

# RESOTUNE II (tm) Electronic Drum Tuner

<u>Table of Contents</u>	1. FIND BOTH.....(scan to find both note resonances).... Page 3
	2. TUNE-LUG/DRUM...(read and display Note pitches)..... Page 4
	3. CLEAR-LUG .....(read and display Lug matching)..... Page 5
	4. SAVE/RECALL.....(save and recall note data)..... Page 6
	5. SPECIFICATIONS.....(and general info)..... Page 8

FAST START- Support RESOTUNE II above your drum head, pointed at the first reference lug as shown in Fig 1 (page 2). Press **ON** button to turn on, then press **FIND BOTH** button to find both notes. When **CLEAR LUG** led starts blinking, press **CLEAR LUG** button. Rotate RESOTUNE around to read the other lugs one at a time and adjust the lugs to fine match each other as advised by the arrows above the CLEAR display leds.

That was easy :-) but please read the rest of this fine manual I wrote. JR..

*Your new **RESOTUNE II (tm)** is the most advanced drum-tuning device ever made for percussionists. RESOTUNE uses internal sound sources to vibrate your drum head at precise note intervals, then measures the actual acoustic response coming back from the tensioned drum heads to determine true note tuning and lug clear quality.*

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## LIMITED WARRANTY

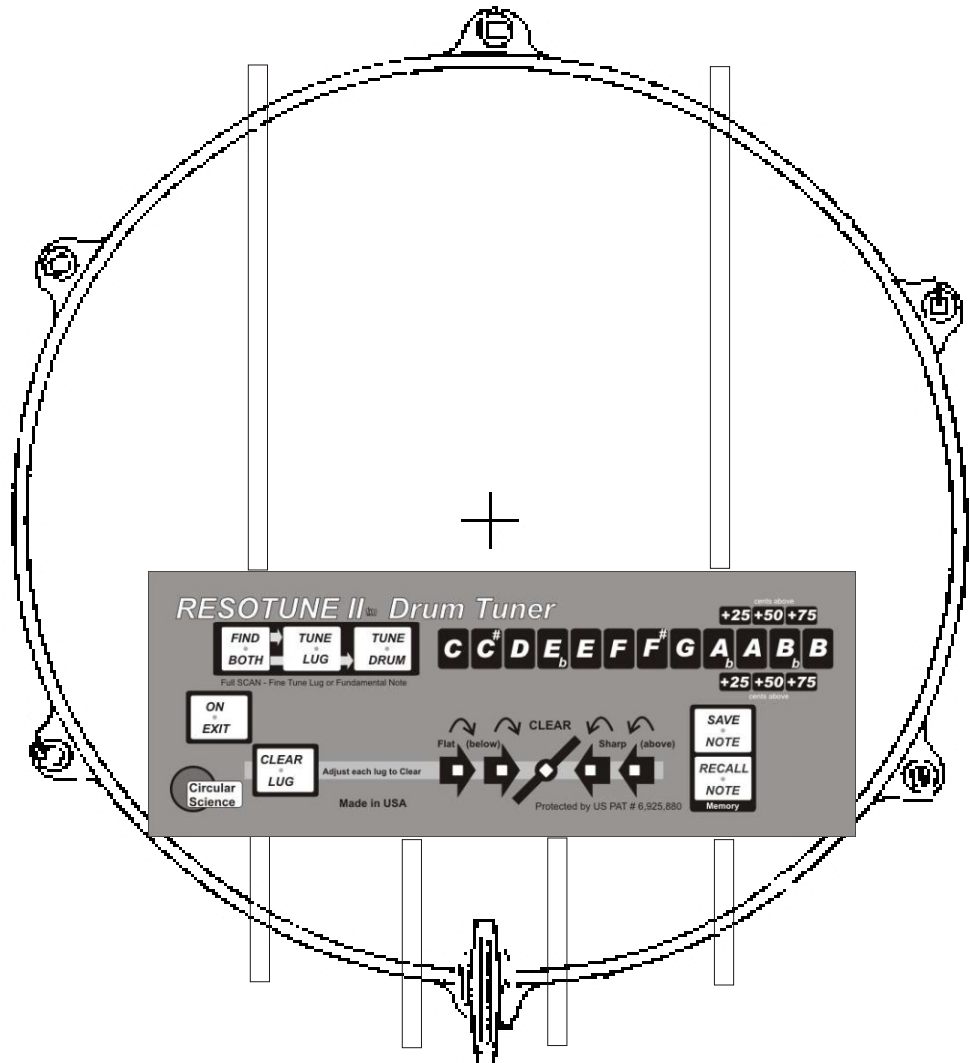
*Circular Science warrants RESOTUNE II against defects in materials and workmanship for a "Warranty Period" of three (3) years from the date of original purchase. The guarantee is given in accordance with legal requirements.*

