

A Science Guide with Supplemental Experiment Kit

AGES  
8+

TM

# JR. SCIENTIST

## SERIES



© Mizutani salucoro/Gakken



# mini ELECTRIC GUITAR

Requires 2 x AA batteries  
(Not included)



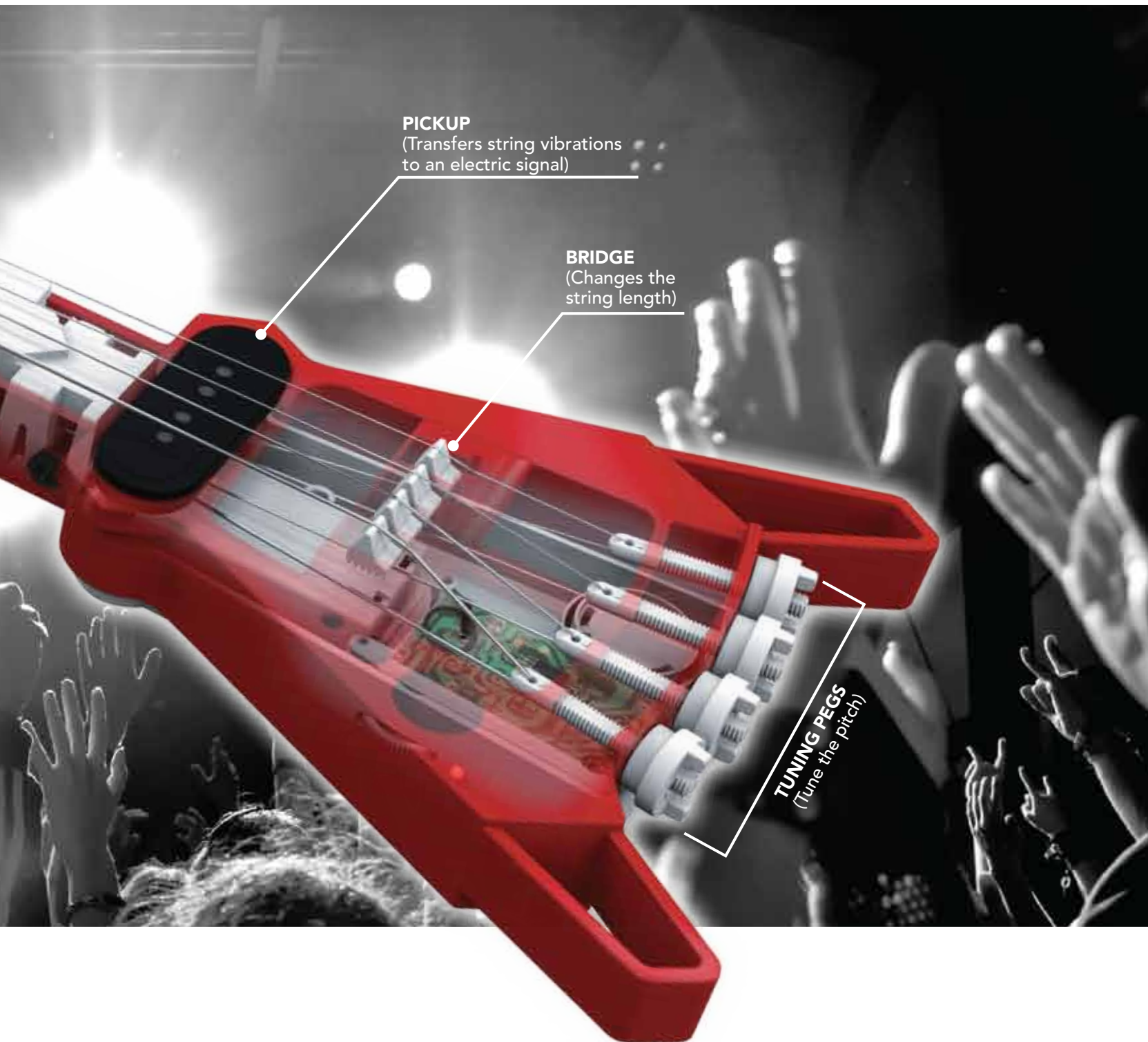
**WARNING:** This product contains a small magnet. Swallowed magnets can stick together across intestines causing serious infections and death. Seek immediate medical attention if magnet is swallowed or inhaled. Not suitable for children under 8 years.





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**PICKUP**

(Transfers string vibrations to an electric signal)

**BRIDGE**

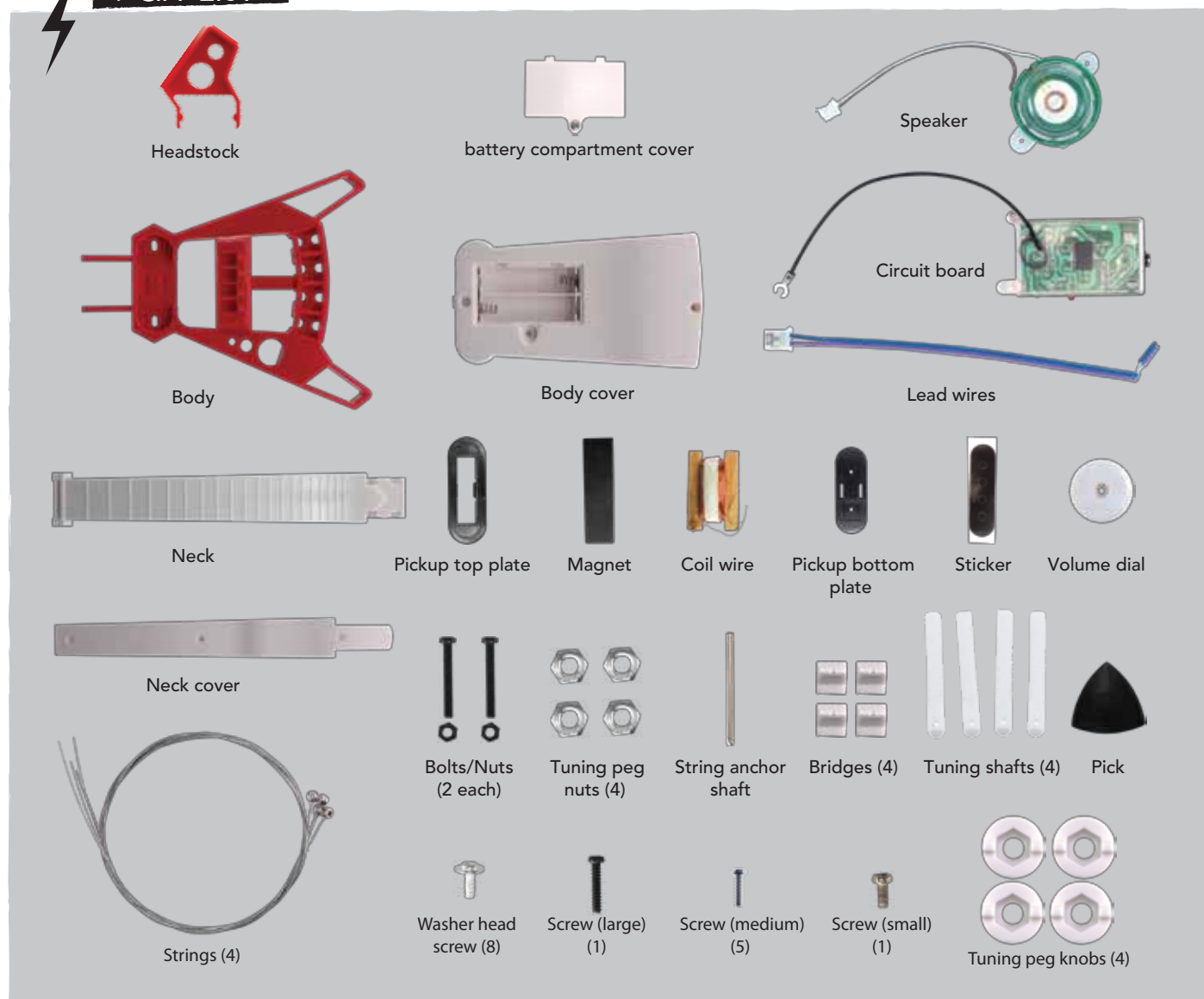
(Changes the string length)

