Academy Audio Inc.

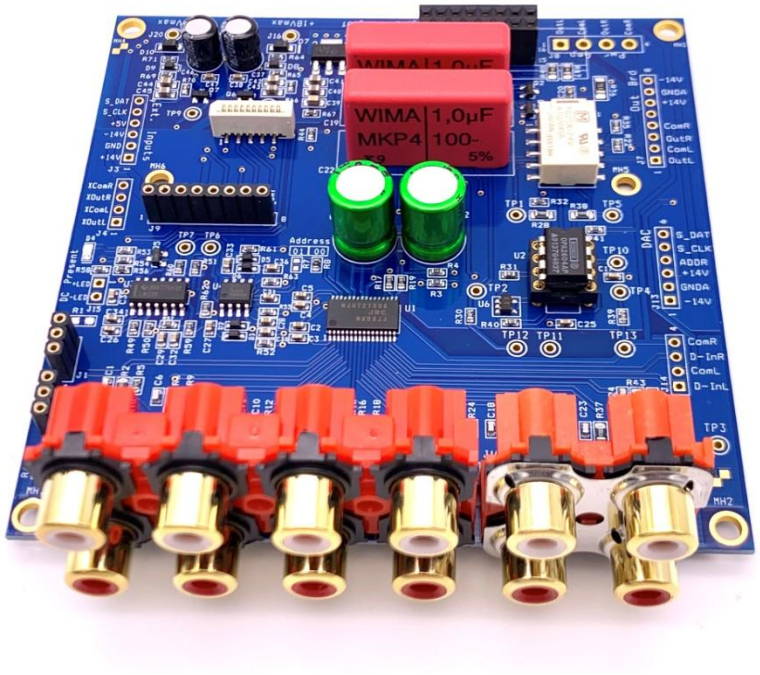
discovering the soul of music®

ISS Hi-End MUSES®
Electronic Input Selector

Ver. 01

User Manual

Rev. 01



1. Introduction

Thank you for purchasing the ISS Hi-End MUSES® Electronic Input Selector board from Academy Audio Inc.

This six input electronic stereo RCA selector board is designed and built in the US, using the best quality parts, and is aimed to satisfy the highest audiophile quest for purity of sound reproduction.

The unit is built using a high quality relay for muting and a unique multichannel electronic analog switch chip designed to pair with the NJR MUSES®72320 volume control chip. This chip does not include any active circuitry, and therefore provides vanishingly low level of noise and distortions. It also features lower capacitance compared to signal relays.

When used with the MCL Control board, the VCM module and a power supply, the ISS board makes a complete Hi End preamp that rivals most of the best commercially available preamplifiers.

A high quality output opamp is installed in a socket, and may be replaced by any dual JFET opamp with the standard pinout. The board can be used with an outboard amplifier/buffer section or without any active amplifier/buffer.

