

Frequency/Amplitude Response Workstation

Audio Modification Analysis Unit
User Manual And Technical Reference

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I wish you the greatest success in your research

James Chaffinch
James Chaffinch, CEO

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Description

The Frequency/Amplitude Response Workstation - typically abbreviated as “F/AR Workstation” - is an amplitude response analysis tool capable of producing audio waveforms, collecting audio responses and graphing those responses in a layered fashion. In effect, this device can collect the frequency response of any audio unit.

It performs this task in a very simple way, by sending a range of waveforms of different frequencies from the Audio Signal Output port, while measuring the amplitude response received in the Audio Signal Input port. It then graphs this result on the Wave Result Viewport.

Understanding this central idea, the rest of the system is for the purpose of control of the various facets and variables within the process. What waveforms are sent, how long they take, etc.

Frequency Range And Step

The ‘Start Frequency’ and ‘End Frequency’ selectors at the top of the control area are used to select the overall window of values that the system will work between. “Step Size” then selects the detail within that window.

For example, with a range of 0 to 10, a step size of 2 will result in six frequencies being used.



Whereas the same range with a step size of 1 will result in 11 frequencies being used.



Notice how in both situations, the size of the strip of frequencies is the same, only the number of markings between each end is different.

Process Activation, Control And Progress

The three buttons to the bottom of the device control the activation of the data collection process. Pressing the ‘Start’ button will begin the waveform sequence generation and data collection, locking various controls in-place until the process is stopped or completes. The ‘Stop’ button will immediately stop an ongoing process.

Whether the process completes or is stopped manually; the collected data will be added to the ‘Wave Result Viewport’. Pressing the ‘Clear’ button will delete all collected data, and clear the viewport of all graphs.

The Wave Result Viewport

This section of the device is a screen showing the 10 most recently collected responses. Each newly added graph will cause all previous graphs to dim by 10%, allowing you to run multiple processes and immediately compare the results.

Seconds Per Step

The dial to the left of the 'Step Size' selector, is used to determine how long each generated frequency will be produced for, before the system progresses to the next value. This is a very small range, from 0 seconds to 1/10 of a second. Shorter time periods mean the overall collection process will be faster, but also that the collected data can be less accurate.

Below we can see an example of this. The data in figure one was collected with the 'Seconds Per Step' set to zero, while figure two has this value at 0.0125.

Notice the bumps and spikes in data that are present in figure one but not figure two. This is a result of the test unit not having enough time to respond to the F/AR, resulting in incorrect data collection. This delay is also present in the second figure, but due to the slower progression rate the incorrect values can be overshadowed by the larger number of correct values.