**TUNING PEGS**  
(Tune the pitch)

# How to Assemble Built-in Amp and Speaker Mini Electric Guitar



## Part List

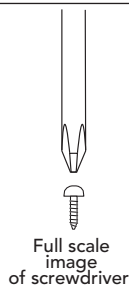


## Things you will need

Screwdriver; cellophane tape; rubber bands; scissors; two AA alkaline batteries or two zinc-carbon batteries. (\* NiCd and other rechargeable batteries have low voltage. Therefore the guitar may not work when these batteries are used. Oxyride batteries have high voltage. Using these batteries may break the circuit.)

## Notes for tightening screws

When tightening screws, firmly press the screwdriver straight against the screw and turn. It is said that 70 percent of the force applied is used for pushing against the screw and 30 percent for turning it. The types of screws used are those that carve grooves into the plastic as they are inserted (self-threading). For this reason, the screw hole may be damaged if you exert too much force when tightening the screw. Since it is difficult to turn a precision screwdriver, please use a small driver that has a grip radius of about 2 cm.



## CAUTION!

Please be sure to read the following instructions before assembling this kit.

- Take necessary caution when handling parts with pointed edges. There is a risk of injury.
- This kit includes screws and other small parts. Be careful not to swallow them. There is a risk of suffocation.

Two AA batteries are used. Incorrect use of the batteries may cause the generation of heat, explosions or liquid leakage. The following precautions should be taken.

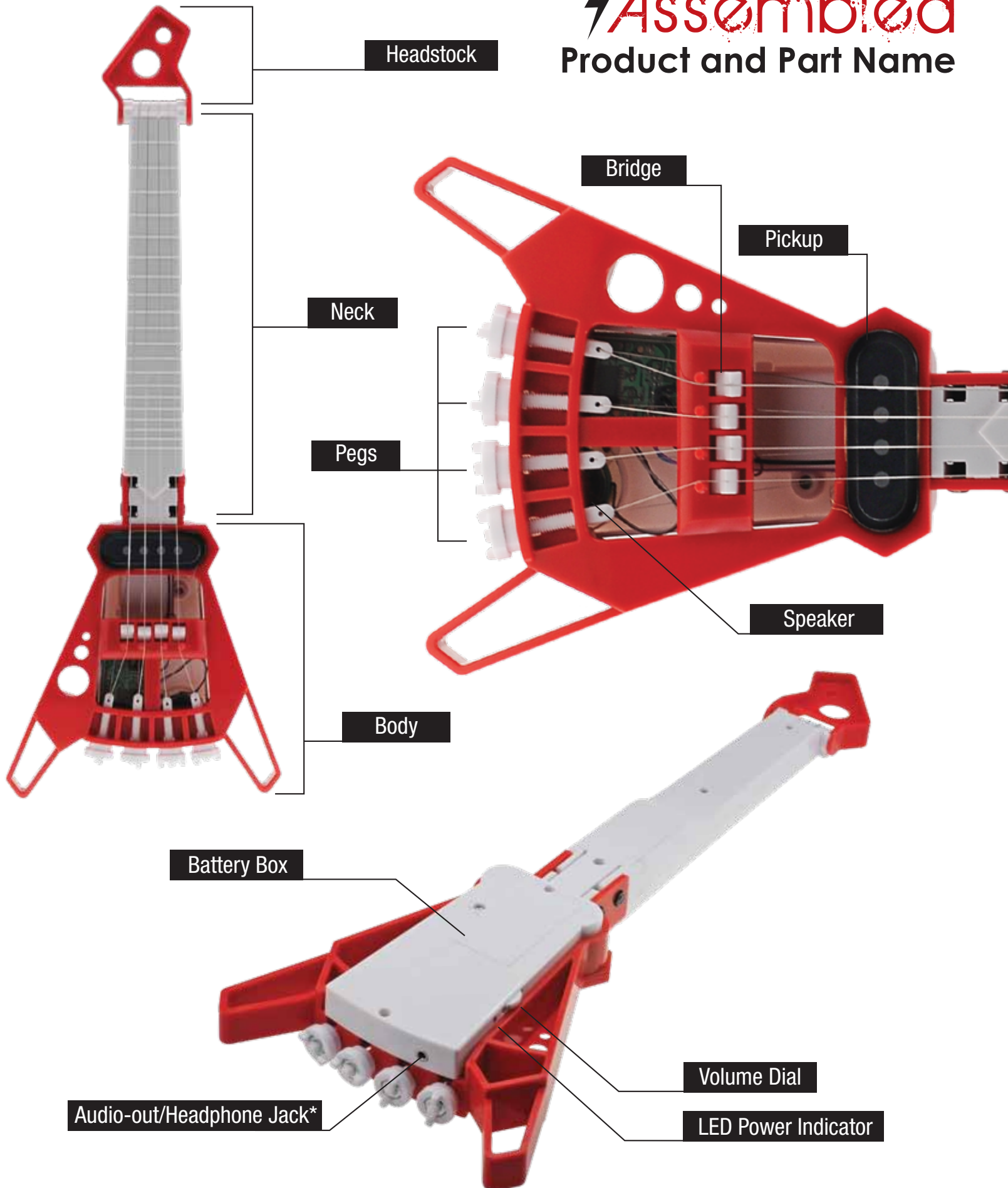
- Do not use rechargeable batteries such as NiCd batteries, or Oxyride batteries
- Ensure that the positive and negative terminals of the batteries are aligned correctly.
- If liquid that leaked from batteries gets into your eyes, rinse it well with plenty of water and consult a doctor immediately. If liquid leaks onto your skin or clothes, immediately wash it off.
- Always remove the batteries after use.
- Do not mix old and new batteries.
- Store the kit in a location out of the reach of small children.

