

FRACTUS V:

METAL DETECTOR

commissioned by Adam Groh

for Percussion and SuperCollider

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ELI FIELDSTEEL

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I. PROGRAM NOTE

Fractus V: Metal Detector is fifth in an ongoing series of interactive duets for solo performer and interactive electronic sound. Both the human performer and the computer improvise unique material with each performance, and numerous musical parameters are left to the discretion of the players, including instrument/sound choices, and the lengths of musical sections. Like other pieces in this series, the composition aims to explore the possibilities of uniquely-generated content, establish a dynamic relationship between human sounds and computer sounds, and of course, showcase the musician's talent.

II. INSTRUMENTATION

Fractus V is scored for categories of instruments, rather than specific instruments. For many instruments, substitutions can be made as desired, allowing the performer to create a unique realization based on taste and available battery. Items with an asterisk are subject to substitution, and suggestions are included in parentheses:

core drum set:

snare drum

tom-tom (mounted or floor)

kick drum (notated "BD," should sound very dead and "thuddy")

hi-hat

suspended cymbal (crash or splash)

singing bowl

a trap table, to be mounted over kick drum

a frame for suspending instruments, to be mounted over the trap table

* two pitched membranes (bongos)

* three resonant metals, on trap table (glockenspiel bar, crotale, metal pipe)

* one resonant metal, suspended on frame (flower pot)

* two shakers, on trap table (egg shaker, caxixi)

* three bell-like instruments, on trap table (desk bells)

* two resonant woods, on trap table (wood slats, wood blocks)

* two gong-like instruments, suspended on frame (small gong, opera gong, almglocken)

