIVE EARTH, 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.

RECALL MODE

The **RECALL MODE** automatically loads the last activated configuration on start-up of the ACS.

- Activate the RECALL MODE by entering the SETUP MENU and push AMP-SWITCH 1. See « SETUP MENU » for more details.
- ⇒ In case a configuration cannot be loaded (due missing or removed cabinet), the amplifier won't be enabled. The Recall Mode gets deactivead automatically once the LINK MODE gets activated.

SETUP PROCEDURE

For an easy and quick setup of the ACS systems, follow a simple setup procedure:

- ⇒ Study this manual in detail before using the ACS, making sure you understand functions, features and wiring correctly and as intended.
- ⇒ Start with the most simple and basic setup. Hook up one amp and one cab, and verify all functions.
- ⇒ Add more amps and cabs step by step, always testing and verifying.
- Add more complex elemens such as Load Boxes, Attenuators, Reamping Boxes and Effect Pedals last, after verifying the basic operation of the system. Add them step by step, and always making sure the wiring is correct and the system operates correctly.

INITIAL SETUP PROCEDURE

- 1) Make sure all amplifiers and the ACS are powered OFF and the volume turned down.
- 2) Power on the ACS.
- 3) Connect all load devices to the ACS.
- 4) Connect the amplifiers inputs and outputs one by one to the ACS :
- 5) Verify the cabeling once again, make 100% sure there is no misrouting or cable mixup. Misrouting can damage the amplifiers and the ACS!
- 6) Activate one cabinet output by pressing the switch on the frontpanel
- 7) Power-on the first amplifier and activate the amp by pressing the switch on the panel.
- 8) Slowly 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!

NORMAL START-UP SEQUENCE

- 1) Power-ON the ACS
- 2) Turn on the amplifiers, standby mode.
- 3) Let the amplifiers heat up.
- 4) Disable the standby mode of the amplifiers.
- 5) Enjoy!

RULES OF OPERATION

NEVER change cable wiring while ACS, amps or load boxes are powerd ON.

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

NEVER unplug the amplifier input cable and never plug the guitar cable straight in the amp input.

NEVER exceed the maximum amplifier & load power rating.

NEVER unplug a power attenuator in the power attenuator insert while the ACS is ON.

ALWAYS power-on the ACS before the connected equipment.

BE CAREFUL when using built-in time-based effects in amps like reverb or delay. Always make sure to either

- C) turn the effect pedal off before disableing or changing an amp or
- D) let the effect completely ring out before disabeling / changing the amp.
- \Rightarrow These rules also apply to permanentely connected effect pedals in the fx-loop of a single amplifier.

Ignoring these rules can damage the ACS or the connected equipment.

ACS 4x2





The KHE ACS 4x2 is our most basic amp switcher for 4 amplifiers and 2 speaker cabinets or load boxes in compact desk-style format. **Features**: MIDI Control, Dual Cab Mode, Tuner Output

⇒ NOT included features: Attenuator Insert, FX-Loop Switching and Link Mode.

ACS 4x4 & ACS 4x4 FX



The KHE ACS 4x4 is an amp switcher for 4 amplifiers and 4 speaker cabinets or load boxes in compact 19" 1u format. The KHE ACS 4x4 FX has the same switching capabilities and features like the ACS 4x4, but with added fx-loop switching. **Features**: Attenuator Insert, Link Mode, MIDI Control, Dual Cab Mode, Tuner Output



ACS 8x4



The KHE ACS 8x4 is an amp switcher for 8 amplifiers and 4 speaker cabinets or load boxes in compact 19" 1u format. FX-Loop switching functionallity can be added by adding a AFX 8 to the setup. **Features**: Attenuator Insert, Link Mode, MIDI Control, Dual Cab Mode, Tuner Output

ASX 8

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The KHE ASX8 is an amp switcher for 8 amplifiers and a single speaker cabinet or load boxe in compact 19" 1u format. The KHE ASX 8 Amp Switcher can be used in standalone mode with a single cabinet, or in link mode to add 8 additional amp channels to other switching systems. The ASX 8 operates in Standalone Mode as long as no other units are linked. In case no load is connected to the ASX's output, the operation will be blocked and no amps can be activated (all LED's blink red).