\* Please read the instructions and cautions thoroughly before use.

\* For your safety, be sure to follow the instructions and cautions in this manual. In addition, do not use any parts that have become damaged or deformed during use.

# ⚡ Assembled

## Product and Part Name



\* For external connection to headphones or external speaker

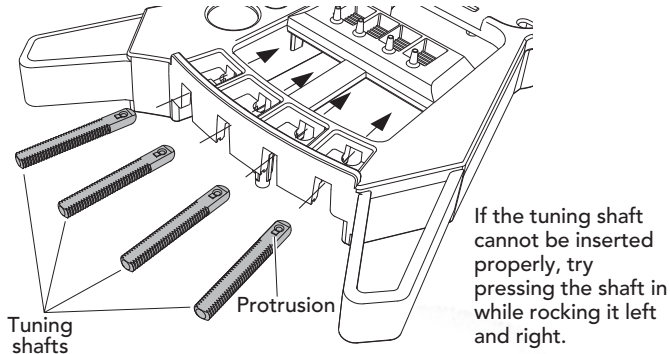


# ⚡ Assembling The Body

## 1 Assemble the tuning unit

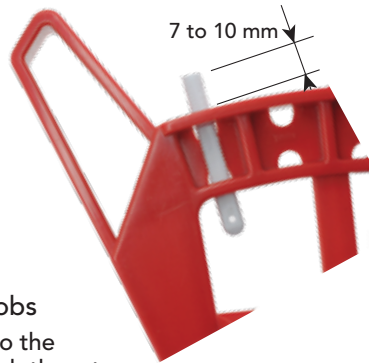
### 1. Attach the tuning shafts to the body

Face the side with the square protrusion up and insert the tuning shafts firmly from the outside.



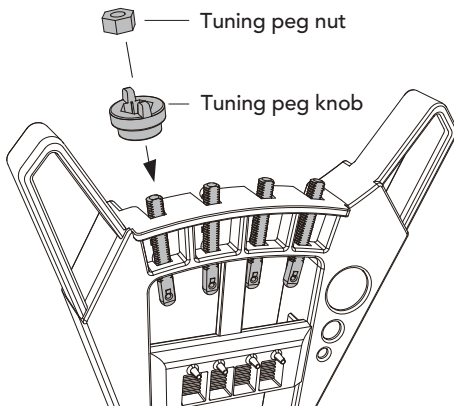
### CAUTION

Make sure that 7 to 10mm of the tuning shaft sticking out.



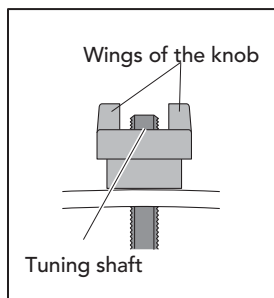
### 2. Attach the tuning peg knobs

Attach the tuning peg nuts to the tuning peg knobs. Then attach them to the tuning shafts by turning the knob.



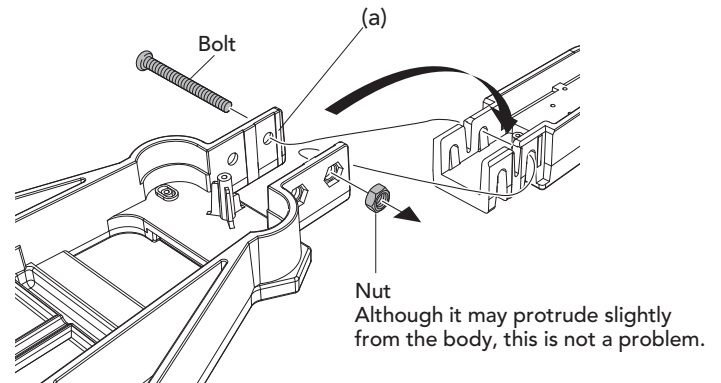
### CAUTION

Make adjustments so that the wings of the knob are the same height as the tuning shaft.



## 2 Attach the neck

Turn the neck and body over and attach the body to the neck from above. Fasten the neck side (a) only with a bolt and nut. At this point, there is no need to tighten the bolt and nut firmly.



## 3 Attach the strings

### 1. Temporarily insert the washer head screws into the back of the neck.

Leave about 2mm of the head protruding



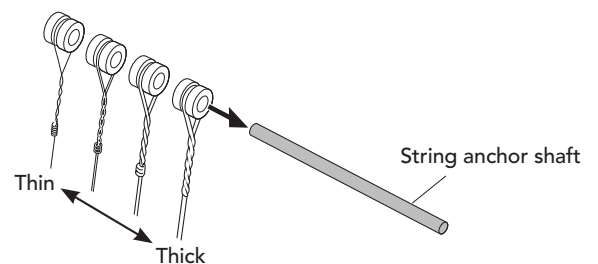
### 2. Slide the strings onto the string anchor shaft

Unwind the strings leaving the piece of paper bundling them. Once you have unwound the strings, remove the paper. Slide the rings on the tips of the strings onto the shaft to attach the strings in order of thickness.