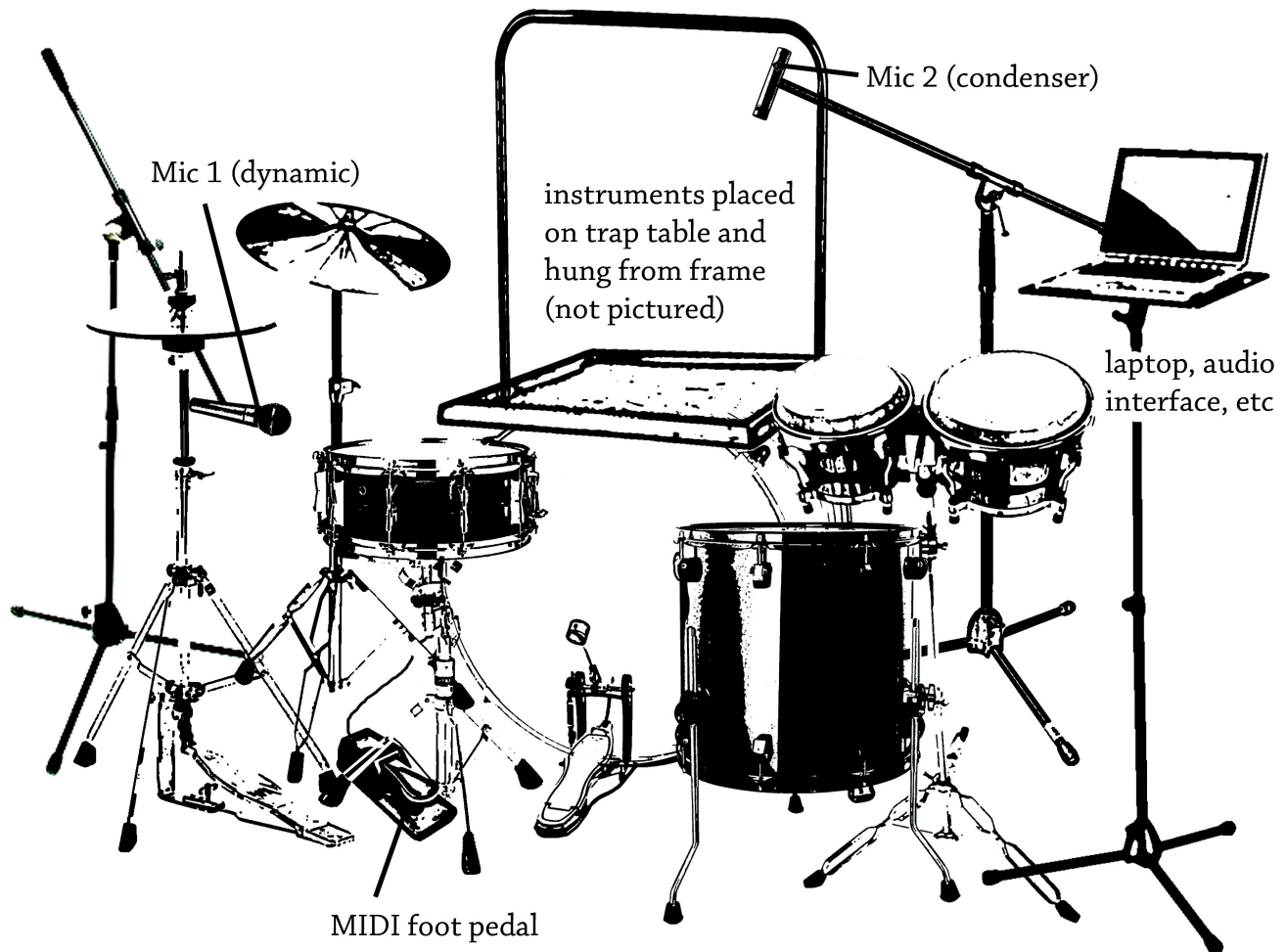
III. HARDWARE SETUP

The following audio hardware is required:

- Laptop running Mac OS 10.6 (or later) and SuperCollider 3.6 (or later). Fractus V was composed on a laptop with 8GB of RAM (the piece will likely work fine with less RAM, but more RAM means a more reliable performance);
- An audio interface with at least two inputs and two outputs;
- Two microphones with boom stands. Ideally, one cardioid dynamic microphone (e.g. the Shure SM58), and one cardioid condenser microphone should be used, although using two dynamic microphones may work fine;
- A MIDI foot pedal capable of sending two discrete messages (i.e. "down" and "up"). The ideal foot pedal will plug directly into the laptop via USB. However, many foot pedals terminate in a ¼ inch plug, in which case the foot pedal must be routed through a MIDI keyboard controller (such as the portable M-Audio Oxygen 8, or similar device), which is then connected to the laptop via USB;
- Two good quality loudspeakers, and;
- Appropriate cables to connect and power these devices.

After arranging the instruments as desired, position the dynamic mic (mic 1) so that it is close to both the hi-hat and snare drum, while not in a position where it will be accidentally struck (an underneath position may

work very well). Position the condenser microphone (mic 2) near the trap table and frame so that it will easily pick up the various smaller instruments, while distant enough that it will not be accidentally struck. Plug mic 1 into the first input jack on the audio interface, and plug mic 2 into the second input jack. The stereo outputs of the audio interface should be sent to the loudspeakers, although it is preferable to route them through a mixer for ease of level control and EQ. The laptop should be placed so that the screen is clearly visible to the performer, while not in a position where it may be accidentally struck. The MIDI foot pedal should be placed near the hi-hat pedal. The loudspeakers should be placed slightly downstage of the instrument setup to help avoid audio feedback.



IV. SOFTWARE SETUP

SuperCollider is free software, and can be downloaded at <http://supercollider.sourceforge.net/downloads/>. The piece-specific files for Fractus V are located in a folder called “F5Interface,” which can be obtained through the composer at eli {dot} fieldsteel {at} gmail {dot} com.

After installing SuperCollider, locate the subfolder within F5Interface called “F5classes.” This subfolder must be moved to the SuperCollider extensions directory. To locate the SuperCollider extensions directory, open SuperCollider, and type the following line of code:

```
Platform.userExtensionDir;
```

After typing this line, place the mouse cursor anywhere on this line and press shift-return. A directory

pathname will appear at the bottom of the Post window. Move or copy the subfolder F5classes to this location. After doing so, quit and reopen SuperCollider to recompile the extensions library.