Protected by US Patent # 6,925,880

Designed and manufactured in the USA by Circular Science

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## TO BEGIN TUNING :



**FIGURE 1.**

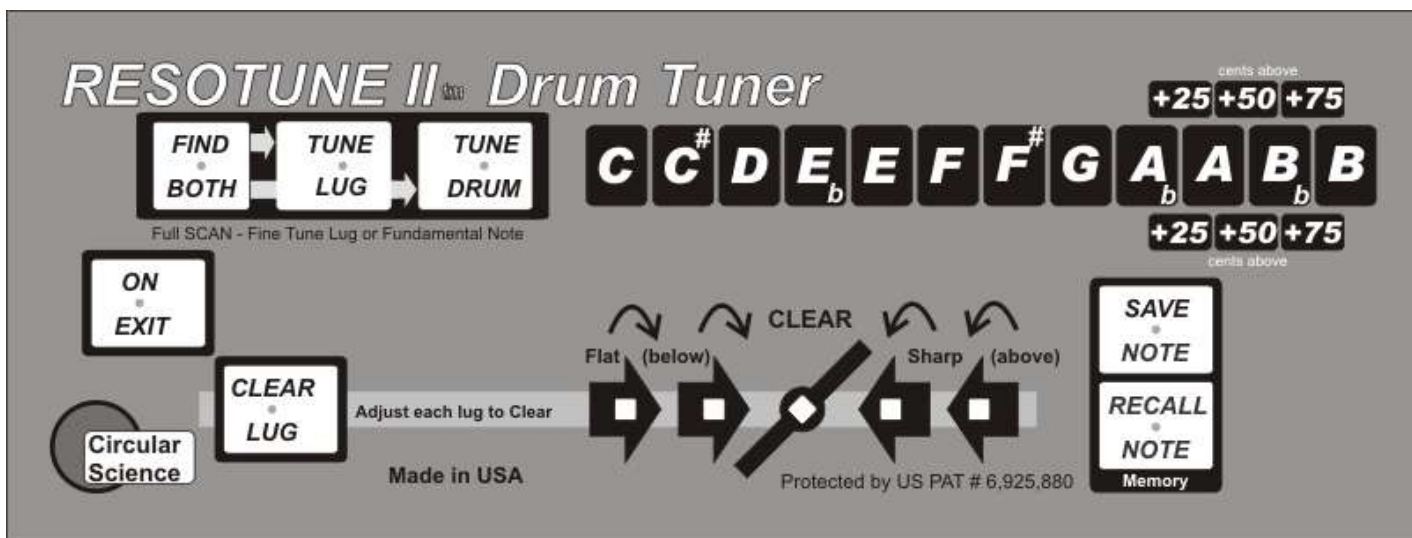
Place **RESOTUNE II** above your drum as shown in the figure above. Use the round wood struts inserted into the molded plastic front and rear ports to support the tuner above the drum head while not touching the head surface so the drum can vibrate freely. Center the two front middle struts on either side of the first lug you want to measure. For accuracy you should keep the tuner distance away from the rim edge similar to shown in the figure above. The exact distance is not critical while the tuner should maintain the same distance from the rim edge for each lug measurement. If the drum being measured has not been played for several days, tap the drum head a few times first to free up the drum's knife edge that can deform the plastic drum head and stick.

RESOTUNE II is our second generation tuning platform using this patented technology so we added all that we learned to make this version simpler to use and more reliable. For the vast majority of tuning tasks it will be as easy as pushing the clearly labeled buttons and adjusting your lugs for the desired reading.