### CAUTION

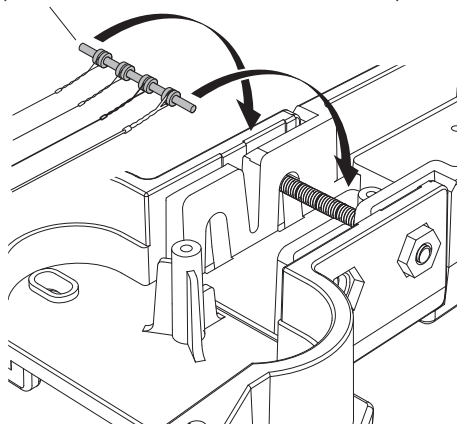
Take caution not to injure hands or face with the tips of the strings.



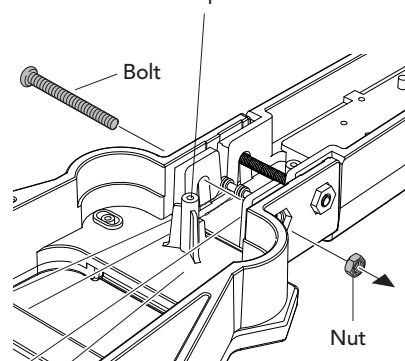
### 3. Secure the string anchor shaft

Insert the string anchor shaft into the groove in the neck. Pass the bolt over the strings while holding the strings and string anchor shaft. Secure it with a bolt and nut.

String anchor shaft  
(Note the direction in which it is attached)



Separate the strings so that there are two on each side of the protrusion

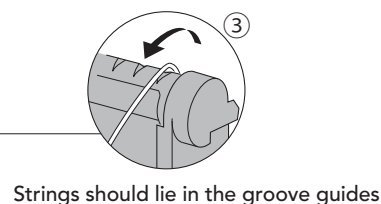
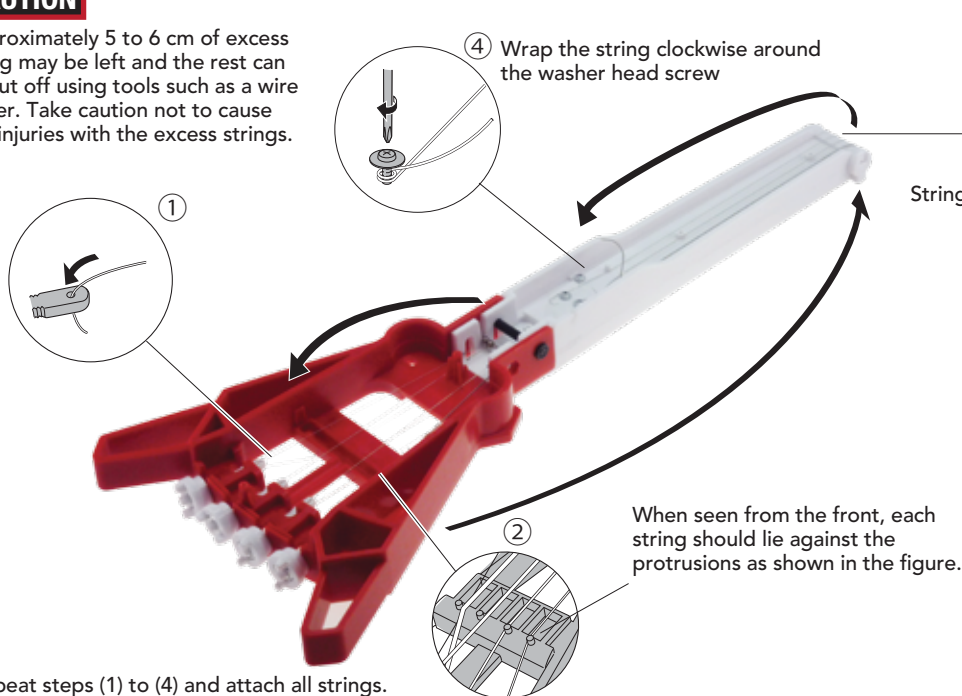


### 4. Attach the strings

(1) Pass the strings through the holes on the tuning shafts to the front of the body. (2) Along the protrusions, (3) pass the strings through the groove at the top of the neck and pull. (4) Then, wrap the strings clockwise one and a half times around the washer head screws that were temporarily inserted in step 1, and secure the strings with the washer head screws.

#### CAUTION

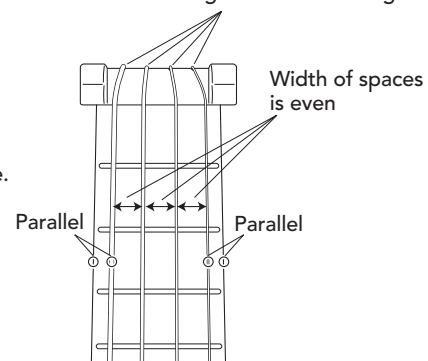
Approximately 5 to 6 cm of excess string may be left and the rest can be cut off using tools such as a wire cutter. Take caution not to cause any injuries with the excess strings.



#### CAUTION

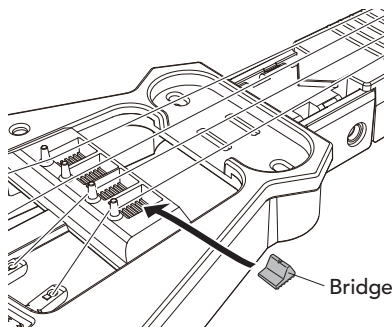
Attach the strings so that they are parallel to the neck and adjust them so that the width of spaces between the strings is even.

String should be in the groove



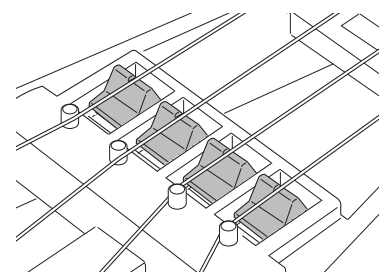
### 5. Attach the bridges

Attach the bridges and lay the strings in the grooves in the center of the bridges. Turn the pegs and adjust the string tension so that they are relatively tight (be careful not to overtighten the strings). If it is difficult to attach the bridge because the strings are too tight, loosen the strings slightly.



Face the raised side of the bridge towards the neck and place it on the closest position to the neck.