CONNECTIONS

Connect the speaker cabinet or load box to the **CABINET OUTPUT** jack. The **THRU** jack is wired parallel to the CABINET OUTPUT jack and is used to link the ASX to other switchers in link mode.



The KHE CSX 8 is a load switcher for 8 speaker cabinets or load boxes and a single amplifier in compact 19" 1u format. The KHE CSX 8 Cab Switcher can either be used in standalone mode with 1 single amplifier, or in link mode to add 8 additional load channels to other switching systems. The CSX 8 operates in Standalone Mode as long as no other units are linked.

CONNECTIONS

- INPUT 1-8: In Standalone Mode, connect your amplifiers speaker output to this jack. In Link Mode, connect the other switchers S-LINE output to this jack to interconnect the load lines with the speaker singal.
 INPUT 5-8: The blue jack INPUT 5 8 is not used at the moment. Do not connect anything to the INPUT
- INPUT 5-8: The blue jack INPUT 5 8 is not used at the moment. Do not connect anything to the INPUT
 5-8 jack. The use of this jack will may be activated and enabled later this year by a firmware update.
- **THRU OUTPUT:** This jack is connected in parallel to the INPUT 1-8 jack and is used to interconnect the load lines in link mode.

CSX STANDALONE MODE

When the CSX 8 is used in Standalone Mode:

- a load MUST always be connected to CABINET 1 output. If no load is connected to the ASX, the operation will be blocked and no output can be activated.
- Make sure to power on the CSX before the connected amplifier.

AFX 8



The KHE AFX 8 FX-Loop Switcher can be used to expand both amp switchers ACS 8x4 and ASX 8 with 8 channel of mono fx-loop switching. See chapter **"FX-LOOP SWITCHING"** for more details on how to use the fx-loop switching feature.

CONTROL

The FX-Loops can be true-bypassed on the ACS: Push the **FX/CTRL** button on the frontpanel short to toggle the FX state. The ON/OFF state gets saved and automatically recalled when switching amps. All FX-Switching functions can be controlled via MIDI.

CONNECTIONS

The two jacks LINK FX INPUT and OUTPUT are connected in parallel to the FX INPUT and OUTPUT jack and are used to interconnect fx-loop switchers in link mode.

SETUP PROCEDURE

The ASX 8 needs a special initial setup procedure to syncronize the ASX to a amp switcher. Before syncing a AFX to a amp switcher, make sure to connect and activate the Link Mode. See « **LINK MODE** » for more details.

- 1) Activate an amplifier on the amp switcher which you want snyc to the AFX.
- 2) Push and hold the FX/CTRL button on the AFX for more than 3 seconds to enter the setup menu.
- 3) Release the FX/CTRL button.
- 4) Push and hold the FX/CTRL button on the AFX for more than 3 seconds to exit the setup menu.
 - A Now the AFX is syncronized to it's amp switcher. After the first syncronization, the configuration will be recalled automatically.

	ACS 4x2	ACS 4x4	ACS 4x4 FX	ACS 8x4	ASX 8	CSX 8	AFX 8
Amplifier Switching	4	4	4	8	8	1	0
Cabinet Switching	2	4	4	4	1	8	0
FX-Loop Switching	0	0	4	(8)	<mark>(</mark> 8)	0	8
Attenuator Insert	no	yes	yes	yes	(yes)	(yes)	no
MIDI Control	yes	yes	yes	yes	yes	yes	yes
Link Mode	no	yes	yes	yes	yes	yes	yes
Ground Lift	yes	yes	yes	yes	yes	no	no

FEATURE LIST

MIDI CONTROL

Control the ACS remotely via MIDI controllers such as footswitches, pedalboards or daw. The MIDI setup and operation is very simple and intuitive. Load complete presets with amp and cab combinations, or control the ACS by single commands, similar to the frontpanel switches.

MIDI CHANNEL SETTING

In the SETUP MENU, the MIDI channel of the ACS can be set between 1 - 15. When entering the SETUP MENU – PAGE 2, the first 4 switches and leds from the left represent the MIDI channel of the ACS. See **"SETUP MENU"** for more details.