On a new line, type the following code, (including the unmatched left parenthesis):

```
Perform.new(
```

Drag and drop the F5Interface folder into the SuperCollider text editor, which will create a directory pathname to the folder, enclosed in double quotes. On my computer, the result looks like this:

```
Perform.new("/Users/eli/Music/Compositions/Electroacoustic/Fractus V/F5Interface/")
```

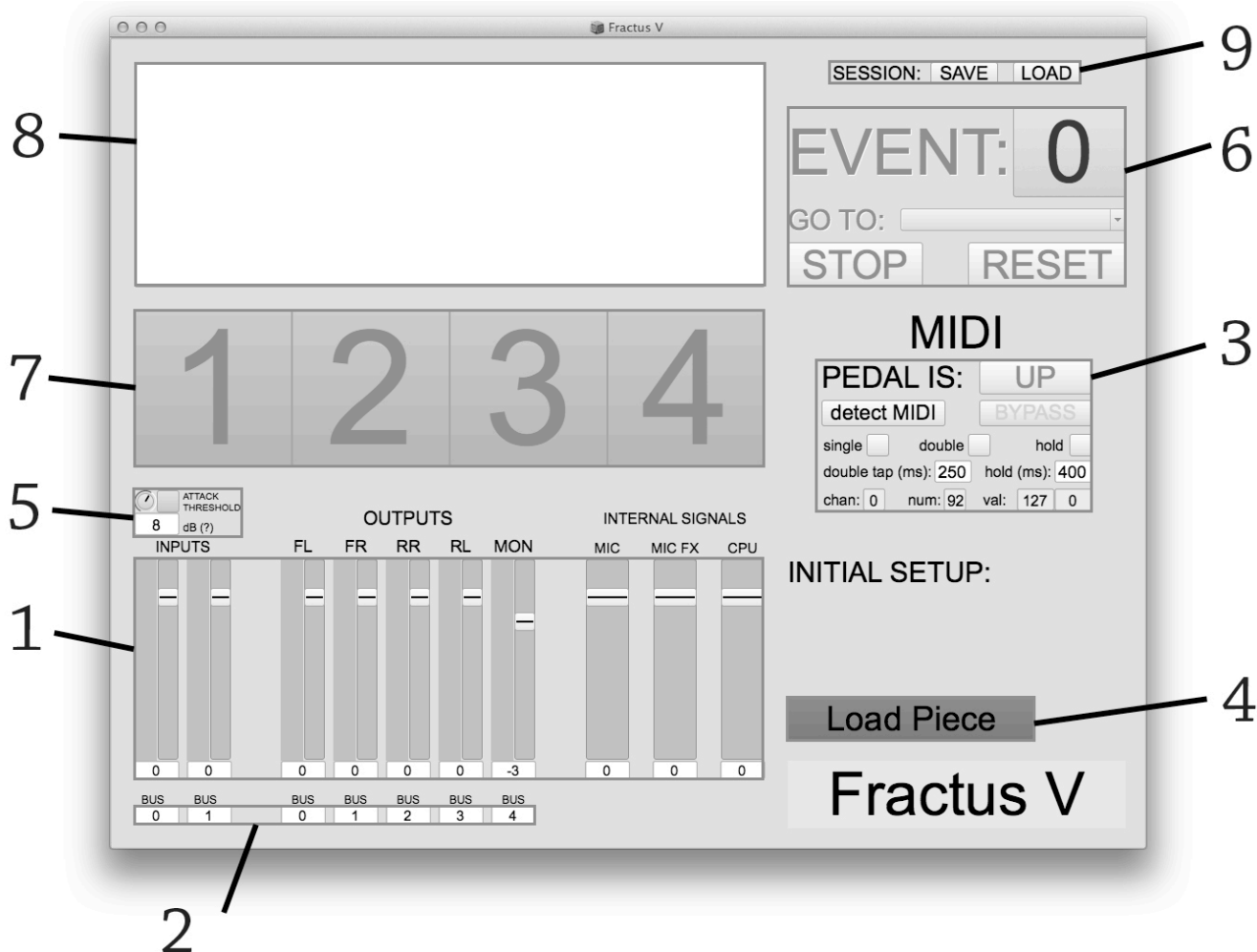
Last, close out the parentheses, and add a semicolon:

```
Perform.new("/Users/eli/Music/Compositions/Electroacoustic/Fractus V/F5Interface/");
```

Place the mouse cursor anywhere on this line and press shift-return to launch the performance interface.

