CUSTOM AUDIO ELECTRONICS INC.

2x4

AUDIO CONTROLLER

OPERATING GUIDE

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Introduction

The 2x4 Audio Controller is a compact (1 rack space), comprehensive audio switching and control system designed to interface a wide variety of effects and amplifiers. Easily configured for use with any type of system, the 2x4 can be the heart of a simple pedal-based system, to a more elaborate line level “rack effects” rig, or any combination in between. The 2x4 consists of 8 series audio routing loops and 4 “footswitch type” Control Functions, 2 of which can be used as switchable audio outputs (mutes). These 12 functions are MIDI controlled via control change numbers, and can be interfaced with a number of different control devices. Of course, the 2x4 is best suited for use with the CAE RS-10 MIDI Foot Controllers. The RS-10MKII is a perfect companion for the 2x4 and is fitted with a rugged XLR connector, as is the 2x4, for reliable, easy interfacing. The 2x4 Audio Controller utilizes passive relay based switching in it’s signal path for the upmost sonic transparency. In addition, unlike other relay based switchers, the 2x4 uses 2 separate relays for each loop; 1 for the send, and 1 for the return. This eliminates any high gain crosstalk and/or oscillations when using preamps or fuzz pedals in the loops, resulting in quieter, more predictable operation. Switching noise is also kept to a minimum. The 2x4 consists of 2 series chains (A&B) of 4 loops each. The inputs and outputs of both chains are accessible on both the front and rear panels of the 2x4, the front panel inputs having priority over the rear. The input of each chain contains a low noise signal buffer to eliminate signal loss when feeding the chains with high impedance signal sources such as passive guitars. Both buffers can be hard-wire bypassed on the front panel for a completely passive signal path. The loop sends and returns are located on the rear panel of the unit as is the MIDI In, Out/Thru and 9vac power input. The front panel also contains the Control Function jacks as well as the switchable audio outputs. In addition, there are LED’s to indicate Loop/Control Function status and power. As mentioned before, the front panel also utilizes an XLR connector for interfacing CAE RS-10 MIDI Foot Controllers.

Connecting the 2x4

Typical effects devices, either of the pedal type or “rack mount”, connect to the rear panel send/return jacks. Effect inputs to the loop sends, effect outputs to the returns. An exception is when using a Chain (or part of a Chain) as a switchable splitter. In this case, effects and/or amp inputs connect to the sends, and no connection is made to the returns. See example diagrams for details. Amps and preamps, as well as any device using the Control Functions connect to the front panel. However, since there is access to both Chain A&B inputs and outputs on the rear panel as well as the front, connections between the loops can take place in front or on the rear of the unit. Connect MIDI controllers to the rear panel MIDI In or if you are using a CAE RS-10, to the front panel XLR. The 2x4 will provide phantom power to the RS-10 Foot Controller when using the front panel XLR or the rear panel DIN connector. See connection diagrams and front/rear panel descriptions for more details.