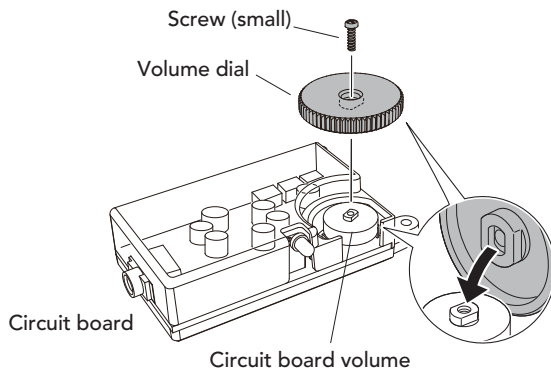
Lay the strings in the center of the bridges.



## 4 Assemble the electrical components

### 1. Attach the volume dial

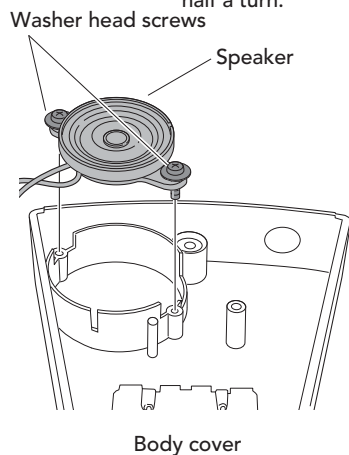
Align the volume dial hole and place the volume dial onto the volume dial protrusion on the circuit board and fasten it to the circuit board with the screw (small).



### 2. Attach the speaker to the body cover Secure the speaker with washer head screws.

#### CAUTION

The speaker may become tilted if the screw is overtightened. Do not secure the speaker while it is tilted. If this happens, loosen the washer head screw half a turn.



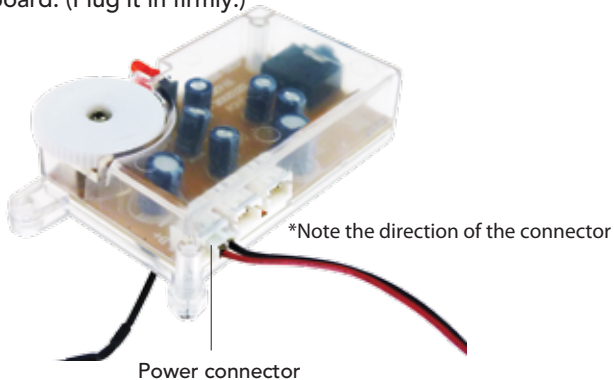
The side with the transparent cone should face up. Try not to touch the cone.

It becomes easier to secure the speaker if the washer head screws have been passed through the screw holes on the rubber part of the speaker beforehand.



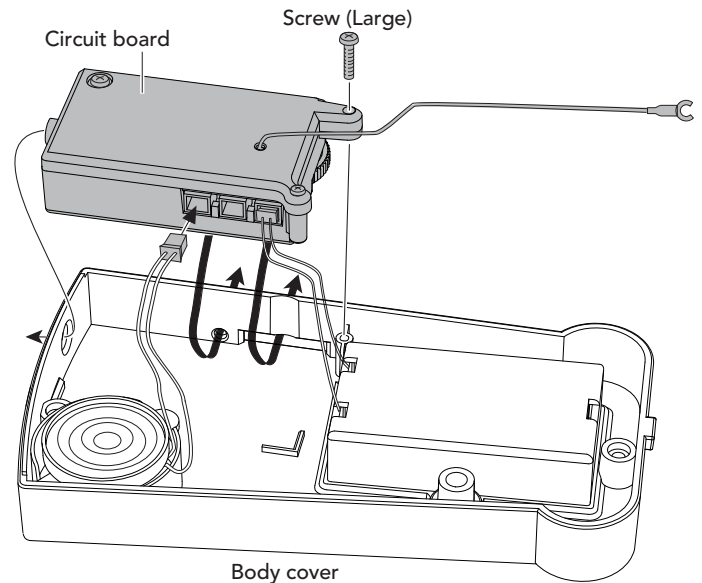
### 3. Connect the power connector

Plug in the power connector to the circuit board. (Plug it in firmly.)



### 4. Mount the circuit board

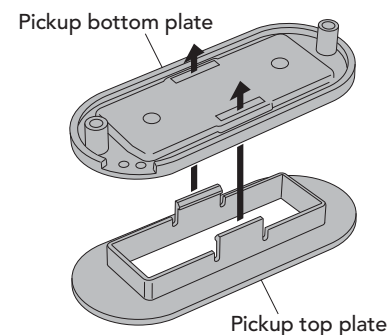
Adjust the position of the circuit board so that the volume dial and the LED power indicator protrude from the holes in the side of the body cover. Secure the circuit board with the screw (Large).



## 5 Assemble the pickup

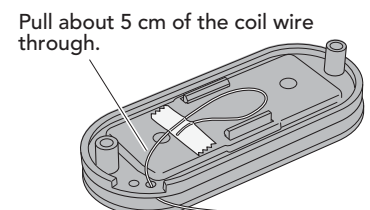
### 1. Combine the top and bottom plates of the pickup

Press the top and bottom plates of the pickup together until they click into place.



### 2. Pass the coil wire through the hole in the pickup bottom plate

Pass the coil wire through the pickup bottom plate. At this point, pull about 5cm of the coil wire through and affix it with cellophane tape.



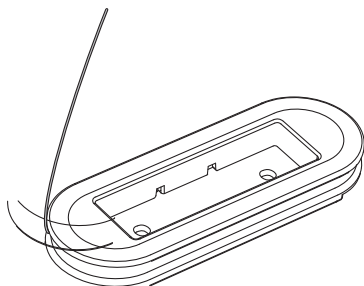


### 3. Wind the coil wire

Wind the entire length of the coil wire around the pickup

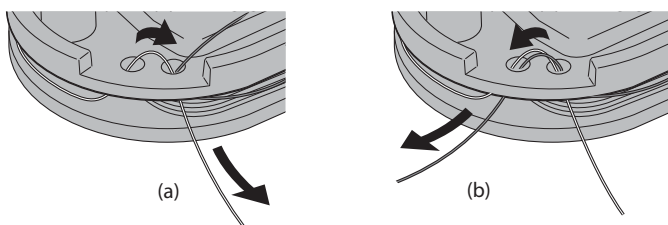
#### CAUTION

- Try not to leave any slack in the coil wire when winding it.
- Be careful as pulling the coil wire too tight will break it.
- The coil wire can be wound around in either direction.