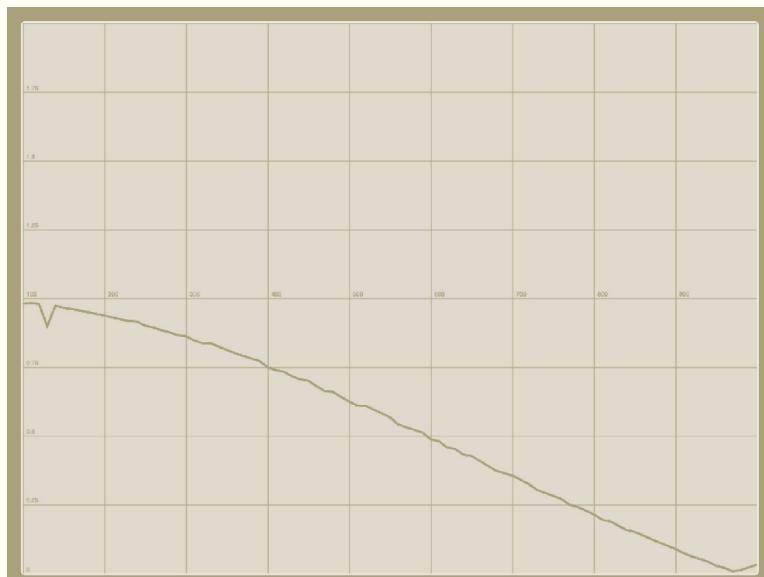


Figure One



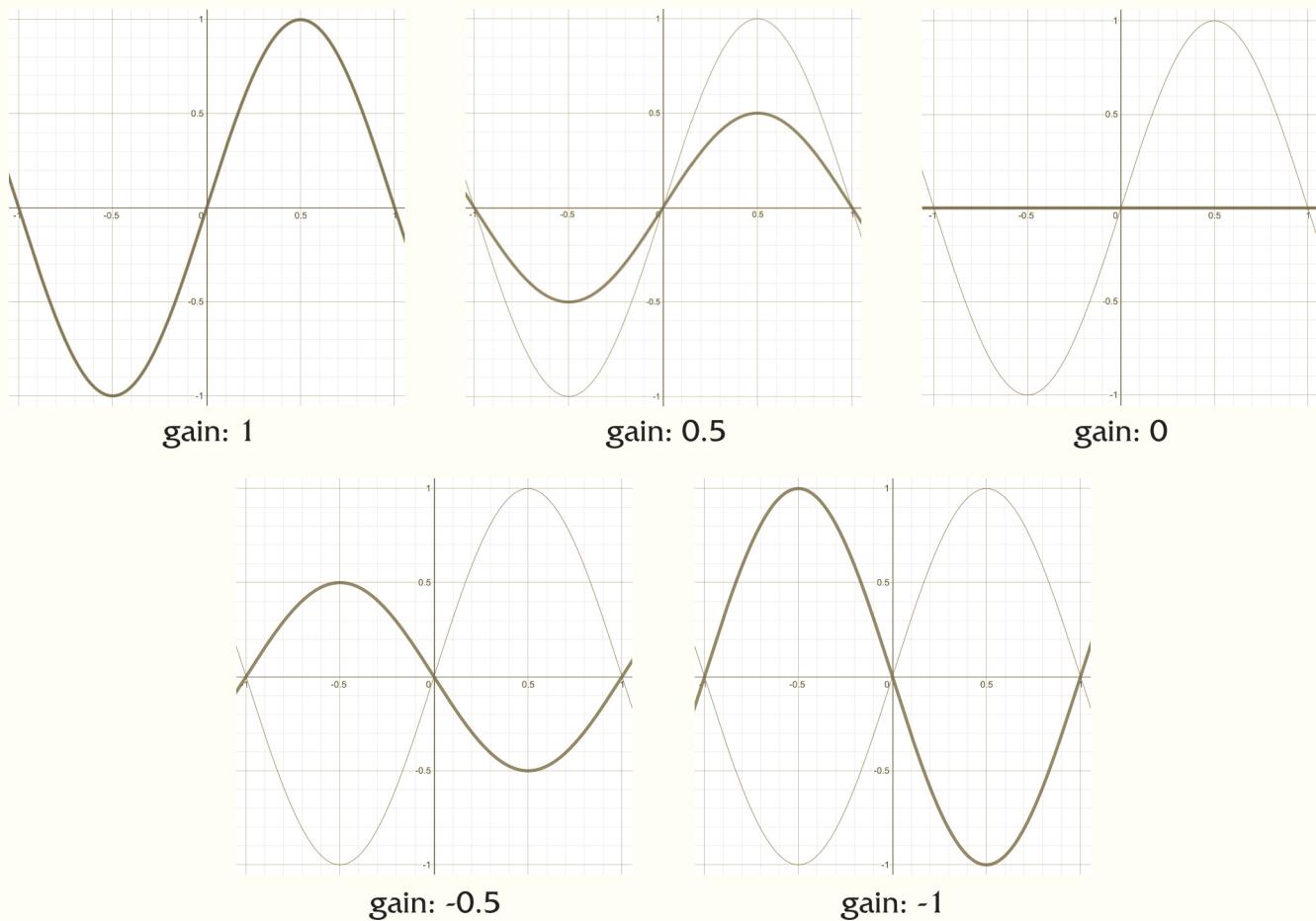
Figure Two

Waveform Select And Modification

There are three main wavetypes available; Sine, Triangle and Square. The Adjust dial is used to modify the wavetypes in different ways. The manner of the modification is related to the wavetype.