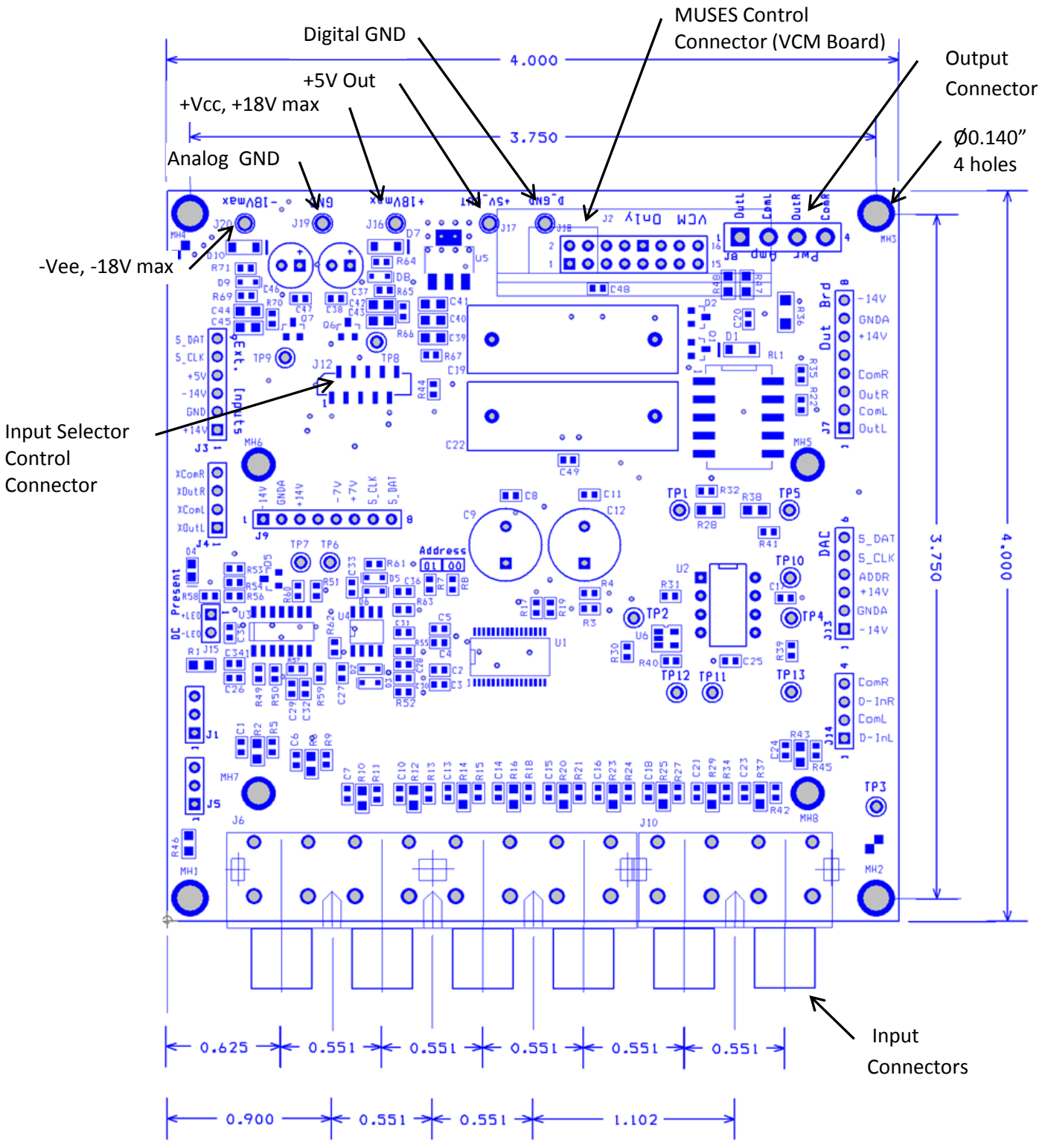
A high quality MUTE relay is provided to eliminate any unwanted noises from power-up/power-down processes.

2. Specifications

Dimensions:	4.00"L x 4.00"W x 1.85"H
Power requirements:	+10V ...+17V, 50mA; -10V ...-17V, 30mA
	(including VCM and MCL boards)
Max. Input Voltage:	5Vrms
Volume Control Range:	0dB to -111.5dB (0.5dB step), MUTE (-120dB)
Total Output Noise:	-108dBV (with VCM and OPA2604)
Total THD+N @1kHz:	-102dBV (with VCM and OPA2604)

3. Mechanical Installation

Refer to Figure 1 for mechanical dimensions and mounting holes location. Provide at least 0.150” between the board and the installation surface.



All dimensions in 0.001". Total assembly height is 1.10" (1.860" with VCM).

Figure 1 ISS Board Installation.

4. Power Connection

The ISS board requires a clean bi-polar power source of Vcc=+10Vdc to +17Vdc and Vee=-10Vdc to -17Vdc. Connect the power source as follows:

J16	Vcc=+10Vdc to +17Vdc, 50mA (no +5Vdc load)
J19	Analog Ground
J20	Vee=-10Vdc to -17Vdc, 30mA

Digital power of +5Vdc required for operation of the MCL (LCD) controller is generated by the ISS board. It is supplied to the MCL (LCD) controller board through the flat cable connector J12.

The ISS board may also supply up to 50mA of +5Vdc to an external load. Use J17 and J18 for that connection.