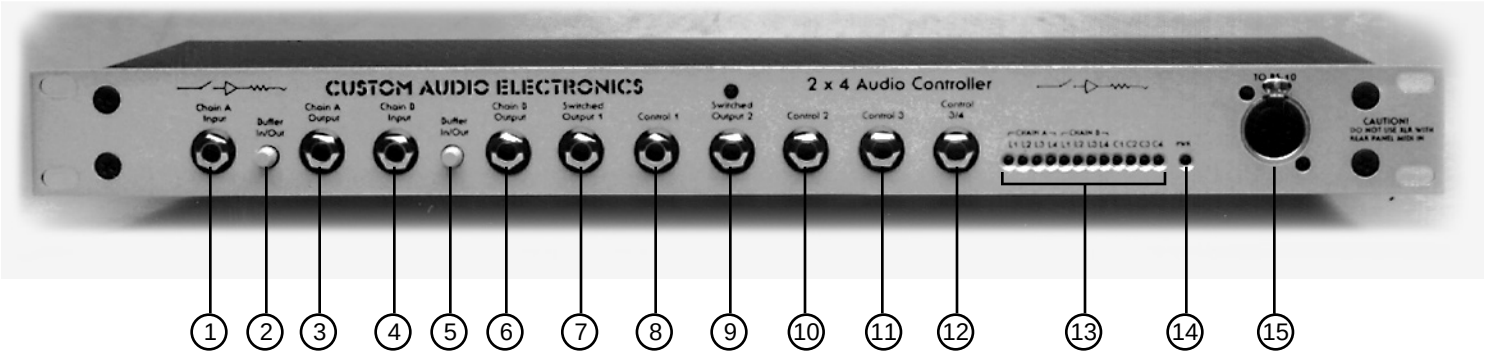
MIDI Control of the 2x4

The 2x4 Audio Controller responds to MIDI control change data in Omni mode (all channels). Each loop and Control Function is assigned a separate MIDI control number. These numbers are fixed at the factory and cannot be changed except by software revision. Care must be taken when using multiple 2x4’s in a system so that 2 or more units do not respond to the same MIDI control numbers. Therefore, each 2x4 is capable of responding to 2 different sets of control numbers depending on the addition (or deletion) of circuit board jumper J2. In most cases, this procedure will not be needed. Please consult the factory if the alternate set of control numbers are necessary. The 2x4 responds to MIDI control data as follows:
MIDI control value 000 = Loop “Out”; Control Function = Open; LED indicator “off”.
MIDI control value 127 = Loop “In”; Control Function = Closed; LED indicator “on”.

The 2x4 Loops/Control Functions and their respective MIDI control numbers are as follows:

Normal Control Numbers	**Alternate Control Numbers**
Chain A Loop 1 = Control #1	Chain A Loop 1 = Control #101
Chain A Loop 2 = Control #2	Chain A Loop 2 = Control #102
Chain A Loop 3 = Control #3	Chain A Loop 3 = Control #103
Chain A Loop 4 = Control #4	Chain A Loop 4 = Control #104
Chain B Loop 1 = Control #5	Chain B Loop 1 = Control #105
Chain B Loop 2 = Control #6	Chain B Loop 2 = Control #106
Chain B Loop 3 = Control #7	Chain B Loop 3 = Control #107
Chain B Loop 4 = Control #8	Chain B Loop 4 = Control #108
Ctrl. Function 1/Out 1 = Control #9	Ctrl. Function 1/Out 1 = Control #109
Ctrl. Function 2/Out 2 = Control #10	Ctrl. Function 2/Out 2 = Control #110
Ctrl. Function 3 = Control #11	Ctrl. Function 3 = Control #111
Ctrl. Function 4 = Control #12	Ctrl. Function 4 = Control #112

Front Panel Description



1. Chain A Input (This jack has priority over the rear panel Chain A Input).

2. Chain A Input buffer select switch. Push in to engage Chain A Input buffer. Gain is factory set at +1db. Switch out hard-wire bypasses the buffer circuit. Buffer input impedance is 500k Ohms.

3. Chain A Output. This jack is in parallel with the rear panel Chain A Output jack and is “normalled” to the Chain B Input jack.

4. Chain B Input (This jack has priority over the rear panel).

5. Chain B Input buffer select switch. This switch functions the same as the Chain A switch, but for Chain B.

6. Chain B Output. This jack is in parallel with the rear panel Chain B Output jack. In addition, signal appearing at this jack feeds both Switchable Output circuits 1 and 2.

7. Switchable Output 1. This is a buffered low impedance audio output when engaged via MIDI. Signal appearing at this jack (when active) is the same as that appearing at the Chain B output jack. As an option, this output can be transformer isolated to eliminate ground loop hum when connected to an amplifier input. When not engaged, no signal appears at this output. NOTE: THIS OUTPUT JACK HAS PRIORITY OVER THE CONTROL 1 JACK. That is, both jacks may NOT be used at the same time! You must choose which type of function you want to use; a switchable audio out, or a “footswitch-type” control function.

8. Control 1. This is an isolated “normally open”, latching “switch-to-ground” control function. When activated via MIDI (LED “on”), a relay shorts the jack tip to sleeve. NOTE: This function is not available if you are using the Switched Output jack. See above.

9. Switched Output 2. Same as Switched Output 1. See #7.

10. Control 2. Same as Control 1. See #8. NOTE: This function not available if using the Switched Output 2 jack. See #7.

11. Control 3. Same as Controls 1 and 2. See #8. This jack has priority over the “Control #3 function” of the Control 3/4 jack, when used. See #12.