PRESETS: PROGRAM CHANGE MESSAGES

When sending MIDI PC instructions (0xC0 / 192), you can load presets of combinations of amps, cabs and fxloop states. 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 wanted amp-cab combination. Now the CTRL led starts to blink, which means that the (blank) preset got changed. To save the preset, simply push and release the CTLR switch. Now the CTRL led is continously on and the preset is saved.

SINGLE COMMANDS: CONTROL CHANGE MESSAGES

When sending Midi CC instructions (0xB0 / 176), you can enable / disable all amps and cabs individually, similar to the key operation at the front panel of the ACS. Send the value of 127 / 0xFE to toggle the on/off state of an amp or cab. Midi CC instructions get filterd by the same advanced switching logic as the amp/cab switches.

	Midi CC Command							
dez	hex	ACS 4x4	ACS 4x2	ACS 4x4 FX	ACS 8x4	ASX 8	CSX 8	AFX 8
0	0x00	AMP 1	AMP 1	AMP 1	AMP 1	AMP 1	CAB 1	
1	0x01	AMP 2	AMP 2	AMP 2	AMP 2	AMP 2	CAB 2	
2	0x02	AMP 3	AMP 3	AMP 3	AMP 3	AMP 3	CAB 3	
3	0x03	AMP 4	AMP 4	AMP 4	AMP 4	AMP 4	CAB 4	
4	0x04				AMP 5	AMP 5	CAB 5	
5	0x05				AMP 6	AMP 6	CAB 6	
6	0x06				AMP 7	AMP 7	CAB 7	
7	0x07				AMP 8	AMP 8	CAB 8	
8	0x08	CAB 1	CAB 1	CAB 1	CAB 1			
9	0x09	CAB 2	CAB 2	CAB 2	CAB 2			
10	0x0A	CAB 3		CAB 3	CAB 3			
11	0x0B	CAB 4		CAB 4	CAB 4			
126	0x7E	disable all						
127	0x7F	toggle FX-Loop						

- If LINK MODE is active, address each function by this formula: MidiCommand + (12 * (MIDIchannel-1)). Sounds complicated, but it's not. Example: AMP1 unit2 = CC12, AMP1 unit3 = CC24 and so on.
- You can toggle the FX-Loop state of the currently active amplifier by sending MIDI CC 127 or disable all active devices by sending MIDI CC 126.
- A maximum of 10 switchers can be addressed with MIDI CC commands.

LINK MODE

The Link-Mode lets you to dasy-chain up to 15 switchers together: switch between amps and cabs across multiple switchers, by a single push of a button (or midi-command). No need to disable already activated amps or cabs before switching to a different one - the switchers completly take care of that !

- create massive setups like 12x4, 16x8, 24x12, 24x1 and so on
- add the fx-loop switching to the ACS 8x4 or ASX 8
- use different versions of the ACS-Series linked together, to create your dream switcher setup (eg. ACS 4x4FX + ACS8x4 + AFX8)

All switchers constantly exchange their statuses and commands by a special communication protocol, to ensure only one amp / cab is active at the time and no amps can be activated without a load activated. Lots of safety measures (hardware and software) has been taken to make sure the Link Mode is 100% safe for your amps, with no chance of activating invalid states.

The Link-Mode feature is NOT available for the KHE ACS 4x2 !

EXAMPLE : 3x ACS 8x4 in link-mode 24x12 setup.



CABLES

The Link Mode needs 3 different patch-cables types to link one switcher to another :

- 1x MIDI Patch Cable (for linking Communication Lines)
- 1x Speaker Patch Cable (for linking Speaker Lines)
- 1x Instrument Patch Cable (for linking Guitar Input Signal)

WARNING

Follow the setup procedure precisely, step by step. Double and triple-check the wiring of the speaker lines and instrument lines before using the Link Mode. Mis-wiring can cause serious damage to the amplifiers and the switchers. Be 100% sure you got this wiring right before using the Link Mode. If in doubt, do not hesitate to send us a message and ask for assistance, we are happy to help! info@khe-audioelectronics.com

SETUP PROCEDURE

- 1. Power up units
- 2. Set individual MIDI channels

Each switcher must have a individual MIDI channel. Set MIDI channel for all switchers in increasing order, starting by MIDI channel #1 for device #1. Do not skip a channel, and do not use a channel twice ! See « **MIDI CONTROL** » for more details.