The term drum or drum head “clearing” may be new to some percussionists and this is not the same thing as tuning a drum to a specific note pitch. Clearing a drum head is fine matching the lugs to each other beyond what that first lowest note or notes voiced is, no matter what those notes may be, so the lugs are all in complete harmony with each other at every note in the resonance series. Effectively the drumhead is made completely in tune with itself. When “clear” the drumhead will sound more open, making the purest series of overtones it is capable of

**FIND BOTH** : Performs a full scan to identify fundamental and lug notes.

Press the ON button once to turn on RESOTUNE. The first step before fine tuning or clearing a drum head is to let RESOTUNE scan the drum to learn the current head resonances, Press the **FIND BOTH** button to begin the scan from the lowest note range. RESOTUNE will show scan progress on the note display by lighting the note led being scanned in two colors. The found fundamental or “drum”note will display in red, and the higher “lug” note in green. RESOTUNE scans the lowest three octaves in one pass, but will keep scanning above for additional octaves as needed to capture the two lowest notes. Once RESOTUNE has identified the two lowest notes it will exit **FIND BOTH** and begin both **TUNE LUG** and **TUNE DRUM** modes to fine tune each by alternately sweeping from just below, to just above the two resonances. You will observe that these are two different notes and one or both will not fall centered on a full note. As indicated by the red and green + cents leds (right side of note display).

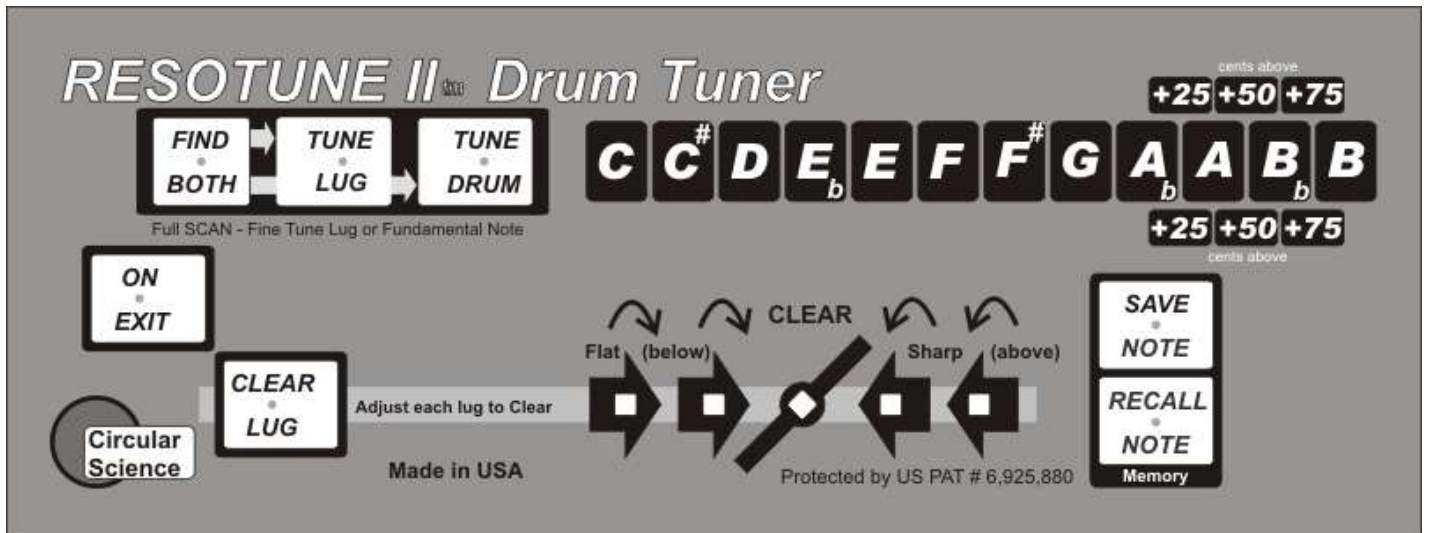


**TUNE DRUM** and **TUNE LUG** displays will follow both note changes as you adjust lug tension. When **TUNE LUG** does not see the lug note change for a few passes it will capture the internal clear lug reference and blink the red **CLEAR LUG** led to advise you it is ready to clear the other lugs. You can ignore the blinking led and continue tuning if you want. RESOTUNE will keep acquiring new LUG references as you continue tuning.

## TUNE LUG and TUNE DRUM: Fine tune fundamental and lug notes.

You can begin **TUNE LUG** or **TUNE DRUM** alone by pressing one, or run both together by pressing both buttons at the same time. To exit from just one with both running press the one you want to keep running. Note if you make changes in **TUNE DRUM** alone, you need to run **TUNE LUG** again to capture a new lug reference before you run **CLEAR LUG** accurately.

