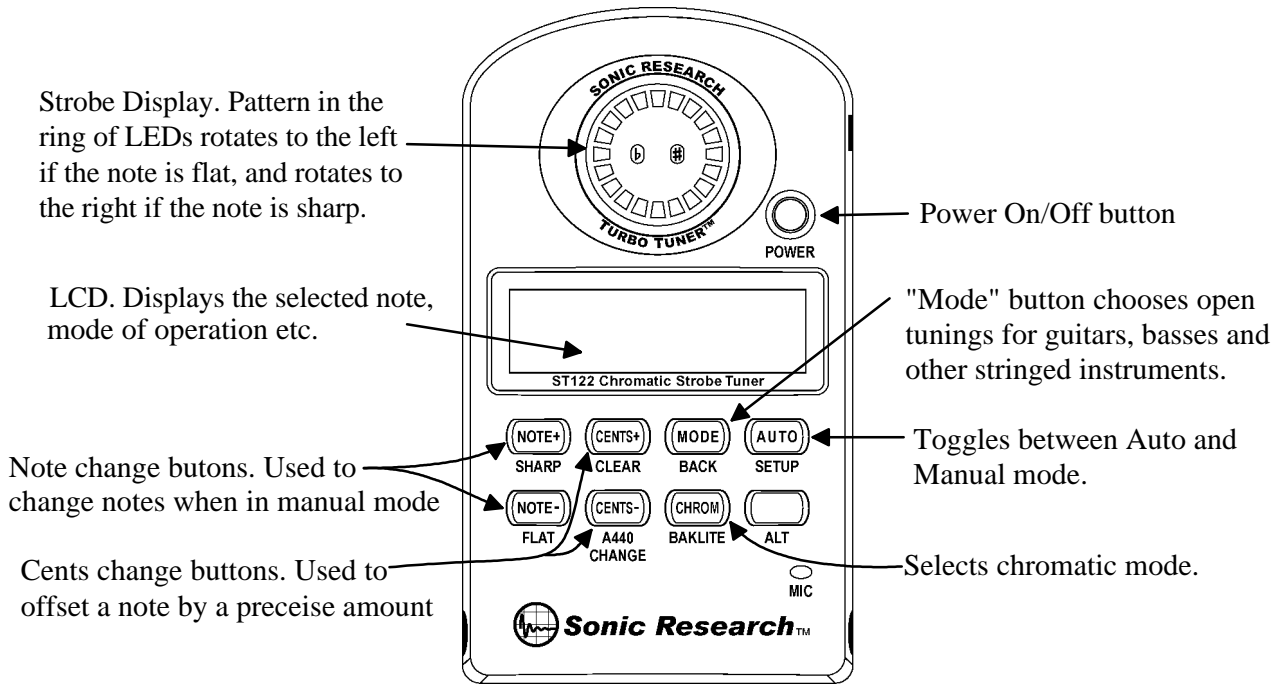
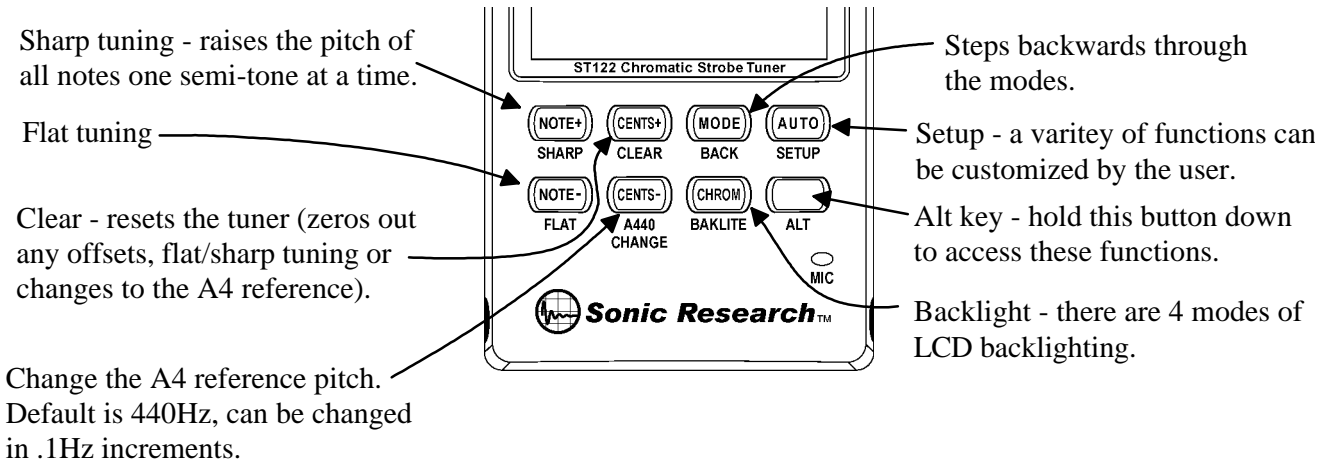