- 3. Power down all units
- 4. Setup communication lines

Link all switchers together by a short 5-Pin MIDI cable. Connect CTRL-OUT from device #1 to CTRL-IN from device #2. Repeat this wiring scheme for any number of switchers. The communication lines are used and needed to let the switchers talk together (exchanging status and commands).

5. Setup speaker and load lines

Link the speaker lines of the switchers together by a short speaker patch cable (1,5mm²): Connect S-LINE SEND from device #1 to S-LINE RETURN from device #2. Repeat this wiring scheme for any number of switchers. Do not use instrument-type patch cables, as this line is carrying high power speaker signals.

6. Setup guitar input lines

Link the guitar inputs lines of the switchers together by a short instrument pactch cable (unbalanced, shielded) : Connect TUNER-OUT from device #1 to GUITAR-INPUT (rear) of device # 2. Repeat this wiring scheme for any number of switchers.

7. Power up all units

8. Check status of the CTRL-LED:

green:	Network setup ok. System ready to use.
red & green:	Network setup failed. Check MIDI channels and communication lines.
red:	Standalone mode. No switchers in network detected.

Notes

- Always plug your guitar into ACS#1.
- MIDI control by CC or PC messages works perfectly in Link Mode. You can save and recall presets across multiple switchers.
- When Link Mode is enabled, the Recall Mode will be disabled.
- Use high-quality 5-pin MIDI cable for connecting the devices together. All 5 pins are needed !
- All linked switchers must be powerd on to activate the switching operation.
- When adding new switchers to your setup, perform a system reset prior setting up the Link Mode (to clear any stored MIDI PC presets, to avoid possible collision of preset configurations.

FAQ Link Mode

- Can i link different versions of the ACS-Series together (eg. ACS 4x4FX + ACS 8x4 + AFX8) ? Yes, you can link any version together, EXCEPT for the ACS 4x2 (unfortunately no more space on the ACS 4x2 for the needed additional jacks and circuitry)
- Can i link multiple fx-loop switchers such as ACS 4x4 FX and ASX ? Yes ! For linking multiple ACS 4x4 FX, use two y-splitter cables to connect the fx-loop lines.
- When using Link Mode, can i still use a MIDI controller to control all the switchers? Yes, you can use a MIDI controller to control any number of switchers. Simply connect your MIDI controller in one of the MIDI inputs. The switcher takes care of exchanging the received Midi commands with all other switchers in the network. Please refere to XXX to learn more on how to

controller in one of the MIDI inputs. The switcher takes care of exchanging the received Midi commands with all other switchers in the network. Please refere to XXX to learn more on how to use and address all MIDI functions in network operation.

• Is MIDI the used communication protocol between the switchers? No. Standard MIDI protocol is uni-directional only. In order to exchange status and commands, the communication needs to be bi-directional, so the switchers can properly talk together (call & response). The ACS uses a robust, industry-standard CAN communication protocoll.

• But why the MIDI connectors?

MIDI connectors are used because they already exist in most studios wall connector boxes. This way, you can easily setup multi-room setups, connecting the switchers by already existing connections between the rooms (for example, ASX in the control room, CSX in the recording room).

- Can i damage something if i accidentally mix-up MIDI connectors and control connectors? No, all jacks are protected for this scenario, nothing bad will happen to the switcher or the MIDI device.
- Can i user the Attenuator Insert in Link Mode? Yes, you can use a global power attenuator with linked switchers. Send us a message and we show you how to connect everything :)

LINK MODE – SETUP EXAMPLES

ACS 8x4 + ASX 8



ASX 8 + CSX 8



ACS 4x4 + ACS 4x4



ACS 8x4 + AFX 8



CABLES

- 1x MIDI Patch Cable (for linking Communication Lines)
 - 1x Speaker Patch Cable (for linking Speaker Lines)
 - 1x Instrument Patch Cable (for linking Guitar Input Signal)

SETUP MENU

In the setup menu, various system configurations can be set, such as: RECALL MODE, DUAL CAB MODE, GROUND LIFT or ATTENUATOR INSERT or setting the MIDI channel of the device. All parameters and settings are saved and get recalled on power up of the unit.