J17	**Output** Vdd=+5Vdc +/-2% , 50mA
J18	Digital Ground

Please note that the left bottom mounting hole MH1 of the board is connected to the analog GND. If this connection is undesirable, remove the resistor R46.

5. Complete System Use

The ISS board is designed to be used as a part of the system with VCM and MCL modules from Academy Audio.

To use the VCC board in the system:

5.1. Plug the VCM module into the J2 16-pin dual row connector as shown on the Figure 5.1. Make sure all 16 pins are fully engaged.

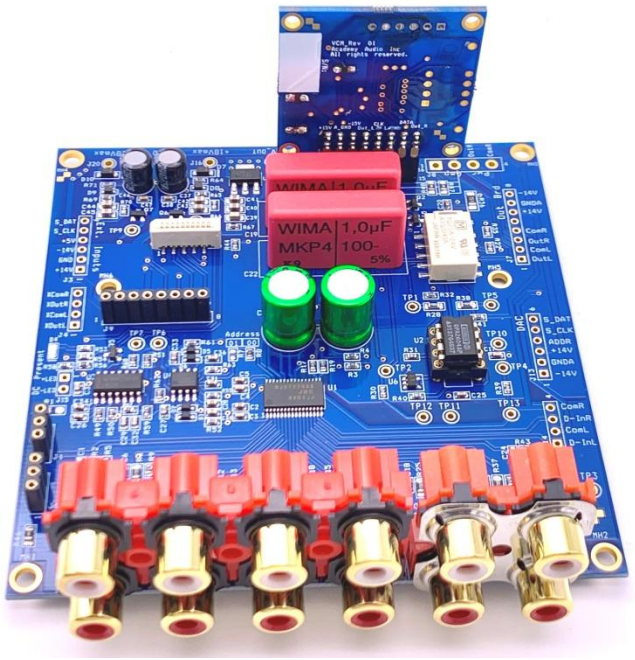


Figure 5.1. ISS board with VCM board installed.

5.2. Connect the power supply as described at Section 4.

5.3. Connect the output RCA connectors or the power amp input connectors to the connector J8.

J8	Description
Pin 1	OutL – Left Channel Audio Output
Pin 2	ComL – Left Channel Audio GND*
Pin 3	OutR – Right Channel Audio Output
Pin 4	ComR – Right Channel Audio GND*

* To avoid ground loops do not connect the Audio grounds to the chassis.

5.4. Connect flat cables supplied with the MCL board to the ISS/VCM combination. Connect the narrow 6-conductor cable to the VCM MUSES control connector J2 (VCM). Connect the wider 10-conductor cable to the channel control connector J12 (ISS) as shown on the Figure 5.2. Make sure the contact area of each cable faces the corresponding connector contacts, and the cables are fully inserted.