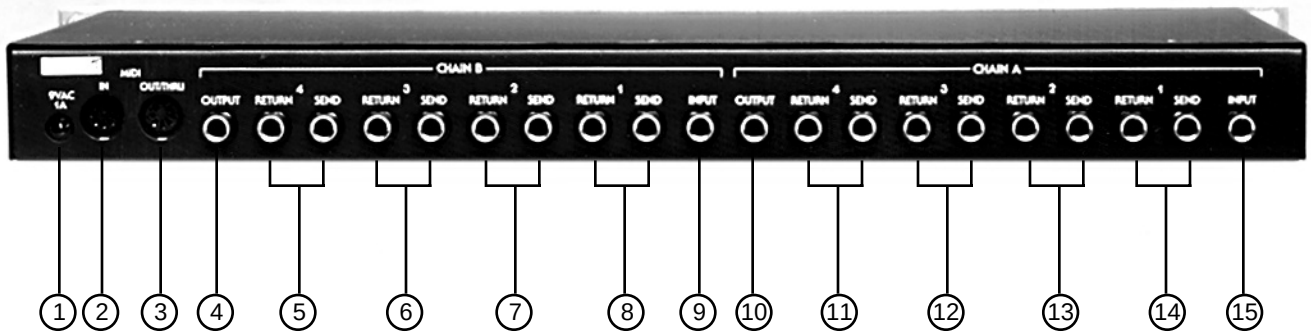
12. Control 3/4. This stereo (TRS) jack has 2 “normally open” control functions similar to Controls 1, 2 and 3. Control 3, when activated via MIDI, shorts ring to sleeve. Control 4, when activated via MIDI, shorts tip to sleeve. NOTE: All 4 control functions are ground isolated to prevent ground loop hum.

13. Loop/Control Function LED status indicators. LED “on” indicates loop is active, LED “off”, loop is bypassed. The same is true with Control Functions: LED “on”, tip is shorted to sleeve; LED “off”, tip/sleeve is open. With Switchable Outputs; LED “on” indicates audio at the Switched Output jack. LED “off”, audio is muted.

14. Power indicator LED. When “on”, 9VAC power is applied to the unit.

15. “To RS-10” XLR connector. Used to connect CAE RS-10 MIDI Foot Controllers. Supplies 9VAC phantom power to the RS-10 on pins 1 and 2, and provides MIDI in to the 2x4 on pins 3 and 4. CAUTION: DO NOT USE BOTH THE FRONT PANEL XLR AND THE REAR PANEL MIDI IN AT THE SAME TIME OR DAMAGE TO THE UNIT MAY RESULT.

Rear Panel Description



1. Power input jack. 2.5mm center pin. Connect to a source of 9 to 12 VAC at 1amp.

2. MIDI In jack. 7 pin DIN. Connect to the output of a MIDI controller to control Loop/Control Function status. This jack also supplies 9/12 VAC phantom power on pins 6 & 7. WARNING: This jack is wired in parallel with the front panel 4pin XLR connector. Do not use this jack at the same time you are using the front panel XLR.

3. MIDI Out/Thru jack. 7 pin DIN. Connect to the MIDI In of the same device in the MIDI chain. Signal appearing here is the same as that at the MIDI In jack.

4. Chain B Output. This jack is the output of series Chain B and is in parallel with the front panel Chain B Output jack. In addition, signal appearing at this jack feeds both Switchable Output circuits 1 and 2. Both front and rear panel jacks are active and can be used at the same time.

5. Chain B loop 4 Send/Return jacks. Connect Send to effect input, Return to effect output when using as a series in-line bypass loop. If you are using all or part of this chain as a switchable signal splitter, connect send to effect input and leave return unconnected. See Block Diagram for signal path configuration.

6. Chain B Series Loop 3 Send/Return jacks. See #5 and Block Diagram for details.

7. Chain B Series Loop 2 Send/Return jacks. See #5 and Block Diagram for details.

8. Chain B Series Loop 1 Send/Return jacks. See #5 and Block Diagram for details.

9. Chain B Input. This jack is the input to the 4 Chain B Series loops. This jack is “normalled” to the Chain A output jacks (front and rear). Inserting a mono 1/4” plug “breaks” the “normalled” connection between Chain A and Chain B. NOTE: The front panel Chain B Input jack has priority over this jack when used. See Block Diagram for details. This input can be buffered to prevent signal loss depending on the setting of the front panel Chain B buffer switch.

10. Chain A Output. This jack is the output of series Chain A and is in parallel with the front panel Chain A Output jack. This jack is also “normalled” to the Chain B Input jack. Both front and rear panel jacks are active and both can be used at the same time. NOTE: This jack is perfect for connecting to a tuner input.

11. Chain A Series Loop 4 Send/Return jacks. See #5 and Block Diagram for details.

12. Chain A Series Loop 3 Send/Return jacks. See #5 and Block Diagram for details.

13. Chain A Series Loop 2 Send/Return jacks. See #5 and Block Diagram for details.

14. Chain A Series Loop 1 Send/Return jacks. See #5 and Block Diagram for details.

15. Chain A Input. This jack is the input to the 4 Chain A series loops. NOTE: The front panel Chain A Input jack has priority over this jack when used. See Block Diagram for details. This input can be buffered to prevent signal loss depending on the setting of the front panel Chain A buffer switch.