Front Panel

The front panel of the ST122 is shown below. The buttons have dual functions, selected the by Alt key in the lower right. The upper diagram shows the primary functions, the lower diagram shows the alternate functions.

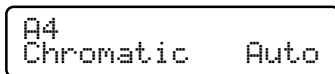


Alternate Button Functions



Using the Tuner - Quick Start

1. Turn on the power (press the Power button).
2. Plug in your electric instrument, or if it's acoustic, position the ST122 close to the instrument.
3. In most cases, the Auto / Chromatic mode is used. You can quickly go to this mode by pressing the Alt and Clear buttons. The LCD will read Chromatic and Auto on the bottom line, and display the note on the first line. In the example below, the note is A4, but this will change to match whatever note is played.



4. Play a note and observe the pattern in the LEDs. The direction of rotation indicates whether the note is sharp or flat. The farther out of tune, the faster the pattern will rotate. When stationary, the note is perfectly in tune. The note and octave are displayed in the upper left corner of the LCD.



Tuning Tips

• Fretted Instruments

1. Mute the strings not being tuned by resting your fingers on them. This will eliminate sympathetic vibrations and give a quicker response in Auto mode, and a cleaner pattern in the strobe display.
2. For electric guitars, selecting the pickup closest to the neck will give the clearest pattern. You can also back off the tone control for even greater clarity.
3. Plucking or bowing away from the bridge gives a clearer pattern than right next to the bridge. Also, try plucking the string with the side of the thumb rather than a pick.

• Tuning New Strings

When restringing an instrument, switch the tuner to manual mode, and select the desired open tuning (via the Mode key) when first bringing them up to pitch. Use the two Note keys to select the string being tuned.

• Changing Open Tunings

The ST122 has a number of built in open tunings, such as Drop-D, open A, etc. and the user can define his own as well. When retuning an instrument, the tuner should be in the manual mode.

• Acoustic Instruments In Noisy Rooms

The ST122 works excellent for tuning up in noisy rooms. If the room is noisy enough that the automatic note selection has trouble picking up the note, simply switch to manual mode.