ENTER SETUP MENU

Push and hold the **CTRL SWITCH** more than 2 seconds. When the CTRL LED starts to blink red, release the button.

MENU LAYERS

When the setup menu is activated, various functions are assigned to the first four switches of the ACS (usually Amp 1 -4). These functions are distributed over two layers. The current activated layer is shown by the blink interval of the red CTRL LED. Functions can be set by pushing the amplifier switches.

To flip between the menu layer, push the CTRL SWITCH short and release.

LAYER 1: System Functions (CTRL LED blinks 1x)				
Amp-Switch 1:	activates / deactivates Recall Mode			
Amp-Switch 2:	activates / deactivates Dual Cab Mode			
Amp-Switch 3:	activates / deactivated the Ground Lift			
Amp-Switch 4:	activates / deactivates the Attenuator Insert			

LAYER 2: MIDI Channel (CTRL LED blinks 2x)

On layer 2, switches 1 - 4 represent the MIDI channel of the unit. The MIDI channel of the ACS can be set between 1 - 15. The MIDI channel value is binary coded by the on/off state of the led of the first four switches. Each press of switch A1 increases the MIDI channel by 1.

MIDI	ACS Frontpanel			
CHANNEL	SW 1	SW 2	SW 3	SW 4
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

EXIT SETUP MENU

Push and hold the **CTRL SWITCH** more than 2 seconds. When the CTRL LED is continously on red, release the button.

THINGS TO KNOW

IMPEDANCE

Visit <u>www.KHE-AudioElectronics.com/impedance-guide</u> for all information regarding impedance management.

INPUT BUFFER

After the guitar input jacks, a high-end impedance converter («buffer») is built into the ACS. This buffer converts the high-impedance guitar signal into a low-impedance signal, which makes the signal more stable and less sensitive to noise or other interference. 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.

USING AMPS WITHOUT LOAD

The ACS is not replacement for a load box! Always connect at least one load device, such as a speaker cabinet or load box, to the ACS.

LOAD DETECTION

Each cabinet jack is equipped with a detection circuit which monitors the state of the cabinet jack. If there is no valid speaker cabinet or load connected, it is not possible to enable the cabinet ouput. The detection circuit measures the actual cabinet, not just the switch contact on the jack.

LOAD RESISTORS

Each amplifier has its own internal load resistor to protect the unused amps from damage and failure. Unused amplifiers get muted at their input, so no signals can reach the power amp.

TECHNOLOGY

Inside the ACS, a massive relay matrix switches between amplifiers and load devices up to 150 watts. The switching procedure is precisely timed and supervised by a microcontroller for fast and precise switching, making sure no invalid combinations can happen. Advanced shielding techniques are used inside the ACS to shield the sensitive input lines from the powerful output lines. The KHE ACS is built in Switzerland, using highest quality parts and construction, such as high-quality toggle switches, AMPHENOL jacks, OMRON relays, in a robust 19" 1u steel enclosure.

PEDALS IN FRONT OF THE AMP

Using pedals like boosts, overdrive, distortion, fuzz, eq, gates, filters, reamp boxes etc. work perfectly in front of the ACS. Make sure to use clean power sources and quality cables for your pedals!

AMPS WITH BUILT-IN EFFECTS

It is possible to use amps with build-in effects, or to use effect pedals with single amps in their fx-loops, without having them connected to the ACS. However, in case you use time-based effects such as Delay or Reverb, follow some additional operation rules. Always make sure to either: a) turn the effect pedal off before disableing or changing an amp or b) let the effect completely ring out before disabeling or changing the amp. Ignoring this rule may damage the ACS or the connected amplifiers!