Gain

This attribute defines the value that will be used to determine the size of the generated waveform. Its range is from positive 1 to negative 1, which allows for the waveform to be inverted.

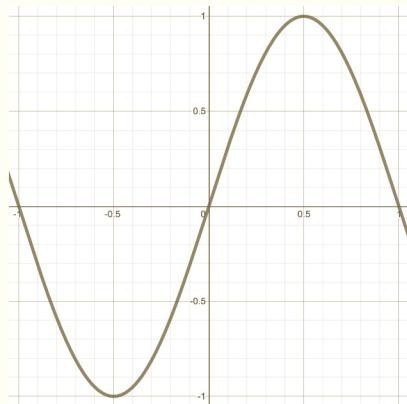


Wavetype

The wavetype can be selected with the three Waveform Select Buttons.

Sine

A simple Sine wave. The Adjust dial has no effect on this wavetype.



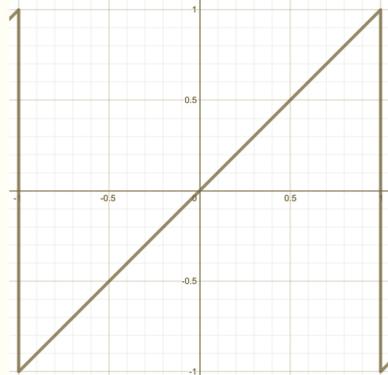
a simple sine wave

Triangle

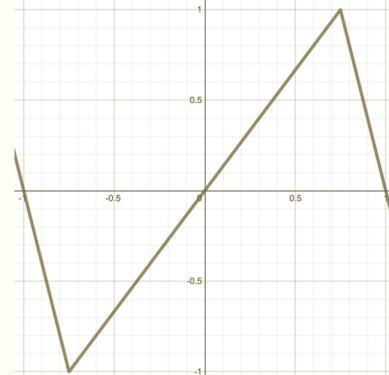
A linear ‘rise-and-fall’ waveform. In a Triangle wave both the ‘rise’ and ‘fall’ periods take 50% of the wave cycle time. The Adjust dial will modify these percentages.

For example, setting the dial to ‘zero’ will result in the ‘rise’ period taking 0% of the wave cycle time, while setting the ‘fall’ period to 100%. Such an arrangement results in a “Negative Ramp Saw Wave”. Setting the dial to ‘one’ will reverse the ‘rise’ and ‘fall’ values, resulting in a “Positive Ramp Saw Wave”.

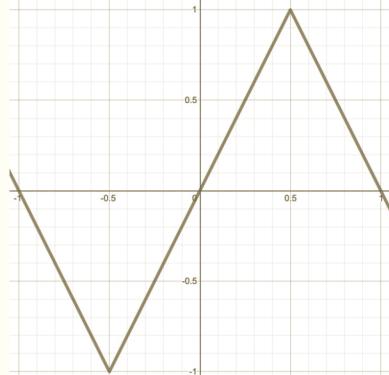
Interstitial values will result in proportional ‘rise-and-fall’ percentages.