### 4. Bundle the coil wire

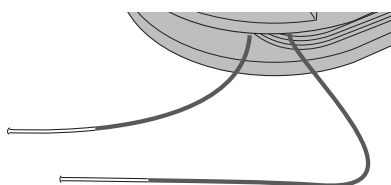
Pass the end of the coil wire through the hole in the pickup bottom plate and through the other hole (a), remove the cellophane tape, and pass the other end of the coil wire through the first hole (b).



### 5. Bundle the coil and lead wires

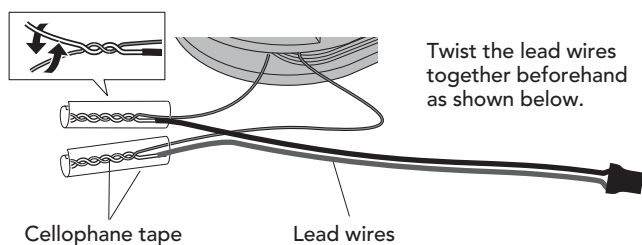
#### CAUTION

Do not cut off the silver parts on each of the coil wire. Doing so will cause current to stop flowing through the wire and the speaker to stop producing sound.

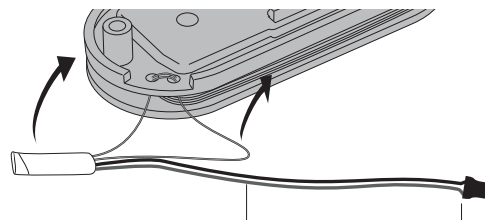


Bundle each end of the coil wire and lead wires by twisting them together. Fasten one end of both the coil and lead wires with cellophane tape, twist them together and then bundle them again with cellophane tape.

Either the purple or blue lead wires can be bundled.



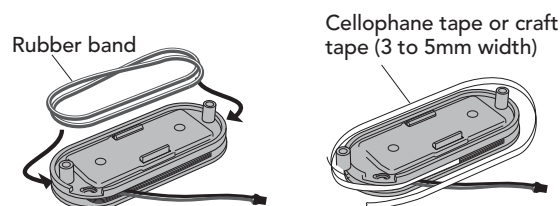
Wind the coil wire and lead wires that have been bundled together with cellophane tape around the pickup. Excess coil wire should be folded and wound around the pickup.



Do not wind this part around the pickup.

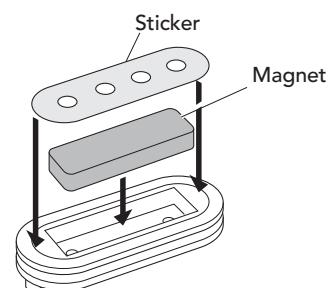
### 6. Cover the coil wire and lead wires

Cover the coil wire and lead wires with rubber bands or a thinly cut piece of cellophane tape.



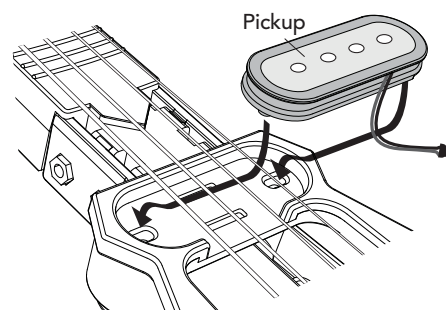
### 7. Insert the magnet into the pickup top plate

Insert the magnet into the top plate of the pickup and affix the provided sticker on top.

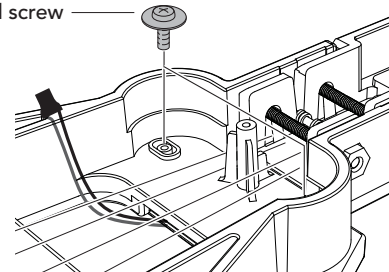


### 8. Install the pickup to the body

Insert the pickup in from the side, below the strings, and attach it to the body from behind using the washer head screws.



Washer head screw



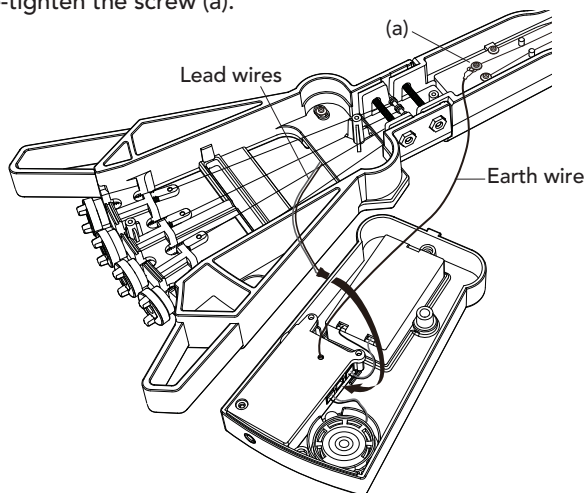
#### CAUTION

Pass the lead wires of the pickup to the back from between the body and the end most string.

## 9. Connect the lead wires and earth wire

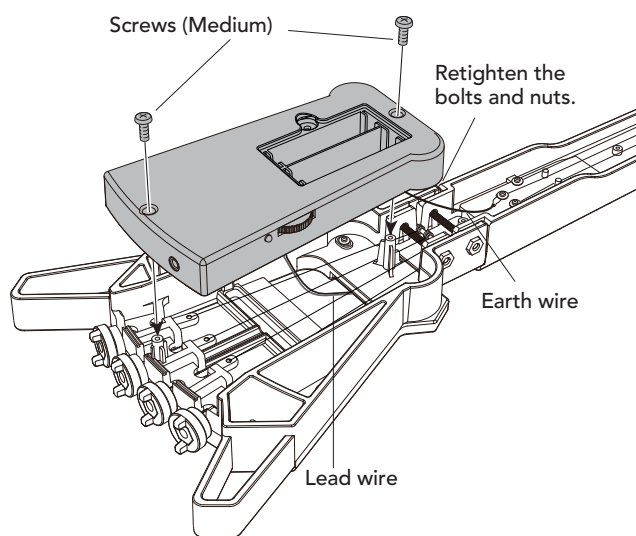
Connect the lead wires that have been passed through to the back to the connector for the lead wires on the circuit board.

In addition, after slightly loosening the screw (a) on the back of the neck which fastens the second thinnest string, attach the earth wire on the circuit board to the screw (a) and re-tighten the screw (a).