ST122 Features

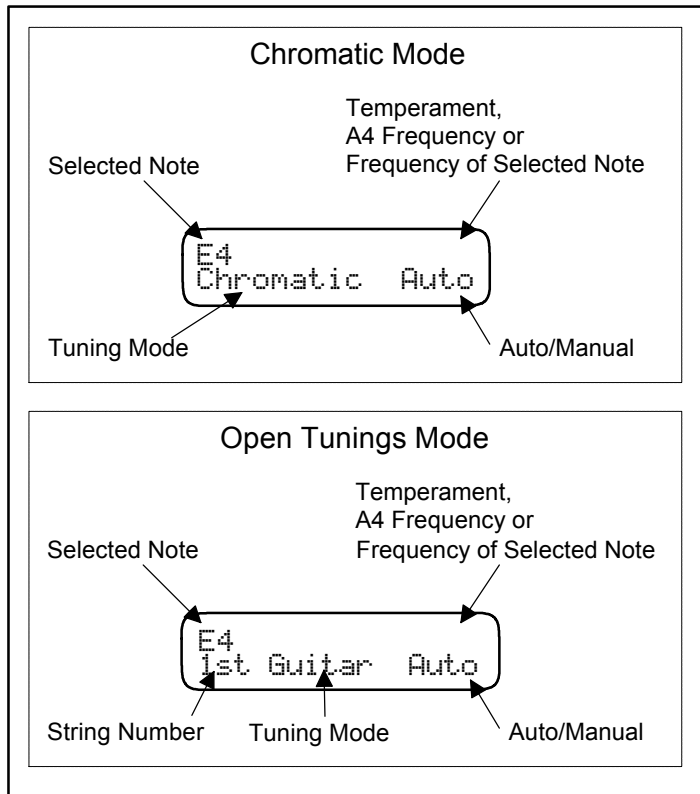
- **True Strobe Display** - easy to read display instantly shows the slightest difference in pitch of the note played from the indicated note.
- **Extreme Accuracy** - the internal timing generator is calibrated at the factory to maintain a precision of ± 0.02 cents.
- **Chromatic Mode** - permits tuning to any of the 12 notes from C0 to C8, in any temperament.
- **Open Tuning Modes** - tunes to preset or user defined tunings. In this mode the tuner only recognizes notes that are defined for the specified tuning. The tuner comes with a number of pre-defined tunings for stringed instruments. These can be added to and/or erased by the user.
- **Auto/Manual Modes** In Auto mode the tuner senses the note being played and adjusts the strobe display to the nearest note of the selected tuning mode. In Manual mode the Note+ and Note- keys select the note. Manual mode is useful when restringing an instrument, changing to a different open tuning, or tuning an acoustical instrument in a very noisy environment.
- **Power On Restore** - by default the ST122 remembers the settings from the last time it was powered down. This can be changed by the user.
- **Cents Adjustment** - the Cents+ and Cents- keys adjust the cents deviation of the note in increments of 1 cent or .1 cent. Press both keys simultaneously to switch increments, hold both keys for 1 second to clear the cents offset.
- **Flat and Sharp Tuning** - raise or lower all pitches up to six semitones.
- **Reference Pitch Change** - the tuner uses A4=440Hz as the reference pitch. This can be changed in increments of .1Hz
- **Temperaments** - the ST-122 can operate in the equal temperament or any 12 note temperament the user desires. The ST-122 can store a total of 14 different temperaments, in addition to the equal temperament.
- **Auto Power Off** - after about 5 minutes of no activity the tuner will shut off to prolong battery life. This feature may be disabled by the user via the Setup menu.
- **Low Battery Indication** - when there is about one hour of battery life remaining, a low battery warning is shown on the LCD.
- **Frequency Display** - the frequency of the note in Hertz can be displayed along with the note and octave.

LCD Display

The LCD displays information such as the note being tuned, the temperament, open tuning mode etc. The diagram below shows the general layout of the information on the LCD for normal operation.

The ST-122 has many special features, and the LCD configurations for these special features are shown in later sections.

The examples below show the display when using the equal temperament. In this case, the temperament name is not displayed.



Using the Special Features

• Open Tuning Modes

The tuner operates in either chromatic mode, or one of up to 17 different open tuning modes. The open tuning modes are useful for any stringed instrument. The tuner comes programmed with a number of commonly used open tunings for guitar, bass and bowed instruments. The user may program any desired open tuning for any stringed instrument no matter how many strings it has. See the appendix for a complete list of the pre-programmed tunings.

In an open tuning mode, the tuner only selects notes that are defined for the particular tuning. For example, standard guitar tuning has six notes, E4, B3, G3, D3, A2 and E2. Open tunings are very handy when an instrument is way out of tune, such as when putting on new strings or changing from one alternate tuning to another.

To select an open tuning, press the Mode button. The name of the currently selected tuning along with the string number is shown on the bottom line of the LCD as shown below.

```
G3
3rd Guitar  Auto
```

Each time the mode key is pressed the tuner advances to the next open tuning. Holding the Alt key and pressing Mode will backup through the list of available tunings.

