

# HUSA1A

## Handheld Ultrasonic Spectrum Analyser

Firmware Revisions: HUSA0.22 & USMM0.26

## User Guide

**DISCLAIMER:** The product described in this user guide is intended to be used as an indicator only. In the event it does not perform as expected, RHDC Services Ltd may not be held liable.



**WARNING:** This product uses a sensor that is biased at 200VDC. To avoid electric shock, do not disassemble the unit.

**BATTERIES:** Use only alkaline AA batteries such as Energizer E91.

## 1 Scope

This document describes how to use the HUSA1A (Handheld Ultrasonic Spectrum Analyser model 1A).



**Figure 1. HUSA1A Handheld Ultrasonic Spectrum Analyser**

## 2 Important Notes

Please read the following important notes before using this product.

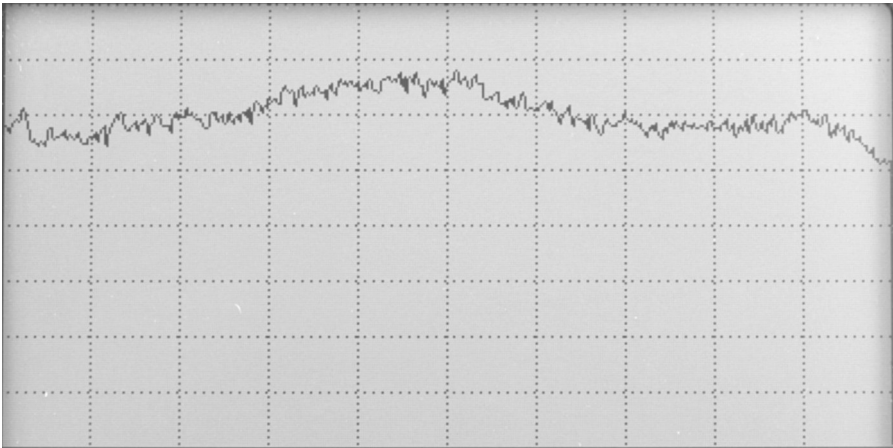
1. The unit must be kept dry. Do not use in the rain or damp.
2. Use Alkaline batteries only such as Energizer E91 or an equivalent.
3. The 3.5mm headphone socket at the base of the unit is not supported by the current product firmware and should be left unconnected.

### 3 Introduction

The HUSA1A combines a low-noise broadband ultrasonic transducer with a direct-sampling FFT based spectrum analyser to create a hand-held instrument suitable for the detection and characterisation of ultrasonic signals.

As well as having high-sensitivity, thanks to the transducer's narrow beam pattern, signal sources can be easily and accurately located using this highly portable instrument.

The transducer used in the HUSA1A is an electrostatic type that covers the frequency range of 10kHz to 110kHz with a typical response shown below.



**Figure 2. Typical Frequency Response (10kHz to 110kHz, 10dB/div)**

Note. As can be seen in the above image, sensitivity varies slightly with frequency. However, this is to be expected for a large-diaphragm (and therefore low-noise) transducer.

## 4 Controls

The image below shows the four controls of the HUSA1A.

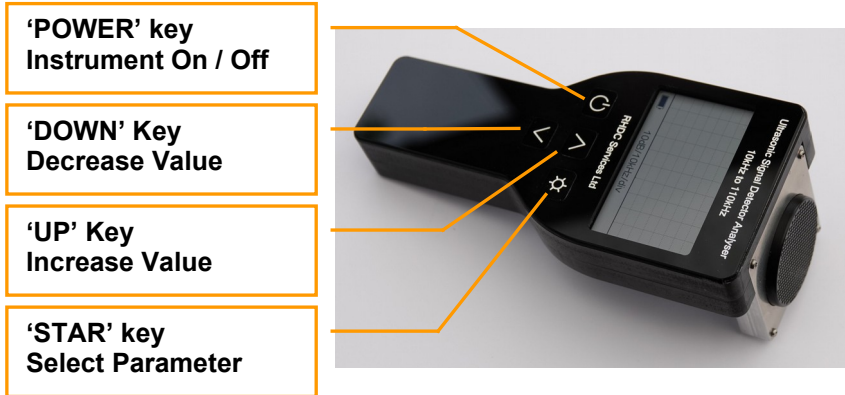


Figure 3. HUSA1A Controls.

Pressing the UP and DOWN key together pauses or unpauses the display.

