



**CHICAGO LABORATORY FOR ELECTRO-ACOUSTIC THEATRE**

## CLEAT OPERATION MANUAL

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This document will explain the main functions and features of the CLEAT speaker system at Elastic Arts. It is meant to help you get started with using the system for your own projects.

### SETTING UP YOUR COMPUTER

To use the CLEAT system with your own computer, you will need the latest MOTU 16A drivers installed. These can be found at <https://motu.com/proaudio/index.html> (do not worry about installing firmware updates onto the interface – all you need is the drivers on your computer). Your computer will also need a standard USB 2.0 port.

Once the drivers are installed and the USB from inside the rack is connected, you should be able to choose the MOTU 16A as the audio input and output device within the audio software of your choice, including Reaper, Ableton Live, Max, Supercollider, Logic, Audition, Pro Tools, and so on.

### PLUGGING IN

The front panel of the rack can be removed by twisting and swinging out the four twist locks connecting it to the main rack, two on each side. Once removed, switch the entire rack on with one switch: the rocker switch on the very top unit. Everything else should turn on when that comes on, no need to use any other power switches. There is a tan USB cable stuffed into one of the upper gaps. Use this to connect to your computer.

## WHAT'S IN THIS RACK?

The rack consists of:

- a Power Conditioner (for managing power to all the devices)
- an APHEX 8CH D/A device (used to break out 8 additional “ADAT” digital channels from the MOTU 16A)
- two 24-position patch bay units (explained more below)
- a MOTU A16 audio interface, and four 4-channel audio amplifiers.
- four 4-channel Behringer audio amplifiers, to provide 16 independent channels of amplification to the speakers. Speakers 1-4 are powered by the first unit, 5-8 by the 2<sup>nd</sup> unit, and so on. **The levels on these amplifier channels should remain at 11:00, and should not be turned up for any reason.**

After each concert or work session, please be sure to remove all patch cables from the patch bay, switch off the main power switch only, and then carefully replace the USB cable and the front rack panel.

## BASIC ROUTING FROM YOUR SOFTWARE

The outputs of the MOTU 16A are hard-wired to the amplifiers that power the hanging Hemisphere speakers. Sound can be routed to the speakers in the software according to the following numbering scheme:

CLEAT Physical Channel Map					
	back door		projection wall		
art	1	2	3	4	storage room door
	5	6	7	8	pianos, etc.
	9	10	11	12	
	13	14	15	16	office
bar	front door		booth/rack		

## USING THE PATCH BAY

The patch bay allows sounds to be routed between the main Elastic sound system and the CLEAT system. There are four rows of patch points that should be patched using 1/4" TRS patch cables. The function of each of the 4 rows is as follows:

- Top row, top unit: The 16 analog outputs from the Behringer X32 Mixing Desk are wired to the first 16 patch points of this row. So, anything coming out Output Bus 1 on the board will appear at the first patch point in the row.
- Bottom row, top unit: This row sends out to the main house sound system at Elastic. Only a few of the jacks are active. Channels 1-4 are connected to monitor positions 1-4 on the floor box, channel 14 goes to the subwoofer, and channels 15 and 16 go to the main left and right PA speakers in the house. This row and the one above it are semi-normalled, meaning that a sound coming out of the x32 board on bus 14 will go directly to the subwoofer EXCEPT when there is a patch cable interrupting the signal flow. This is why removing cables from the patch bay after each work session is so important (see more on this below).
- Top row, bottom unit: Only positions 17-24 are active here. These are the breakout channels from the Aphex unit, allowing the first 8 ADAT channels from the MOTU 16A, aka software channels 17-24, to be accessed and routed elsewhere. The most common use of this is connecting a patch cable from position 17 here to position 14 on the row just above, allowing the house subwoofer to be driven by output 17 of the MOTU (and therefore output 17 of your software).
- Bottom row, bottom unit: These are connected to the 16 analog inputs of the MOTU 16A. To patch an instrument or microphone into, the MOTU, you can connect the signal to the X32 board, then route it to an output bus on the board, turn up the bus, and then, on the patch bay, patch the corresponding board output (top row, top unit) into one of the first 16 positions on this row. The signal will show up at the corresponding channel in your software. If you are unfamiliar with how to route signals within the X32 mixing board, ask for help. It's not rocket science, but it's not really intuitive either.

**IMPORTANT NOTE: WHENEVER THE CLEAT SYSTEM IS NOT IN USE, ALL CABLES MUST BE REMOVED FROM THE PATCHBAY SO THAT "NORMAL" USE OF THE MAIN SOUND SYSTEM IS NOT IMPAIRED.**

Here is a quick-reference diagram that condenses the above information:

CLEAT RACK PATCHBAY MAP																											
X32 OUTPUTS 1-16 (normals match board output defaults)																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
MONITOR LINES 1-4																SUB		MAIN/LR									
																APHEX OUT 1-8 (MOTU 17-24 OUT VIA ADAT1)											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
MOTU 16A ANALOG INPUTS 1-16																											

Grayed-out jacks are not connected to anything.

## TROUBLESHOOTING

If you are having trouble using the system, try rebooting your computer, reinstalling the drivers, and even rebooting the rack (carefully and slowly). If problems persist, speak to anyone who is present from Elastic (they may be able to help), and send an email describing your problem to [cleat@elasticarts.org](mailto:cleat@elasticarts.org) - we will do our best to help you as quickly as we can.

Please enjoy the CLEAT system, use this community resource responsibly and with joy, and please make sounds that will make our brains tingle.

Love,  
Matt, Sam, and Stephan