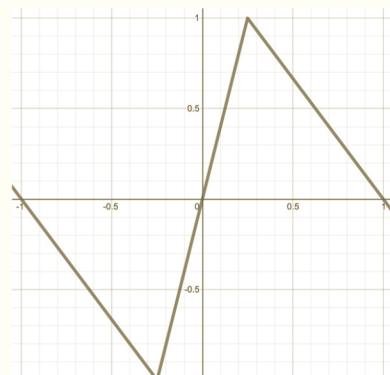
adjust: 1



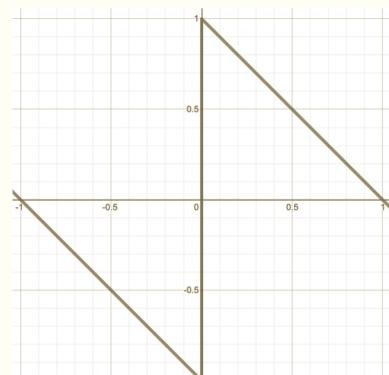
adjust: 0.75



adjust: 0.5



adjust: 0.25



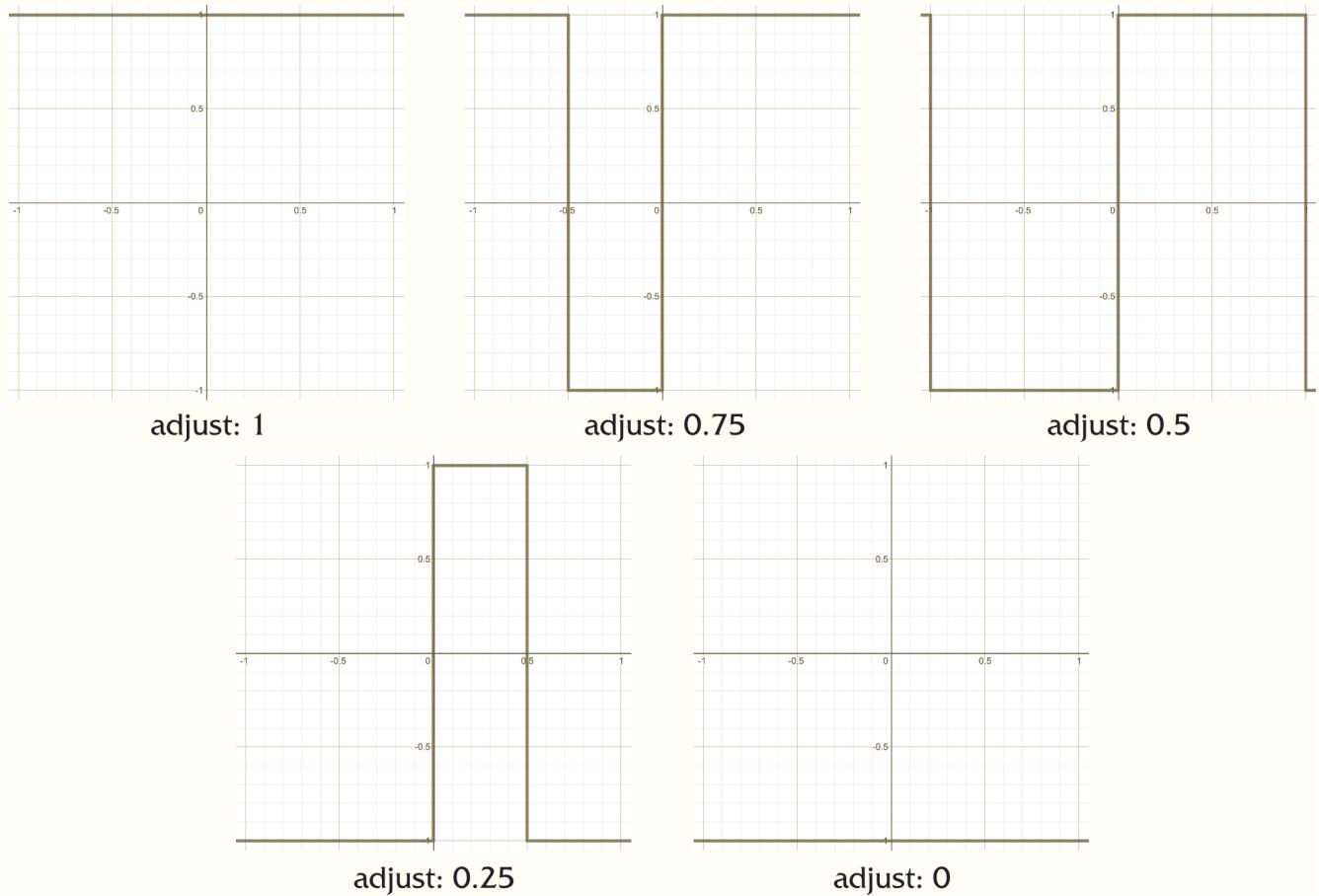
adjust: 0

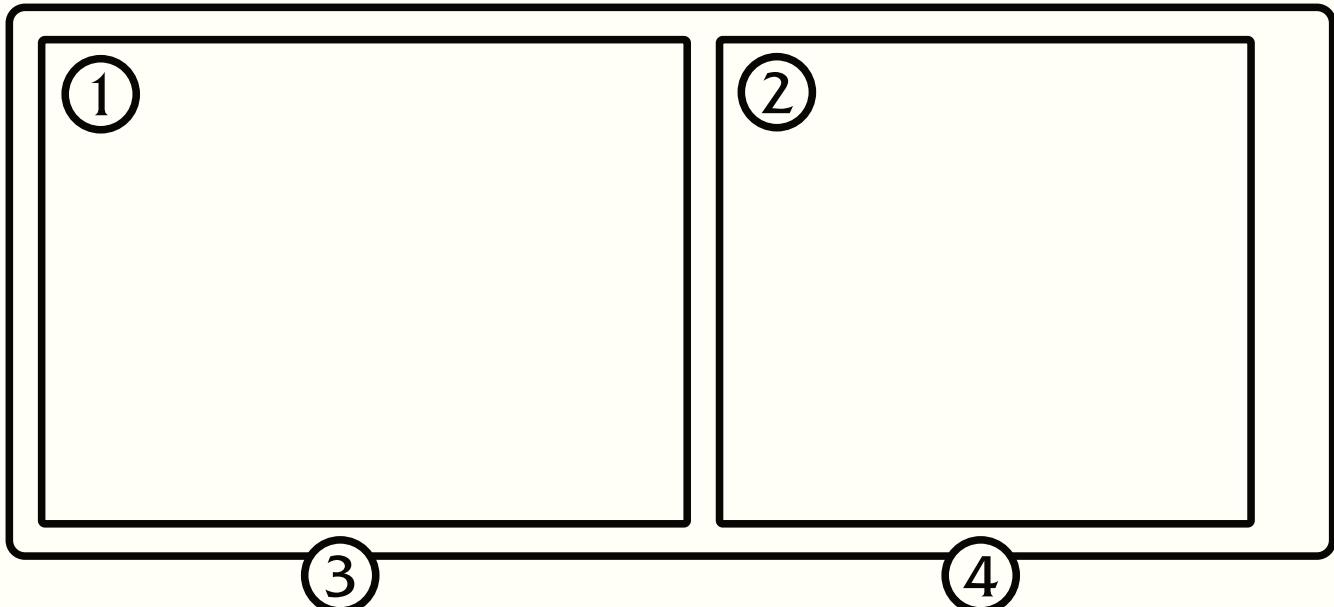
Square

A logical ‘up-and-down’ waveform. In a Square wave both the ‘up’ and ‘down’ periods take 50% of the wave cycle time. The Adjust dial will modify these percentages.

For example, setting the dial to ‘zero’ will result in the ‘up’ period lasting 0% of the wave cycle time, while setting the dial to 100%. Such an arrangement would result in the generated signal only consisting of the lower value of the waveform; essentially a constant value. Setting the dial to ‘one’ will reverse the ‘up’ and ‘down’ values, resulting in a constant higher value.