When making a large note change **TUNE DRUM** (red) will be more representative of the average drumhead tension so preferable to use. In fact the **TUNE DRUM** fundamental note depends on the average tension of both heads. **TUNE LUG** is reading a resonance that is local to just the nearest head being measured, so more useful for fine tuning, and is the note used for lug clearing.



We do not offer specific drum voicing advice but in general the fundamental or drum note (red), is the lower "thud" sound. The Lug Note (green) is the dominant pitch when you strike the drumhead off center, and is the characteristic pitch of the sustain. When detuning the resonant head to be sharp or flat relative to the batter head, it is the lug note (green) that is shifted sharp or flat. Which note you favor when tuning toms may depend how you play. For example if you play a run across the toms striking dead center you may want to tune the drum notes (red) to be on key, if more interested in the after ring or sustain the LUG note (green) may be more important. Experiment and decide for yourself what matters most to your playing style.

The tuning advice from DW to match the head tuning to their shell resonance "Timbre-Match" (r) is advising you to make the bottom resonant head match the marked shell note, and if you do detune the two heads apart, make the top head sharp or flat relative to the bottom head and shell. We do not make any claims about this and suggest you ask DW if you have more questions about their advice Note Timbre-Match (r) is a registered mark of Drum Workshop, Inc. .

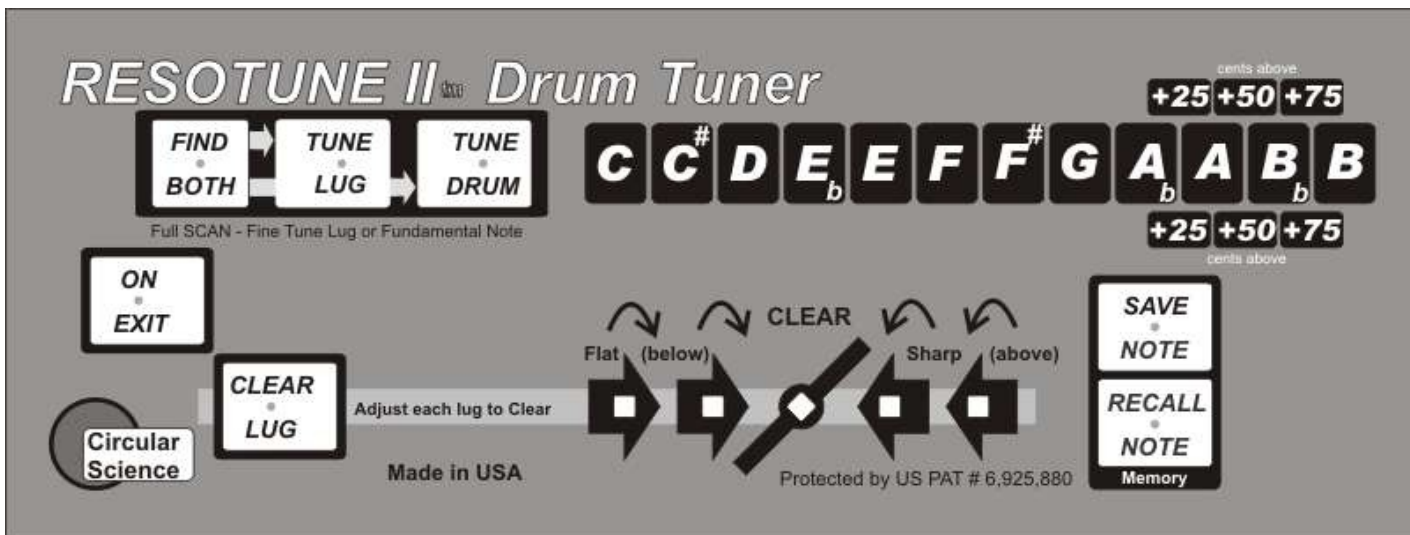
When retuning a newly mounted head to a formerly saved note pair use the lug note (green) first since it will be less susceptible to errors from the opposite head. The lower drum note (red) can vary dramatically if only one head is mounted and/or opposite head tension is way off.

You can exit both TUNE modes by pressing **ON/EXIT** to idle RESOTUNE, or press another function to jump directly into that different mode. You can likewise start **TUNE LUG** and/or **TUNE DRUM** at any time from idle or another function by pressing one or both buttons. If you are ever uncertain that RESOTUNE is locked to the correct resonances just press **FIND BOTH** for a quick re-scan to be sure.