• Flat Tuning

Flat tuning lowers the pitch of all notes below the regular tuning from one to six semitones. Hold the Alt key and press the Note- key once for each flat desired. The LCD display will show the number of flats selected. In the example below, four flats have been selected.

```
G3 bbbb
3rd Guitar  Auto
```

To reduce the number of flats, use the Alt-Note+ key combination, or clear them with the Alt-Clear key combination.

• Sharp Tuning

This is the inverse of flat tuning and operates in the same manner.

• Changing the Reference Pitch

The default reference pitch is A4=440 Hz. This can be changed in .1Hz increments from 220.0 Hz to 880.0 Hz.

To change the reference pitch, press the Alt-A440 Change key combination. The display will then look as shown below:

```
A4=440.0
Adj w Note&Cents
```

Use the Note keys to change the frequency in 1 Hz increments, and the Cents keys to change it in .1 Hz increments.

Pressing Note+ and Note- simultaneously will set the frequency back to 440.

When finished, press the Alt key by itself to save the new value and return to normal operation.

When the A4 value is anything other than 440Hz, its frequency is shown in the upper right of the LCD display as demonstrated below (A4 is set to 445.3Hz).

```
A4          A445.3
Chromatic   Auto
```

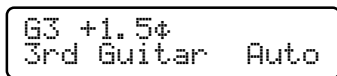
To set the pitch back to 440Hz, you can use the Alt-Clear key combination, or Alt-A440 Change then press Note+ and Note- together.

• The Cents Keys

The cents keys adjust the selected note by up to ± 50 cents in increments of 1 or .1 cents. This allows you to precisely measure a note, or create a custom tuning for special purposes.

To see how far a note is out of tune, sound a note and use the cents keys to adjust the tuner until the strobe display is stationary. By default the increment is 1 cent. To change to .1 cent, press both keys at the same time.

The cents offset is displayed to the right of the tuning note on the LCD as shown below.



The image shows a rectangular LCD display with a black border. The text on the display is arranged in three lines: the first line shows 'G3 +1.5¢', the second line shows '3rd Guitar', and the third line shows 'Auto'. The text is in a simple, monospaced font.

The Cents keys have an auto repeat feature where if you hold the key down for one second the value will automatically increment or decrement.

Pressing and holding both keys for 1 second resets the cents offset back to zero.

• LCD Backlight

The LCD backlight mode is set using the Alt-Backlight key combination. Hold the Alt key down and repeatedly press the Backlight key to scroll through the four different backlight options:

1. **Off** - the backlight is never used.
2. **On** - the backlight is on all the time. Note that this will greatly reduce the life of the battery.
3. **On Key** - the backlight will illuminate any time a key is pressed, and will remain on for about 5 seconds.
4. **On Sound** - the backlight will illuminate when a note is played.

• The Clear Key

Pressing the Alt-Clear key combination is a quick way to reset any special functions and offsets that have been set. The following happens when Alt-Clear is pressed:

- Cents offset is reset to zero.
- The A4 reference frequency is set to 440Hz.
- Any sharps or flats are cleared.
- The temperament is set to equal temperament.
- The display frequency feature is turned off.
- Auto mode is selected.
- Chromatic mode is selected.

• The Setup Menu

Pressing the Alt-Setup key combination enters the setup menu. The menu is set up so that pressing the "Auto" key advances to the next menu item without making any changes, and the "Note+" key performs the indicated action.

The Setup Menu is used to perform the following functions. These are covered in detail in later sections:

- **Auto Power Off** - when on, unit will shut off after about 5 minutes of inactivity.

- **Show Note Frequency** - when selected, the tuning note's frequency in Hertz is shown on the LCD.
- **Power on Settings** - by default the tuner powers up in exactly the same state as when it was shut off. There are several other options, explained in the next section.
- **Enter New Tuning** - allows the user to program custom open tunings.
- **Delete Tuning** - user may delete the currently selected open tuning.
- **Change Temperament** - the user can select any available temperament.
- **Delete Temperament** - self explanatory
- **Edit Temperament** - new temperaments may be defined, and existing ones may be edited.
- **Restore Defaults** - this will restore all the factory defaults including the tunings and temperaments. ANY USER DEFINED TUNINGS AND TEMPERAMENTS WILL BE ERASED.