V. GRAPHICAL PERFORMANCE INTERFACE

The following diagram illustrates the main features of the performance interface:



1. Mixer

There are ten level meters, grouped into three sections (inputs, outputs and internal signals), capable of controlling the amplitudes of various signals.

Since Fractus V requires two microphones, both input faders should be adjusted to an appropriate level prior to rehearsal and performance.

The output level abbreviations (FL, FR, RR, RL, MON) stand for front left, front right, rear left, rear right, and onstage monitor. Since Fractus V is a stereo piece, RL and RR are irrelevant. MON is a mix of the other four output signals and is suitable for sending to an onstage monitor for the performer. Generally, you will not need to adjust the output faders.

The three internal signal faders allow for individual control of different output components. MIC controls the amplitude of the sum of both microphone inputs. MIC FX controls the amplitude of any live microphone effects (echo, granular synthesis, etc). CPU controls the amplitude of computer-generated sounds. Historically, taking the CPU fader down to about -6dB has produced a good mix for performance.

2. Input/Output Routing

The two numbers on the left determine the hardware inputs from which SuperCollider will read. The five numbers on the right determine the hardware outputs to which SuperCollider will send its output. If you are using the first and second inputs on your audio interface, then these numbers should be 0 and 1. If, for example, your audio interface had eight inputs, and you were using the fifth and sixth, these numbers should be 4 and 5, and so on. The same applies to the output numbers; if you are using the audio interface's first and second outputs, the first two numbers should be 0 and 1.

3. MIDI Controls

This section gives control over MIDI behavior. To synchronize your MIDI pedal with the Fractus V performance interface, first make sure your MIDI pedal is connected and sending data to your computer. Click "detect MIDI," then press and release your MIDI foot pedal. SuperCollider should acknowledge your pedal.

If you ever wish to disable the MIDI pedal (e.g. if you want to avoid accidental pedal presses), click BYPASS. Click this button again to re-activate the pedal.

Using the smaller number boxes at the bottom of this section, it is possible to adjust the maximum allowable time between taps required to register a double-tap, as well as the minimum time to depress the pedal to register a hold.

4. Load Button

This button will turn on audio processing and load the necessary components to start the piece. After the status window (see No. 8) indicates that loading is complete, you may begin the piece by tapping the pedal once or clicking the blue EVENT button (see No. 6).

5. Amplitude Threshold

Some of the audio events in Fractus V are only triggered when the amplitude of a struck snare drum or hi-hat crosses a user-determined threshold.

After clicking the load button and setting the input faders properly, the performer should turn the threshold knob while playing slow fortissimo snare drum and hi-hat hits until the button next to the knob reliably flashes green with every hit.

Be sure to take the time to set the threshold as accurately as possible. If the threshold is set too high, SuperCollider may miss a percussive attack at a crucial moment. If set too low, SuperCollider may detect an attack where none was present.

6. Event Navigation

The blue EVENT button indicates the audio event which occurred most recently. Clicking this button (or tapping the MIDI foot pedal) will advance to the next event (events are notated on the score as boxed numbers with a downward arrow, see section VI below). The GO TO drop-down menu allows the performer to jump to different sections of the piece for ease of rehearsal. STOP will terminate all audio while remaining on the current event. RESET will terminate all audio and reset to the beginning of the piece.

7. Metronome

During certain sections of Fractus V, the numbers on this four-bar counter will illuminate in time with the beat. Such sections are indicated in the score with text.

8. Status Box

When appropriate, this text box displays important information, such as unique event activity, and when a preset is saved or loaded.