## 10. Mount the body cover onto the body

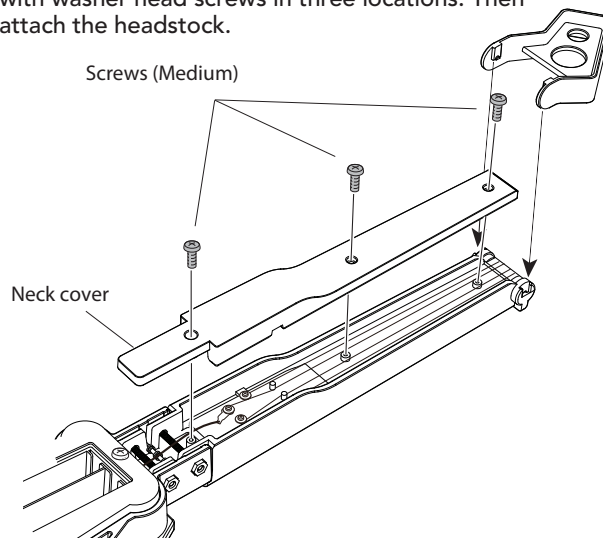
Mount the body cover onto the body and secure it with the screws (Medium).



**CAUTION** Ensure that the lead wires of the pickup do not come off.

## 11. Attach the neck cover and headstock

Attach the neck cover to the neck and secure it with washer head screws in three locations. Then attach the headstock.



**CAUTION** Be careful not to pinch the strings when tightening the screws. After attaching the neck cover, observe the guitar from the side to make sure that the neck and body are attached together evenly. If the neck is not straight, loosen the two bolts, straighten the neck and retighten the bolts.



Q. The coil wire has broken.

A: Join the two broken ends and continue winding. The coil wire has a transparent coating and this should be removed using sand paper or the like. Following this, ensure that the strands are well wrapped around each other.

Q. The guitar does not produce any sound when turned on.

A: Confirm that the batteries are new and that they have been inserted in the correct direction.

A: Ensure that the pickup and battery connectors have been securely fastened in place.

Q. Increasing the volume has little effect.

A: Ensure that the speaker is facing the correct direction. (The transparent cone should be facing outward.)

A: Indentation of the transparent speaker cone can also cause the volume to stay low.

Q. Turning the tuning peg does not cause the pitch to rise.

A: The initial string tension may be insufficient. Remove the neck cover, loosen washer head screw securing the string in question, increase the tension in the string, and then retighten the screw.

A: Note that excessive tightening of the tuning peg can damage the threads on the tuning shaft. If this has occurred, remove the string in question, move the peg lug to a position beyond the damaged threads, and then tighten the string.

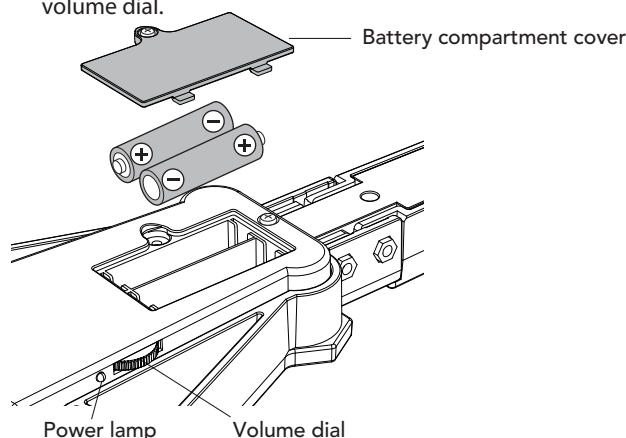
Q. The guitar cannot be tuned properly.

A: Check whether the bridge has become detached or is angled incorrectly.

# Let's make some noise

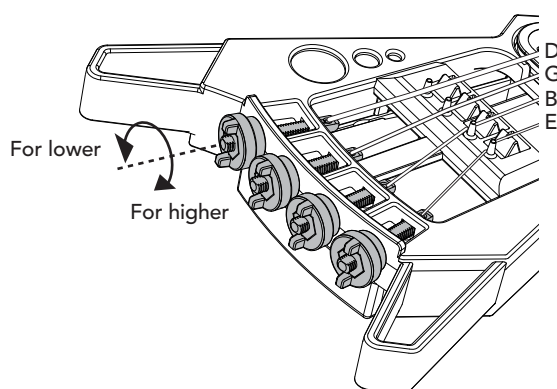
## 1 Insert the batteries and turn the power on

Insert the batteries into the battery box and turn the volume dial to ON. The LED power indicator lights when the power is on. You can adjust the volume with the volume dial.

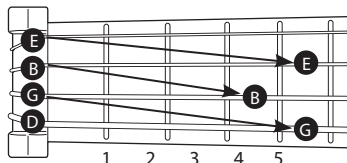


## 2 Let's tune

If you have a musical instrument nearby, tune the guitar using the scales of the instrument. Turn the pegs to adjust the tension of the strings until getting the desired pitch. When you turn the pegs, you are increasing the tension in the strings from loose to tense. The pitch will gradually increase while you are turning the pegs. Stop turning when you have reached the desired pitch. If you have tuned too high, turn the pegs to reduce the tension in the strings and start tuning again. Because the tension in a string changes during tuning, it may affect the other strings. Since the tuning of one string will affect that of the others and may change their pitch, once you have finished tuning all four strings, start again from the thickest string.

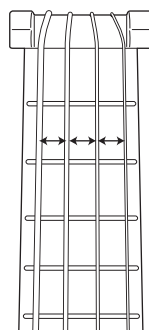


The pitch of each string is as shown to the left. Pitches that are connected with arrows are the same pitch. Therefore, if you tune one string, you can use that string to tune the other strings as well. If you do not have any musical instruments nearby, the pitch for the dial tone when you pick up the phone is "G". You may find it useful to tune the 3rd string with this pitch.

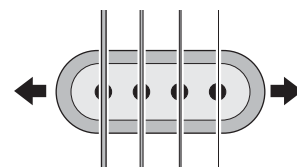


## 3 Let's adjust each part

After you have actually made some sound, try changing the spacing between the strings or the position of the pickup. You may find a difference in ease of play and in the sound. Try moving them around until you find positions that you like.