Power On Settings

There are three different options for the tuner's settings when it is powered on. As shipped from the factory, it powers on with the exact same settings as the last time it was shut off.

The three options are:

- **Factory Defaults** - The tuner will always be set as follows when first turned on:
 - Mode is Chromatic / Auto
 - Note is A4
 - LCD Backlight is Off
 - Show Frequency - Off
 - Auto Power Down is On
 - A4 is set to 440.000 Hertz
 - Cents offset is 0
 - No sharps or flats
 - Temperament is Equal
- **Current Settings** - When this is selected from the Setup Menu, the current settings are saved and the tuner will start with these settings each time it is powered up.
- **From Power Off** - The tuner powers up with the exact same settings as when it was last turned off. This is the default as shipped from the factory.

Defining a New Open Tuning

To define a new open tuning, first enter the Setup Menu via the Alt-Setup key combination, then advance through the options using the Auto button until you come to a selection called "Enter New Tuning". Press the Note+ key to get started.

Enter the Name for the New Tuning

The first step is to enter a name for the tuning. The name may be any combination of letters and numbers. There can be a maximum of 7 characters in the name. The name is entered as follows:

- Note+/- scrolls through the alphabet
- Cents+ toggles between upper and lower case
- Chrom advances to the next character position
- Cents- backspaces over the previous character
- Auto accepts the name and advances to the next step, entering the notes for each string.

Entering the String Tunings

This starts with the highest string, which is always string 1. The strings must be entered starting with the highest note and going to the lowest.

- The display will show the currently selected note on the first line, and the second line will read "Set str 1 enter"
- Use the NOTE+/- and CENTS+/- keys to select the note. The unit is in manual mode. You can set the note by plucking the desired string and adjusting the note and cents to match it.
- Press the AUTO button (under the word "enter" on the display) to enter the note into memory and proceed to the next string.
- It will then ask if there are any more strings. Pressing yes will repeat the procedure for entering a new string. No will enter the tuning into memory and return to normal operation.

Canceling a Tuning

If you wish to cancel entering a tuning, simply shut the power off. The tuning is not saved until you tell it there are no more strings.

Editing an Existing Open Tuning

You may edit the notes of any tuning except Guitar. The note values of the tuning may be changed, but the number of notes and the name of the tuning cannot be changed.

To edit a tuning, first use the MODE key to select the tuning you wish to edit. Then enter the Setup Menu via the Alt-Setup key combination, and advance through the options using the Auto button until you come to a selection called "Edit Tuning?". Press the NOTE+ key to get started. The display will then show the following message, reminding you that the MODE key is used to exit edit mode.

```
Press MODE when
finished. Start
```

Press the AUTO key (under the word "Start" on the display) to enter the edit mode. The display will then look similar to this:

```
E4
Set str 1 Scroll
```

The AUTO/ALT keys are used to scroll through the different notes in the tuning. The bottom line shows the "string number" and the upper line shows the note for that string. Simply use the NOTE+/- and CENTS+/- keys to adjust the

notes you want to change. When you are finished, press MODE and the tuner reverts to normal operation.

Deleting a Tuning

Any tuning except Guitar and Chromatic may be deleted.

- First, use the MODE key to select the tuning you wish to delete.
- Enter the Setup Menu and advance to the option "Delete Tuning?". The second line will have the name of the tuning. Pressing NOTE+ for yes will delete the tuning from memory. Pressing AUTO will return to normal operating mode without erasing the tuning.

Once erased, a user defined tuning can only be restored by entering it again.

The tuner comes from the factory with a number of open tunings built in. These may be erased, and can be restored by selecting the "Restore Defaults" option from the Setup Menu. However, doing so will erase any user defined tunings and temperaments.