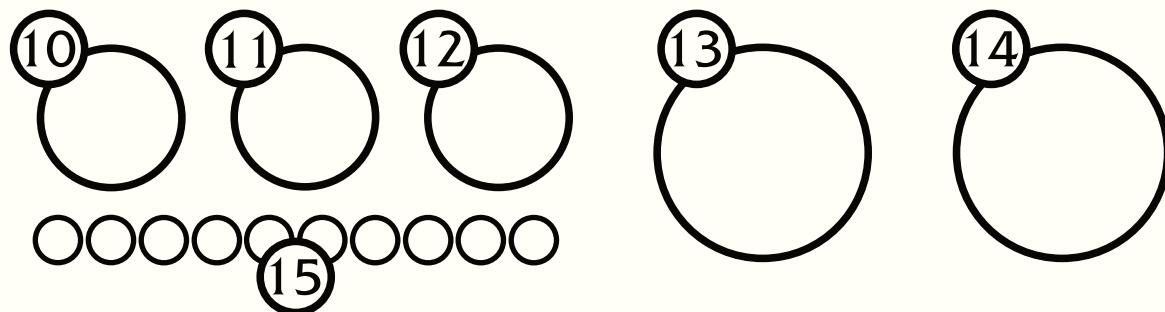
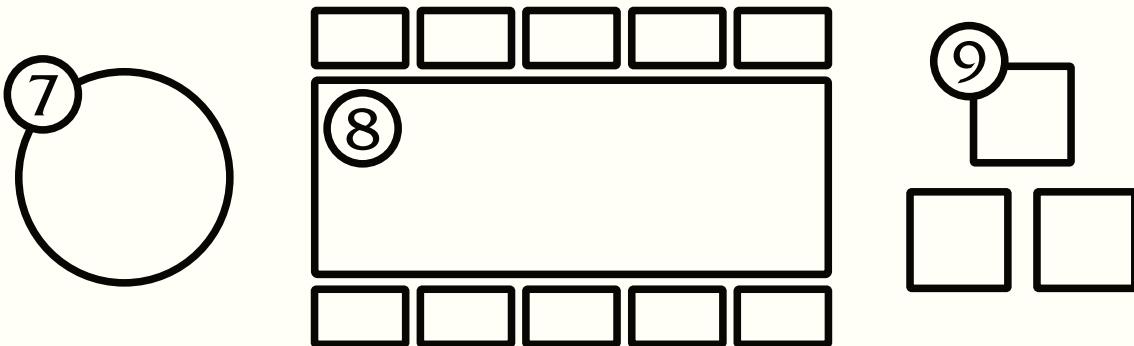
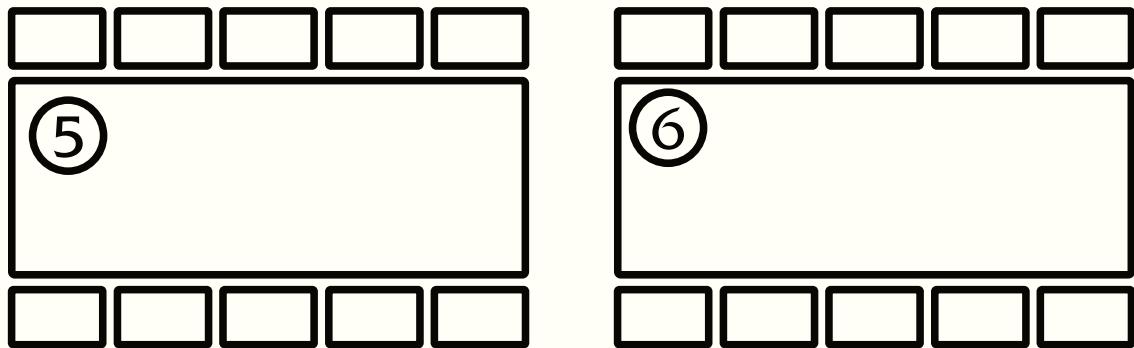
Interstitial values will result in proportional ‘up-and-down’ percentages.