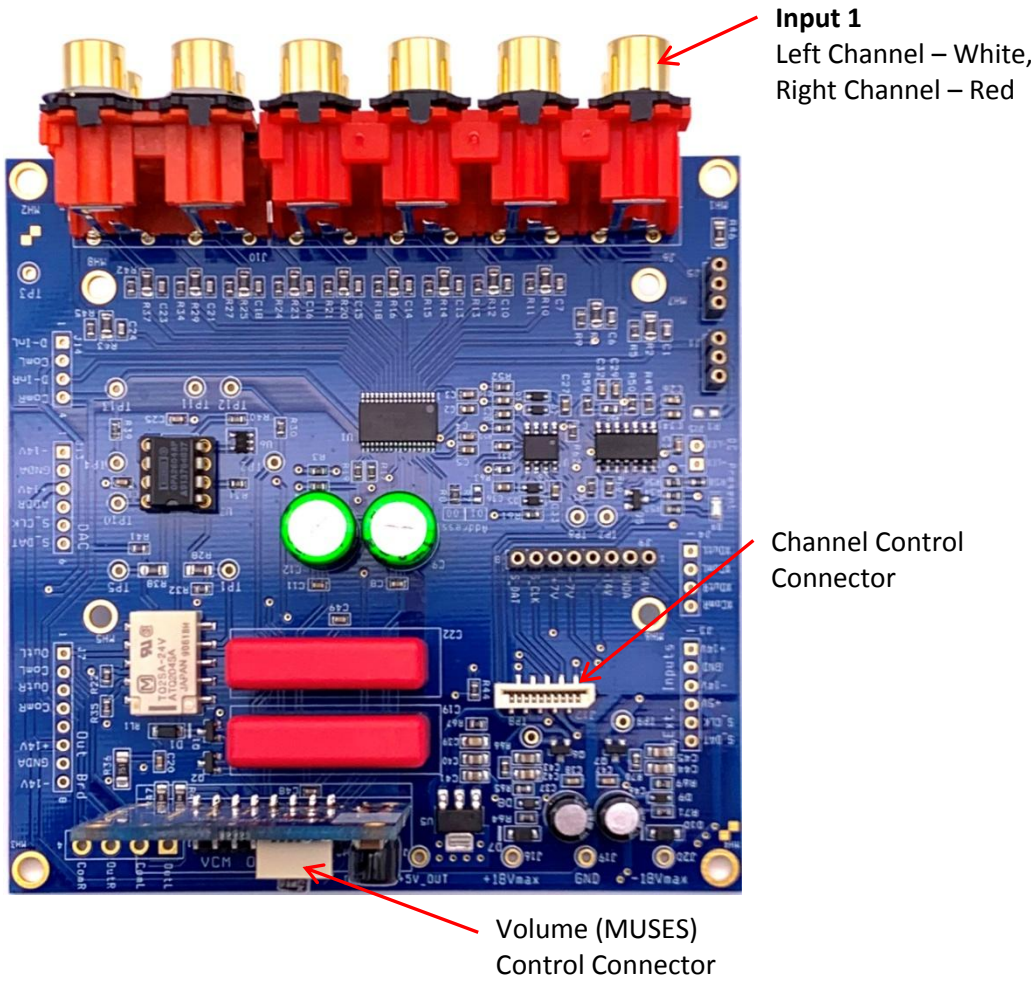


Figure 5.2. ISS board /VCM board control connectors.

5.5. Connect at least one audio source to one of the RCA inputs.

5.6. Apply the power and enjoy the great sound of MUSES!

6. Stand Alone Use

The ISS board can be used as a generic 6-input stereo channel selector unit with any MCU that can provide appropriate control signals not exceeding +5V.

If no +5Vdc load is connected, the power supply requirements in this configuration are being reduced to about 8mA for both Vcc and Vee.

To use the ISS boards as an input selector:

6.1. Connect the power supply as described at Section 4.

6.2. Connect the volume control circuitry inputs to the connector J4.

J4	Description
Pin 1	XOutL – Left Channel Audio Output
Pin 2	XComL – Left Channel Audio GND*
Pin 3	XOutR – Right Channel Audio Output
Pin 4	XComR – Right Channel Audio GND*

* To avoid ground loops do not connect the Audio grounds to the chassis.

6.3. Connect the MCU control signals to the connector J3.

J3	Description
Pin 2	GND
Pin 5	S_CLK, Serial Clock Input
Pin 6	S_DAT, Serial Data Input

The ISS board uses a high quality dual channel 7x3 matrix analog switch NJU72750A form NJR Corporation. The switch is controlled through the two wire serial interface. Refer to the switch datasheet for detailed description of the control signals.

The ISS board makes use of the two pairs of outputs of the switch for either a direct connection, or a connection through 47uF DC blocking capacitors, if there is DC voltage present on the RCA inputs.

By default, the board is configured for the Chip Address of 00. The address may be changed to 01 by moving a jumper resistor from R8 to R7 position.

Table 6.1 summarizes the control commands needed to enable any input configuration.

Table 6.1. Input Switch Control Commands (Chip Address: 00)