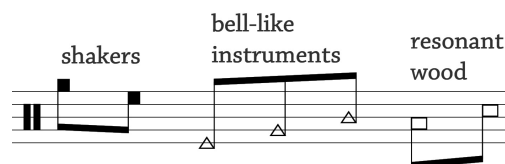
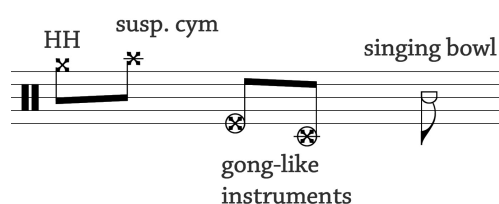
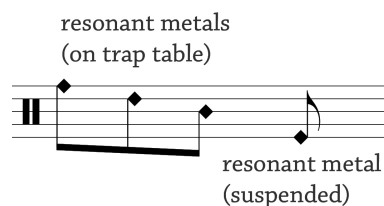
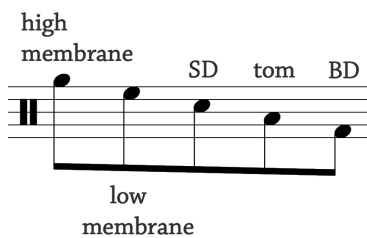
9. Session Save/Recall

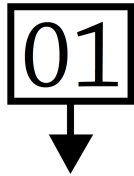
Perhaps the most useful features of the interface, these buttons enable the performer to save and recall a snapshot of the performance interface for repeat rehearsals or performances. SAVE will bring up a “save file” dialog, prompting the user for a file name for the preset. **The preset file MUST be saved in the “presets” subfolder within the F5Interface folder.** Whenever the performance interface is launched, the most recently saved/loaded preset will be loaded. LOAD allows the performer to recall a different snapshot.

If the setup changes in any way, saving a new preset is strongly recommended.

IV. SCORE

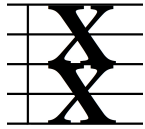
Percussion Key:





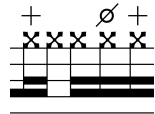
Boxed Numbers with Downward Arrow

Where this symbol is present, the performer must advance to the next cue by tapping the MIDI foot pedal. In general, pedal presses should be as subtle as possible, so as to not “give away the secret.”



“X” Time Signature

Measures with an “X” time signature are notated spatially. Approximate durations are given above or below these measures.



Hi-Hat Notation

Hi-hat notes with a plus articulation (+) indicate tightly closed hi-hat. Notes with a slashed circle articulation (ø) indicate a buzzy, half-open sound. The sound of the open hi-hat is not used.

Improvisation and Related Comments:

With the exception of certain “landmark” gestures (e.g. mm. 2-3, the feathered beam in mm. 8-11, the feathered beam in mm. 44-46, and the singing bowl at the end of the piece), Fractus V is wide open to improvisation.

For example, mm 11, 13 and 15 appear very dense, with quick mallet/beater changes. Realistically, the player can restructure these gestures to fit the percussion setup. The only requirement is that the indicated durations are more or less preserved.

The activation of the graphical beat counter signifies the beginning of m. 17. From here through m. 29, the player is free to improvise in rhythmic fashion on the hi-hat only. The number of measures in this section is fixed; that is to say, the computer will choose one of two fills at m. 30, exactly 13 measures after the metronome activation. If it is too difficult or distracting to count these measures, the player can omit the synchronized gesture in m. 30 and substitute a more passive one.

The sparse pointillistic gestures between mm. 47-55 can be improvised as well. The only requirements are that the gestures are arrhythmic, and that they involve only metals.

Amplitude Threshold Detection:

There are two events in the piece (03 and 08) in which the computer will begin listening to the audio input after the pedal is pressed, and will advance the piece after the next sound which crosses the set amplitude threshold. To minimize false detections and other unwanted behavior, the time between the pedal press and producing the loud sound should be minimal, but not near-simultaneous. A gap of about 1.5 seconds will likely be sufficient.