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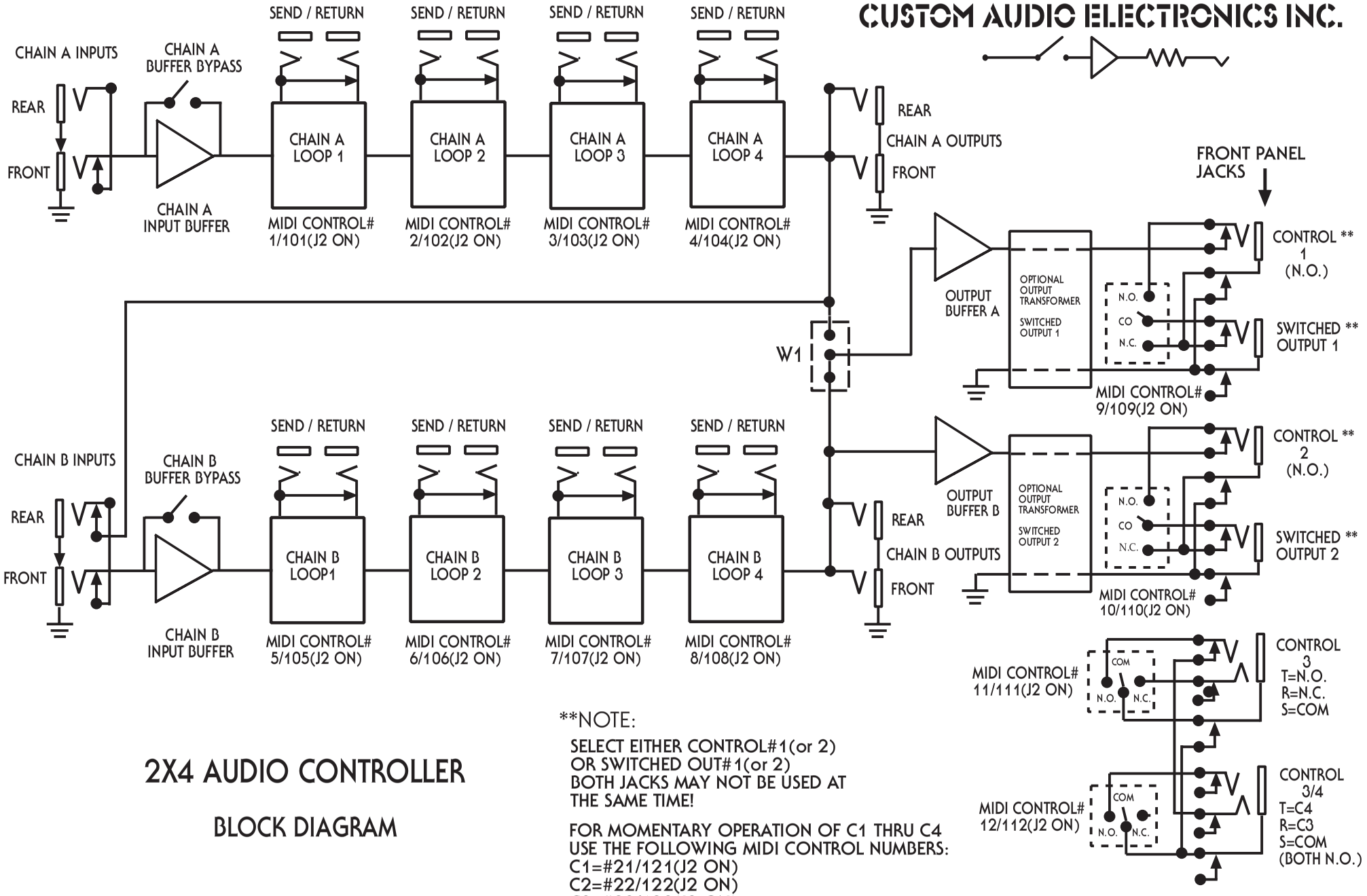

2X4 AUDIO CONTROLLER

BLOCK DIAGRAM

**NOTE:

SELECT EITHER CONTROL#1(or 2)
OR SWITCHED OUT#1(or 2)
BOTH JACKS MAY NOT BE USED AT
THE SAME TIME!

FOR MOMENTARY OPERATION OF C1 THRU C4
USE THE FOLLOWING MIDI CONTROL NUMBERS:
C1=#21/121(J2 ON)
C2=#22/122(J2 ON)
C3=#23/123(J2 ON)
C4=#24/124(J2 ON)