**CLEAR LUG** : Measures clear quality of each lug one at a time

Clearing a drumhead describes the process of fine tuning the lugs to each other not just at a specific note pitch but even more closely than that. When the lugs are matched to be “clear” the drum head is actually making less slightly different notes for a purer more simple sound character. The drum seems to open up and is more resonant. Clearing both heads to each other, increases the sympathetic coupling between the two heads when one is struck. This results in a more resonant voice with longer sustain. Detuning the two heads slightly apart, diminishes the coupling for a less resonant sound with faster decay sustain.

RESOTUNE uses a different property of sound than frequency to measure the lug clear quality. It compares each lug to a previously captured reference or baseline clear quality that is captured from the reference lug during **TUNE LUG** mode.



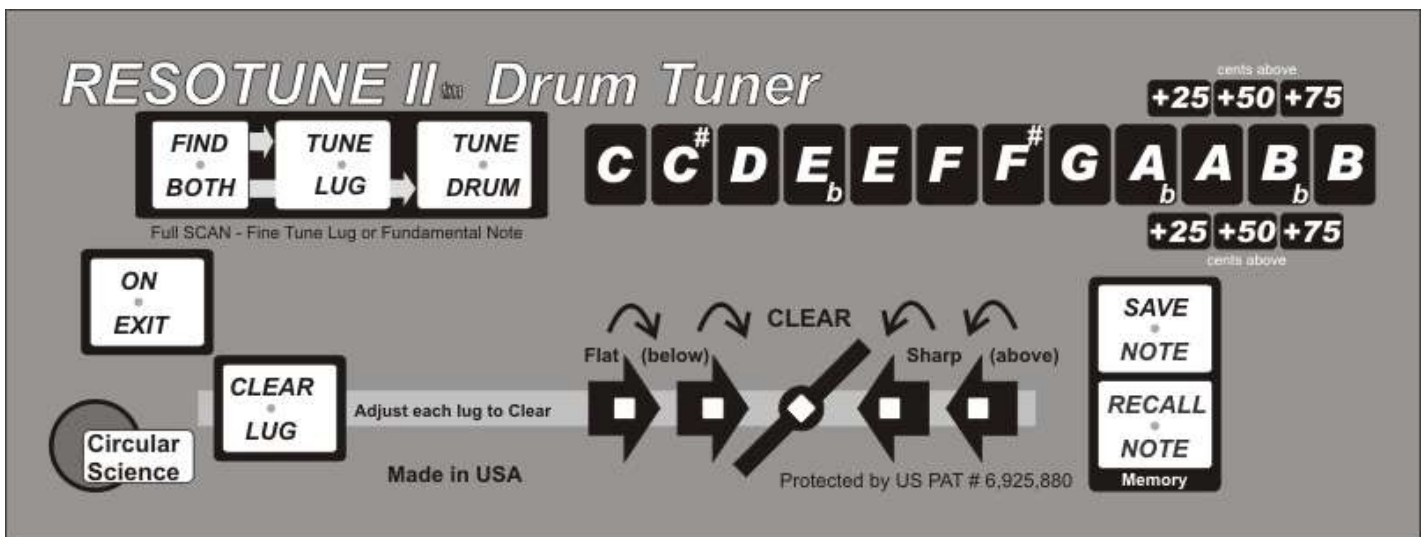
With RESOTUNE sitting above the drumhead as shown in figure 1 (first page) Press **CLEAR LUG** to begin clearing. The 5 led clear display will indicate the clear quality for just the one lug centered between the two middle front struts. If RESOTUNE is still pointed at the lug that was used to capture the reference, it should already measure clear (green led only) or very close. If a sharp or flat red led is also glowing, adjust that lug in the direction indicated above that led until only the green led is on. Then rotate RESOTUNE around to measure and clear each lug one at a time to the same clear reference. You can stop or pause **CLEAR LUG** at any time by pressing **ON/EXIT**. Pressing **CLEAR LUG** again, will pick up again exactly where you left off.

You can make any other lug, the reference lug, by pressing **TUNE LUG**, with RESOTUNE **centered** on that new lug. When the red **CLEAR LUG** led starts blinking, just press **CLEAR LUG** again and you are back clearing lugs but with the new lug reference in place. Note: this may change the clear readings for any previously cleared lugs.