CABLE TYPES

For all BLACK jacks, use high quality shielded unbalanced instrument cables only. For all BLUE, RED and WHITE jacks, use high quality unshielded unbalanced speaker cable only (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 masking tape or such.

STRAIN RELIEF

It's advised to use some kind of strain relief system for the connections and cables on the back of the ACS.

PLACEMENT OF THE ACS

Placing the ACS close to a transformer, such as on top or below of an amplifier, may introduces some additional noise due to the proximity of the large power- and output transformers.

POWER SOURCE

If possible, use the same mains power source (outlet, plug strip) for the ACS and for the connected amplifiers. Otherwise, ground loops may occur.

POWER SUPPLY

The ACS includes an external desktop style power supply with universal input voltage range (100 - 240VAC). Only use the included power supply. Other types of power supplies will not work with the ACS.

PE / EARTH CONNECTION

All amps must have a 3- prong mains power chord, grounded to PE for stability and saftey. Do not use 3-to-2 prong AC ground lift adapters of any of the connected devices. Do not remove any of the PE / EARTH 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.

KEEP THE BOX

Make sure to keep and store the original packaging box. Warranty claims and returned units will be rejected or charged with additional charges if not returned in the original box with the foam inlet.

ACS 2019-VERSION

Units from the first ACS batch in 2019 can not be upgraded with the new functions of the 2020 version.

MULTI ROOM SETUPS

The KHE ACS System let's you build complex multiroom setups. For example, use an ASX 8 Amp Switcher in the control room of your studio, while having a CSX 8 Cab Switcher in the recording room. Both switchers could be interconnected by a speaker line and MIDI line in the stage- or wall box (5-pin MIDI wiring required, all pins!)

MIXING HEADS & COMBOS

It's possible run both heads and combo amplifiers with the KHE ACS. However, take care when using the speakers of small combo amps with powerful tube heads, as their output power may damage the lower wattage speakers.

Got more questions? Something missing in this manual?

Shoot us a message at info@khe-audioelectronics.com

TECHNICAL SPECIFICATIONS

	RACK SPACE	DIMENSIONS	WEIGHT
ACS 4x2:	1 U 1/2 19"	170mm x 180mm x 44mm	1.5kg
ACS 4x4:	1U 19"	483mm x 200mm x 44mm	3.0kg
ACS 4x4 FX:	1U 19"	483mm x 200mm x 44mm	3.2kg
ACS 8x4:	1U 19"	483mm x 200mm x 44mm	3.5kg
ASX 8:	1U 19"	483mm x 200mm x 44mm	3.4kg
CSX 8:	1U 19"	483mm x 200mm x 44mm	2.8kg
AFX 8:	1U 19"	483mm x 200mm x 44mm	2.9kg

Power Supply:	external, desktop style, included
Input Voltage:	100 – 240V AC, 50 – 60 Hz, 0.6A, SK1
OutputVoltage:	15V DC, 1.2A, 18W
Connector PSU:	USA, EU, UK, AU, CH, 3-pin

Power Consumption:	10 Watt max.
Amplifier and Load Rating:	150 Watt max pass thru
Instrument Input Impedance:	2,2MOhm
Instrument Output Impedance:	< 1kOhm
FX-Loop Impecances:	1 Mohm
Switching Time:	3 – 15ms per operation
Crosstalk Level:	< 100dBu
Max. Guitar Input Level:	+15Vpp / +18dBu
Frequency Range:	10-100kHz, +/-0.2dB
Noise Floor:	< 100dBu

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 <u>info@khe-audioelectronics.com</u>.

Warranty claims and returned units will be rejected or charged with additional charges if not returned in the original box with the foam inlet.

DECLARATION OF CONFORMITY

Company :	KHE Audio Electronics Markus Hospenthal Oberdorfstrasse 2 CH - 6222 Gunzwil Switzerland			
Type of Equipment :	KHE ACS Series			
Models :	ACS 4x2, ACS 4x4, ACS 4x4 FX, ACS 8x4, ASX 8, CSX 8, AFX 8			
The products meet the requireme	nts 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 :	2020			
Gunzwil, 07.05.2020	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.