3

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Interface

1. Wave Result Viewport

2. Control Panel

3. Audio Signal Input

CUIS type: Orange

4. Audio Signal Output

CUIS type: Orange

5. Start Frequency Selector

6. End Frequency Selector

7. Duration Spent Per Frequency Step

8. Frequency Step Selector

9. Generated Waveform Selection Buttons

10. Clear Collected Data

11. Begin Test And Collect Data

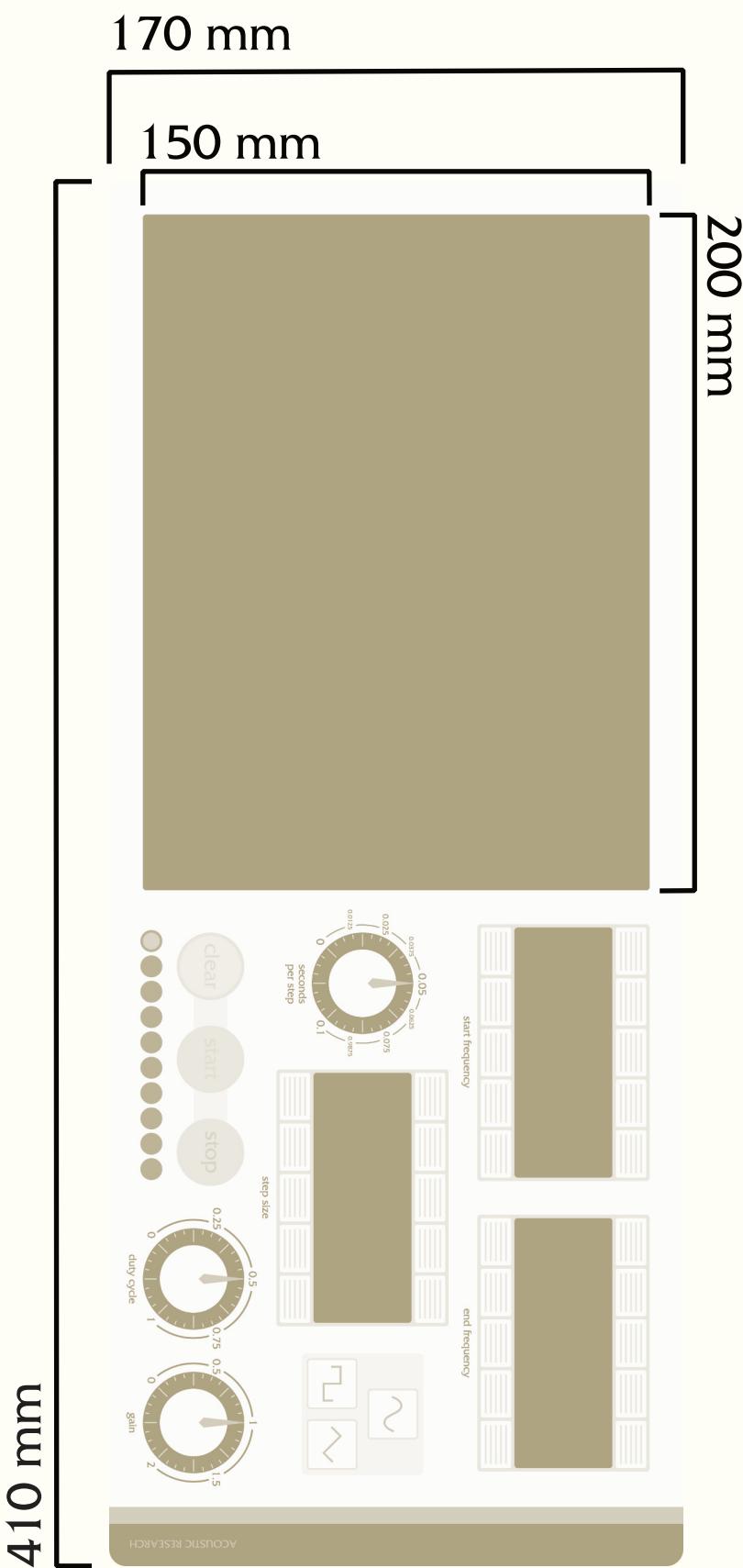
12. Immediately Stop Test

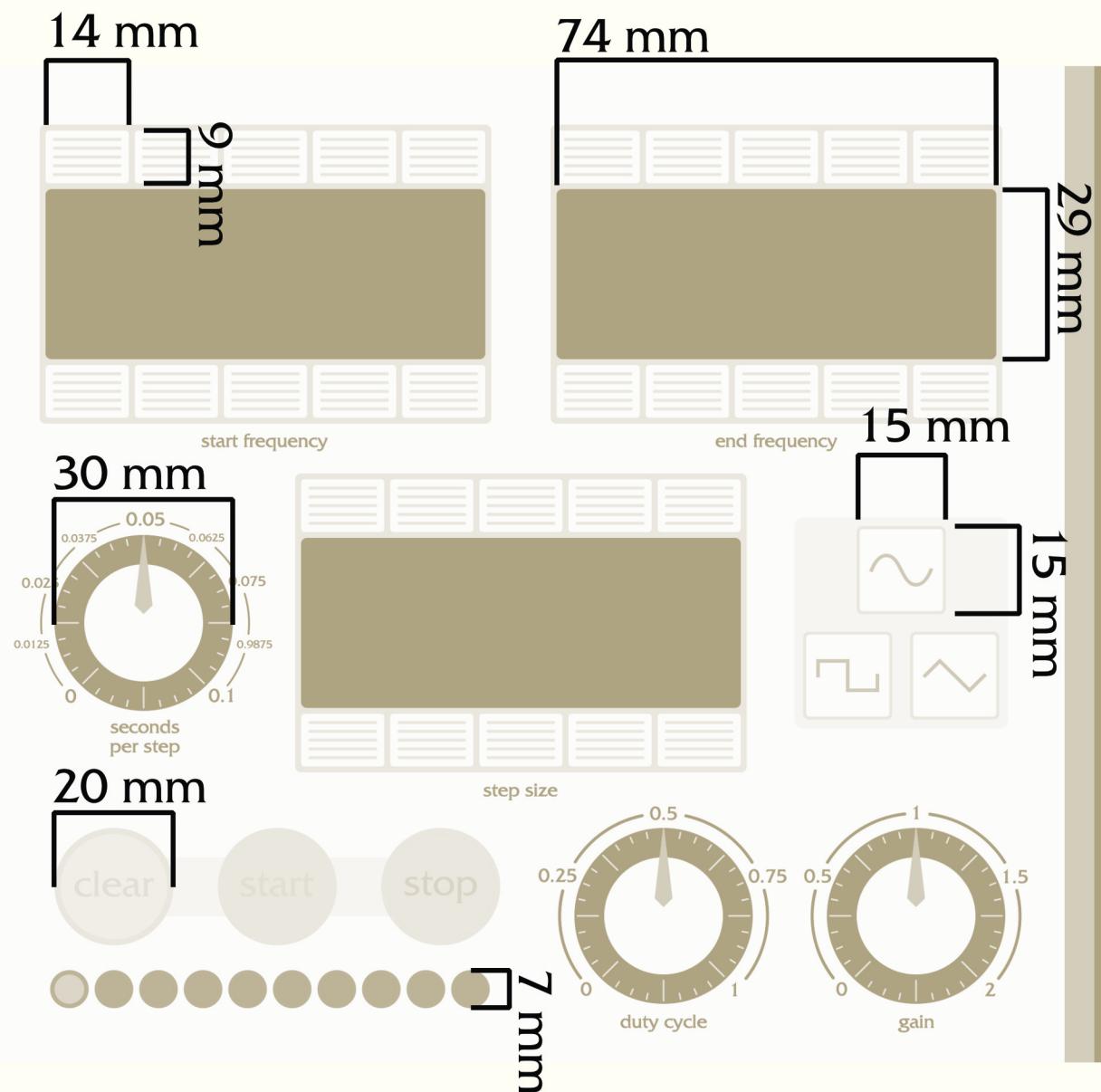
13. Generated Waveform Adjust Dial

14. Generated Waveform Gain Dial

15. Test Progress Indicator

Unit Specifications





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