## SAVE NOTE : Store previously captured and tuned note pairs into permanent memory

You can save new note pairs, both drum and lug notes plus the lug clear reference into memory at any time by simply pressing the **SAVE NOTE** button. RESOTUNE compares the new note pair to all of the previously saved note pairs and if not already in memory, will save them at the top of the list. If there is a good new save you will see the green note leds ramp from left to right to confirm the good save. If the note pair has already been saved you will instead see the red note leds ramp from right to left. If the note pair is already saved but the clear reference data has changed it updates the former saved note pair with the new clear reference data into the same former memory location and gives you a good save display indication.

RESOTUNE can save up to 48 unique note pairs. If the memory is full and you try to save more, it will give a combination display of both green leds ramping left to right followed by red leds ramping right to left, then ignore the save request. We describe how you can erase unwanted note pairs from memory in the **RECALL NOTE** section. These note pairs in memory get transferred from volatile RAM memory into non-volatile FLASH memory when RESOTUNE is turned off. If you remove battery power with RESOTUNE turned on you will lose any new information that hasn't been permanently stored.



## RECALL NOTE: Manage and recall formerly saved note pairs

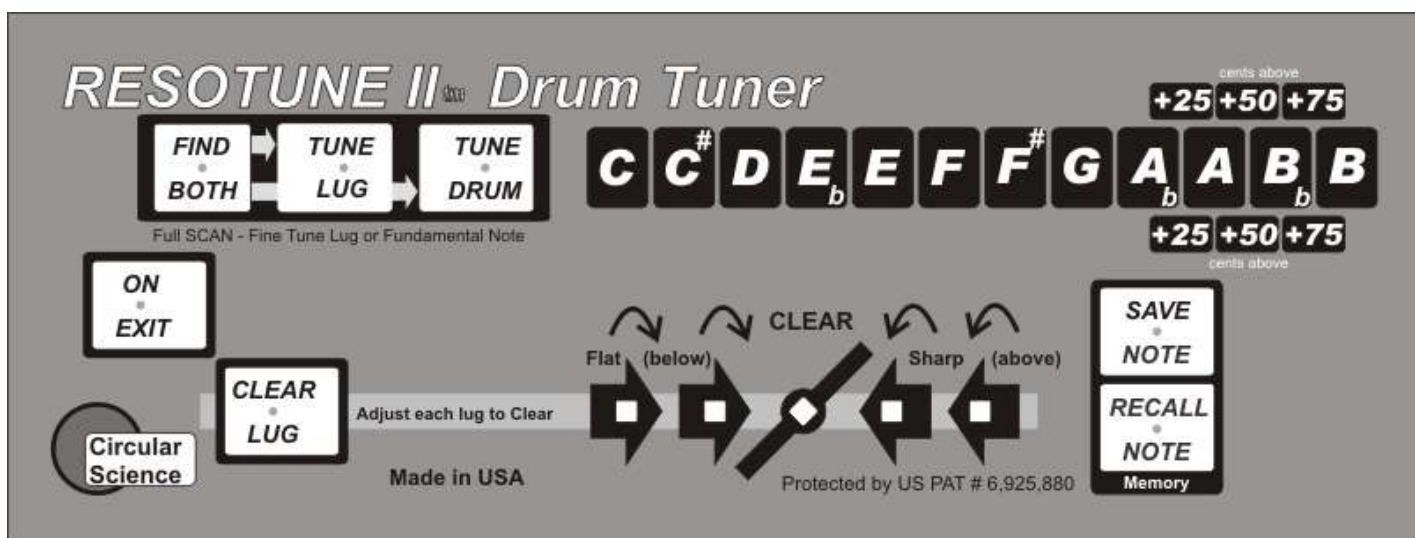
RESOTUNE II has internal non-volatile memory that can save up to 48 note pairs, when the unit is turned off, and even if the batteries are removed. We save both notes and the associated lug clear reference offset data for later use. These saved notes are now self-organized in last-in first-out order. To make it easier to find formerly saved notes that could be stored anywhere on the list, RESOTUNE II provides a feature that measure the actual acoustic response coming back when every note saved in memory is sampled and rearranges the memory into a new order ranked by the strength of the note response with strongest return located at the top of the list so finding the best match for a given drum becomes almost automatic. RESOTUNE uses only the LUG note when performing this sort because the drum note pitch changes dramatically between having only one head mounted or both. Reading the lug level should always work better to find a match even when in the middle of changing heads with only one head mounted.