## 5 Getting Started

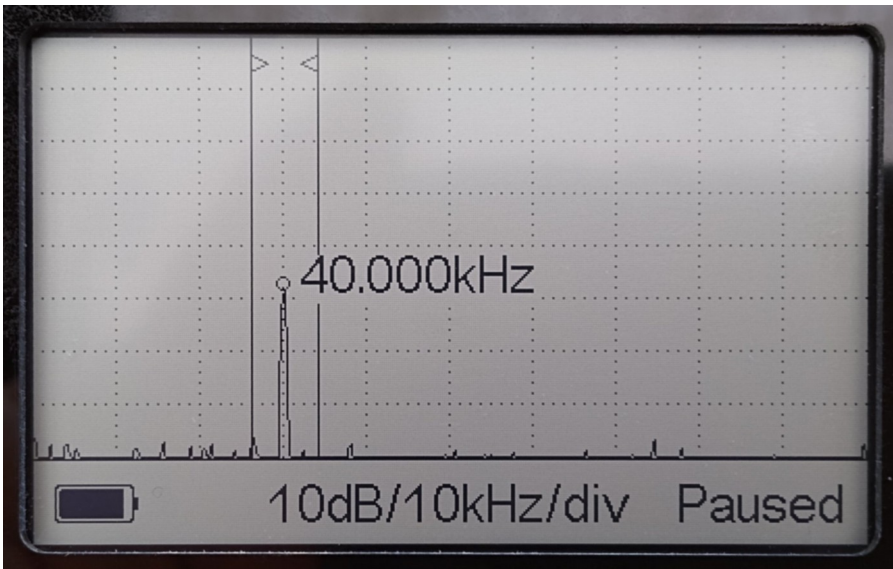
Insert two AA Alkaline batteries then press the power button. The display will become active showing a graph of signal amplitude vs frequency.

Please allow 5 seconds for the transducer bias and amplifier circuitry to stabilise, after which the unit will be at full sensitivity and ready for use.

## 6 Instrument Display

The display shows a graph of signal amplitude vs frequency as follows.

Vertical:            Log Signal Amplitude, grid = 10dB per division.  
Horizontal:        Linear Frequency, 10kHz to 110kHz, grid = 10kHz/div.



**Figure 4. Example Display (showing emission at 40kHz)**

## 7 Settings Menu

In the following sections, use the "Star" key to cycle through the instrument settings menu and the "Up" and "Down" keys to make adjustments.

Note. The menu will exit automatically after a few seconds of inactivity.

### 7.1 Frequency Span and Sensitivity

The span and sensitivity are fixed. There are no settings for these.

## 7.2 Auto Power Off

To save power, the instrument defaults to switching off after 20 minutes. This can be adjusted or disabled using the settings menu.

## 7.3 Display Backlight

The display backlight can be adjusted over 5 power levels or turned off. Turning it off or setting it to "Min" will extend battery life considerably.

## 7.4 Display Mode

The display mode can be cycled through "Normal", "Peak Hold" and "Average" which are similar to standard spectrum analyser display settings.

Note. When the instrument is in "Peak Hold" mode, a "Pk" symbol will be shown on the bottom right section of the display. When it is in "Average" mode, an "Av" symbol will be shown instead.

## 7.5 Frequency Meter Minimum and Maximum kHz

When the spectrum remains steady, the instrument will mark the highest peak and show its frequency. The measurement range is constrained by settings "**f. meter min kHz**" and "**f. meter max kHz**" which are displayed as two vertical cursor lines as shown in Figure 4. Thus, by using these settings, the peak frequency within a section of the spectrum can be found.

Note. Peaks below 10dB are not measured and when the menu is not displayed, keys UP/DOWN move the selected portion of the spectrum.

## 7.6 Display Pause

Provided the settings menu is not displayed, pressing the "UP" and "Down" keys simultaneously will pause or unpause the display. This, in conjunction with the "Peak-Hold" and "Average" display modes, makes it easier for the display to be photographed using an ordinary camera or smartphone.

## 8 Limitations

To achieve high sensitivity, this instrument does not sample the ultrasonic signal continuously. Instead, as indicated in the specifications table below, it samples and processes the signal periodically. Thus, this instrument is unlikely to detect bat calls which are pulsed in nature.

However, for all signals of sufficient amplitude and with a duration of 50ms or longer, detection is guaranteed.

## 9 Specifications

Unless Otherwise Stated: Battery = 2 x Energizer E91 AA Alkaline,  
Backlight (BL) = Low, Temperature = 20°C, Test Frequency = 50kHz.

Parameter	Min	Typ	Max	Units
Detectable Frequency Range (Fixed Span)	10		110	kHz
Frequency Measurement Error			3	Hz
Dynamic Range		80		dB
Sampling Interval (display refresh period)		50		ms
Sampling Time (signal acquisition length)		4		ms
Noise Floor <sup>1,2,3</sup>		5		dB SPL
Battery Life, BL=Low		30		Hours
Battery Life, BL=Off		60		Hours

Note. Specifications are subject to change without notice.

1. Noise Floor calculated at Maximum Sensitivity of 50kHz
2. Minimum Signal Duration for Guaranteed Detection = 50ms.
3. For units with optional fixed 20dB attenuation, noise floor will be increased to approximately 25dB SPL.