Temperaments

- **Selecting a Temperament** - Enter the Setup Menu (Alt-Setup keys) and advance to the option "Change Tempermt". Select the "Yes" option by pressing the NOTE+ key. The display will then look something like this:

```
EQUAL
Scroll OK
```

The top line shows the currently selected temperament, in this case the equal temperament. Use the NOTE+/- keys to scroll through the list of available temperaments. NOTE+ scrolls forward and NOTE- scrolls backward. Press the AUTO key to use the temperament shown on the first line.

When the temperament is anything other than the equal temperament, the name will appear in the upper right of the display as shown below, where the Pythagorean temperament has been selected. Temperament names are limited to 7 characters.

```
A4 PYTHAG
Chromatic Auto
```

- **Editing a Temperament** - Temperaments are defined as offsets from the notes of the equal temperament. These offsets may be edited for any temperament. Temperament names cannot be changed, however.

To edit a temperament, enter the Setup menu (Alt-Setup keys) and advance to the option "Edit Temperament". Select the "Yes" option by pressing the NOTE+ key. Here's how the display will look if the tuner was in the Pythagorean temperament:

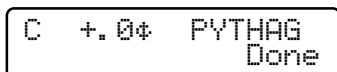
```
PYTHAG
Scroll Edit
```

The top line shows the temperament to be edited. If the tuner was in the equal temperament, the display will look like this.

```
New Temperament
Scroll Edit
```

This is used to create a new temperament, and is covered in the next section.

Use the NOTE+ and NOTE- keys to scroll through the list, and press the AUTO key to edit the temperament. The display will then show the note, the offset in cents and the name of the temperament being edited as shown below.



Use the NOTE keys to scroll through all 12 notes of the scale, the CENTS keys change the offset for the note in increments of .1 cents. Holding one of the CENTS keys down for one second will cause it to auto-repeat. Press the AUTO key when done.

Creating a New Temperament

To create a new temperament, follow the same steps as for editing a temperament, using "New Temperament" as the name of the temperament to edit. You will then be prompted to enter the name for the new temperament. This is done in exactly same manner as entering the name for a new open tuning:

- Note+/- scrolls through the alphabet
- Cents+ toggles between upper and lower case
- Chrom advances to the next character position
- Cents- backspaces over the previous character
- Auto accepts the name and advances to the next step, entering the offsets for each of the 12 notes.

The offsets for each note in the new temperament are set to 0.0, and are changed just as for editing a tuning.

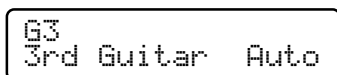
LCD Display

The LCD displays information such as the note being tuned, the temperament, Auto/Manual mode, tuning mode (Chromatic or Open Tuning), A4 reference and the frequency of the note. Many of these are options and only displayed if selected.

The diagrams below show the most common display configurations.

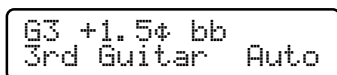
The note being tuned is always shown in the upper left of the display. The bottom line always shows the tuning mode, and Auto/Manual.

Below is the display when the Guitar mode is selected.



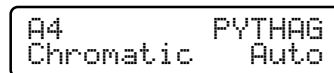
This tells the user the tuner is in the Guitar mode and currently is tuning the 3rd string which is G3.

The note can consist of as many as 4 elements: The note letter, the octave, any cents offset, and any sharps or flats. The example below shows the note offset by 1.5 cents and two flats:

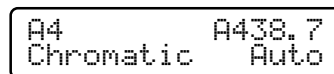


The important thing to remember is the note is always displayed at the start of the first line.

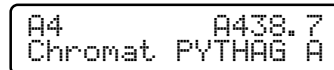
The upper right of the display shows special features. If in a temperament other than equal, it shows the temperament name. Here the Pythagorean temperament has been selected.



The upper right is also used to show the reference pitch if it has been changed from 440 Hz. Here it's been set to 438.7Hz.



So what happens if there is a conflict and there are two values that by themselves would be in the upper right? The ST122 will configure the display so that all of the information is shown. Certain fields will be abbreviated. The example below shows how the display would look in the Pythagorean temperament with A4 set to 438.7Hz.