Press the **RECALL NOTE** button to start playing and displaying the top or last saved note pair. RESOTUNE alternates between playing the LUG note (green) and DRUM note (red), with a relative loudness level bar graph meter display using the 12 note leds. If you press **RECALL NOTE** again RESOTUNE loads the next pair of notes from memory, and shows their relative levels. A strong level return for both notes suggests you have the correct saved note pair for that drum.

## RECALL NOTE cont. : Manage and recall formerly saved note pairs

To return to the top of the list while in **RECALL NOTE** simply press **ON/EXIT** to exit and then press **RECALL NOTE** to start again from the top of the list. To sort the list of saved notes in memory based on level, press **RECALL NOTE** and hold it pressed down for at least a second. When you release the button RESOTUNE will first step through all the saved notes and collect the return levels, then sort them all into a new order based on this new level measurement, If you save a new note pair using **SAVE NOTE** after doing a sort the new note pair will just get placed at the top of the new list order.

To erase a formerly saved note pair that you no longer want to keep in memory, first press **RECALL NOTE** and step through the saved note pairs until you have the note pair that you want to erase displaying in the note display. Press and hold the **ON/EXIT** button down, then before you release the **ON/EXIT** button press **RECALL NOTE**, then release both buttons in any order. The saved note pair will be erased and RESOTUNE will exit from **RECALL NOTE**.



## AUTOMATIC SHUT DOWN

To preserve battery life an internal timer keeps track of button presses and program activity. If no button has been pressed, or tune status has not changed for a predetermined time interval, RESOTUNE will exit from that program and idle in standby mode. After a second similar interval with no activity RESOTUNE will turn itself off.

## LOW BATTERY INDICATION

RESOTUNE II measures the battery voltage when it first turns on and if it detects low voltage (<1V per cell) it blinks the red power led. RESOTUNE will continue working with low battery voltage but measurements may be compromised so no new permanent saves to non-volatile memory will be performed until normal battery voltage is restored. RESOTUNE will continue working with low voltage for a while longer but will shut itself completely off when voltage drops below minimum acceptable.

## BATTERY REPLACEMENT INSTRUCTIONS

To replace the 4 standard AA size batteries remove the front half of the molded plastic clamshell package. This is secured by six machine screws total, one screw on each side near the top where the front and back mate together and one screw in each of the four front strut ports. When all these screws are removed the front can be lifted off. With the front removed you can now slide the face plate/ top control board assembly out. Flex the board up slightly so the microphone clears the bottom plate. You can leave the speaker wires attached, but flip the control board upside down to gain access to the battery holder. There is a fiberglass panel loosely secured to the battery holder to hold the batteries in place during shipping. Observe the alternating alignment of the cells as marked on the battery holder. You can press the ON button while the unit is apart to confirm that the batteries are good and installed correctly.

To reassemble reverse the previous steps. Slide the top control board into the top slots in the back half of the plastic clamshell package, Flex the board up as needed so the microphone clears the bottom plate, then seats in the mic hole in that bottom plate. When the control panel is properly seated in place slide the front half of the plastic clamshell on paying attention to slots for both the bottom metal, and top control panel. With the clamshell halves mated snugly to each other reattach with the four screws in the strut ports, then the two on the sides.

## TECHNICAL SPECIFICATION

Protected by US Patent # 6,925,880

<b><u>Tuning Range:</u></b>	Lowest Note: C# -0 17.3 Hz	Highest Note: C -4 261.6 Hz
<b><u>Tuning System :</u></b>	Equal Temperament	
<b><u>Note Step size :</u></b>	25 cents (1/4th note)	
<b><u>Timebase Resolution :</u></b>	7 Mhz internal oscillator	
<b><u>Power Source:</u></b>	4 x standard AA batteries	
<b><u>Dimensions:</u></b>	2.5" H x 6" W x 10" L	6.35 CM H x 15.24 CM W x 25.4 CM L
<b><u>Weight:</u></b>	2 lbs 6 oz (shipping weight 3 lbs)	1.1 Kg

All specifications are subject to change. .

## S/N and software rev level

Software Rev# \_\_\_\_\_ S/N \_\_\_\_\_



When first turned on the software revision level will be displayed using the fractional note (cents) leds. RESOTUNE II units will also display a unique digital serial number using the note display when first powered on. This S/N can not be altered or removed to conceal identification. Make a note of this digital S/N somewhere safe in case you need to identify to prove ownership of your unit.

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