Channel	Switch Code	Chp Addr HEX	Select Addr HEX	SW Data HEX
Ch1L	A11	98h	00h	02h
Ch1R	B11	98h	01h	02h
Ch1L AC*	A12	98h	02h	02h
Ch1R AC	B12	98h	03h	02h
Ch2L	A21	98h	00h	04h
Ch2R	B21	98h	01h	04h
Ch2L AC	A22	98h	02h	04h
Ch2R AC	B22	98h	03h	04h
Ch3L	A31	98h	00h	08h
Ch3R	B31	98h	01h	08h
Ch3L AC	A32	98h	02h	08h
Ch3R AC	B32	98h	03h	08h
Ch4L	A41	98h	00h	10h
Ch4R	B41	98h	01h	10h
Ch4L AC	A42	98h	02h	10h
Ch4R AC	B42	98h	03h	10h
Ch5L	A51	98h	00h	20h
Ch5R	B51	98h	01h	20h
Ch5R AC	A52	98h	02h	20h
Ch5L AC	B52	98h	03h	20h
Ch6L	A61	98h	00h	40h
Ch6R	B61	98h	01h	40h
Ch6L AC	A62	98h	02h	40h
Ch6R AC	B62	98h	03h	40h

* ChX_AC = DC blocking capacitor in use.

6.4. The onboard muting relay is not used in this configuration. Make sure to mute audio signals when power is not applied to the ISS board to avoid possible clicks and distorted sounds.

7. Using Two ISS Boards

When more than six RCA stereo inputs are required, a second ISS board can be used to get up to 12-input configuration.

To use the second ISS board:

7.1. Remove the opamp chip from the U2 position on the second ISS.
7.2. Move the jumper from the R8 position to the R7 one on the second ISS.
7.3. Install the second ISS board under the first one. Use at least 1.200" long stand-offs or spacers for mechanical installation.
7.4. Connect Pins 1-3, and Pins 5-6 of J3 of the second ISS board to the same pins of the first one. Use pin headers, solid wire or buss wire to make the connections.
7.5. Connect each pin of the J4 of the second board to the same pins of the first one.
7.6. Connect power to the first ISS board **only**.
7.7. Install the VCM board only to the first (upper) ISS board, if needed.
7.8. Use audio outputs only of the upper ISS board.
7.9. Order a special MCL controller board from Academy Audio, or use any MCL adapted to control extra 6 inputs with the Chip Address 01.

8. Advanced Use of the ISS Board

When used with a VCM MUSES Volume Control module, the ISS Input Selector board presents a versatile "playground" for advanced users. The unique properties of the MUSES®72320 volume control chip open extensive possibilities for sound quality improvements.

8.1. Experimenting with Opamps.

Feel free to experiment with any +/-15V powered standard pinout dual opamp using the provided socket U2. It is also possible to use a SOIC-8 SMT dual opamp using an appropriate SOIC8-to-DIP8 adapter.

There is an option to use an outboard buffer or a gain stage. To use this option, remove the opamp chip from the socket in U2 position, and connect the external board to the test points as follows.

Test Point	Description
TP2	Left Channel Input
TP4	Right Channel Input
TP1	Left Channel Output
TP5	Right Channel Output
TP12	ComL, Left Channel Audio GND
TP13	ComR, Right Channel Audio GND
TP10	+Vcc, +11Vdc…+16Vdc, 200mA max
TP11	-Vee, -11Vdc…-16Vdc, 200mA max
TP3	Power GND

For a completely passive volume control solution, remove the opamp from the socket U2 and connect TP1 to TP2, and TP4 to TP5. Remove resistors R32 and R41. Note, that a high quality buffer should be used in the downstream audio circuitry.

8.2. Experimenting with Capacitors.

It is well-known that capacitors in the audio signal path may affect sound quality. The ISS board uses high quality VIMA polypropylene capacitors in the audio signal path circuitry. With the JFET opamp in the U2 position, the -3dB cut-off frequency is about 0.23Hz.

If a true DC operation is desired, install jumpers in the R26 and R33 positions at the bottom of the board. Make sure a JFET opamp is used in J2 position, or a JFET input outboard buffer/gain stage is connected. Using a BJT input circuitry may result in clicks associated with the volume control setting changes.

Provide enough time for break-in before evaluating the results of your experiments.

9. Break-in Period

High-End audio enthusiasts are familiar with the "break-in" phenomenon: the sound gets better with time. In engineering terms that refers to reduced distortions of the audio signal. This distortion reduction may be attributed to priming of the capacitors and all the contacts in the audio path. A noticeable sound improvement is expected after about 100 hours of listening.

10. Technical Support

For any questions regarding operation of the ISS board and for the latest documentation please visit us at www.academyaudio.com.

Happy listening!