Specifications

General Specifications	
Dimensions	4.75" (12cm) x 2.7" (6.9cm) x 1.4" (3.6cm) HxWxD
Weight	175 g / 6.2 oz (including battery)
Temperaments	Equal plus 14 user defined (Just and Pythagorean are pre-programmed into user defined temperament memory)
Tuning Range	C0 (16.35 Hz) to C8 (4,186.0 Hz)
Accuracy	±.02 Cents (calibrated crystal oscillator)
Reference Pitch	A4 = 220.0 Hz to 880.0 Hz in .1 Hz increments. (440Hz default)
Jacks	Input, Output (1/4") and external 9 VDC
Power Supply	9 Volt Alkaline Battery (included), or external 9 Volt DC adapter (optional).
Power Consumption	23 mA typ., 50mA with backlight on

Sonic Research Inc. retains a policy of constant product improvement. Therefore, specifications are subject to change without notice.

Appendix A - Open Tunings

The ST-122 comes with the following open tunings built in. Any of these may be erased or edited by the user if so desired.

Drop D	
String Number	Note Name
1st String	E4
2nd string	B3
3rd string	G3
4th string	D3
5th string	A2
6th string	D2

DADGAD	
String Number	Note Name
1st String	D4
2nd string	A3
3rd string	G3
4th string	D3
5th string	A2
6th string	D2

Open A	
String Number	Note Name
1st String	E4
2nd string	C#4
3rd string	A3
4th string	E3
5th string	A2
6th string	E2

Open D	
String Number	Note Name
1st String	D4
2nd string	A3
3rd string	F#3
4th string	D3
5th string	A2
6th string	D2

Open E	
String Number	Note Name
1st String	E4
2nd string	B3
3rd string	G#3
4th string	E3
5th string	B2
6th string	E2

Open G	
String Number	Note Name
1st String	D4
2nd string	B3
3rd string	G3
4th string	D3
5th string	G2
6th string	D2

BASS	
String Number	Note Name
1st String	G2
2nd string	D2
3rd string	A1
4th string	E1

BASS DD (Bass Drop D)	
String Number	Note Name
1st String	G2
2nd string	D2
3rd string	A1
4th string	D1

BASS-5 (5 String Bass)	
String Number	Note Name
1st String	G2
2nd string	D2
3rd string	A1
4th string	E1
5th string	B0

VIOLIN	
String Number	Note Name
1st String	E5
2nd string	A4
3rd string	D4
4th string	G3

VIOLIN5 (Violin - Pure 5ths)	
String Number	Note Name
1st String	E5+2.0¢
2nd string	A4
3rd string	D4-2.0¢
4th string	G3-3.9¢

CELLO	
String Number	Note Name
1st String	A3
2nd string	D3
3rd string	G2
4th string	C2

CELLOp5 (Cello - Pure 5ths)	
String Number	Note Name
1st String	A3
2nd string	D3-2.0¢
3rd string	G2-3.9¢
4th string	C2-5.9¢

Warranty

Sonic Research Inc. (SRI) warrants the ST-122 to be free from defects in materials or workmanship for a period of one year from the date of purchase. If, during this period, any device in normal use fails to function due to a fault in materials or workmanship, Sonic Research shall, at its sole discretion, either repair or replace the device, and will ship the repaired original or reconditioned replacement device back to the original purchaser, free of charge. The cost of shipping any merchandise to Sonic Research for warranty service is the responsibility of the buyer. All returns must be accompanied by a return authorization number. Please contact Sonic Research at 1-800-811-0272 for assistance. This warranty does not cover damage caused by accident, misuse, attempted alterations or repairs, or defective batteries.

SRI reserves the right to make changes in design or make additions to or improvement upon this product without any obligation to install the same on products previously manufactured.

SRI shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitation of incidental or consequential damage, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

FCC Statement of Conformity

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Contact Information

The Turbo Tuner is manufactured in the USA by:

Sonic Research Inc.
711 S. Carson Street, Suite 6
Carson City, Nevada 89701
(775) 883-4831

www.sonic-research.com

email: info@sonic-research.com

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