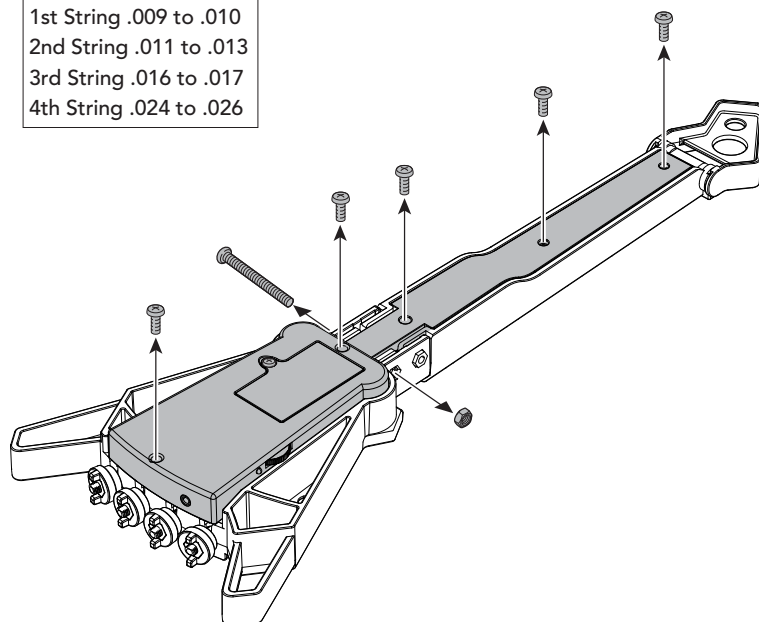
Loosen the screws securing the pickup before adjusting the position of the pickup.



## How to change strings

Change a string if it has broken or become worn. Use strings for electric guitars. We recommend the string gauges to the right. To change the string, (1) turn the pegs so that there is no tension remaining in any of the strings. (2) Remove the neck cover and body cover. (3) Remove the washer head screw on the back of the neck that is securing the string to be changed. (4) Remove the bolt securing the string anchor shaft. (5) Pull and lift up the string anchor shaft and remove the string from the shaft. (6) Pass the new string through the shaft and retighten the string.

String gauges (inch)  
1st String .009 to .010  
2nd String .011 to .013  
3rd String .016 to .017  
4th String .024 to .026





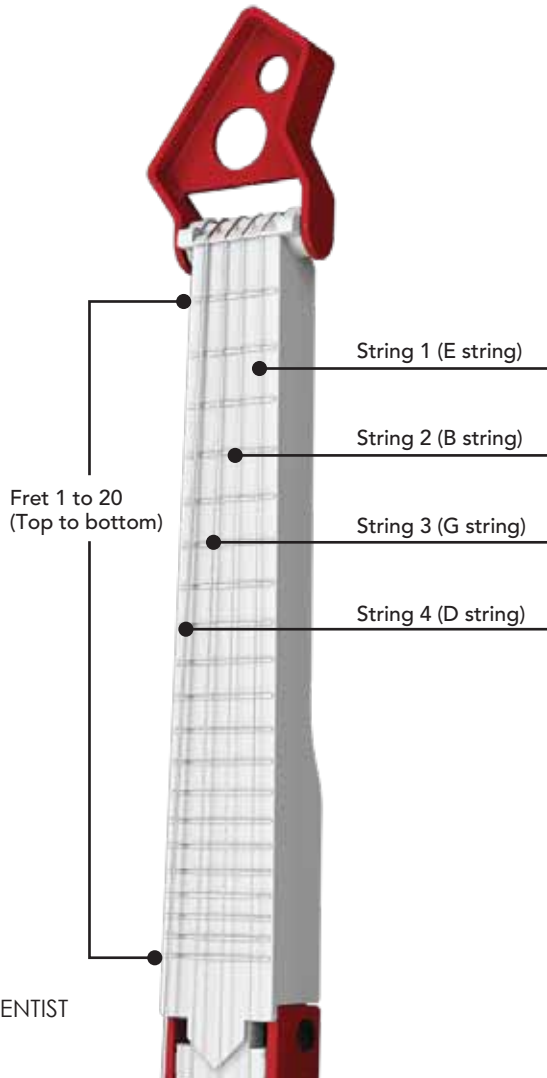
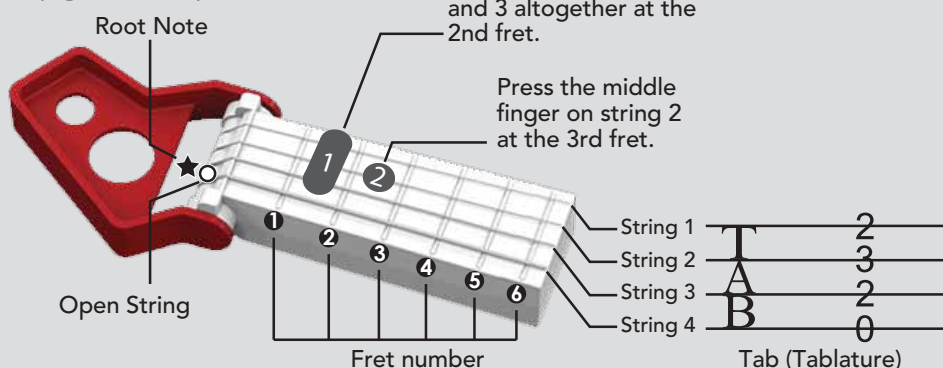
# Basic Chords

## How to read:

### Symbol:

- ① : Index Finger
  - ② : Middle Finger
  - ③ : Ring Finger
  - ④ : Small Finger
  - ① : Press all the strings under the mark
  - ✕ : Marks the string that you don't play
  - : Open String
  - ★ : Root Note
- ① ② ③ ④ ⑤ ⑥  
Fret number

### Chord Notation (eg. D chord)

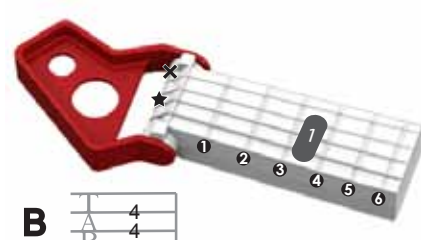
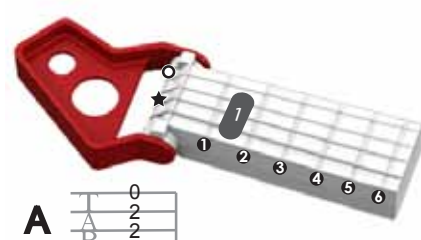
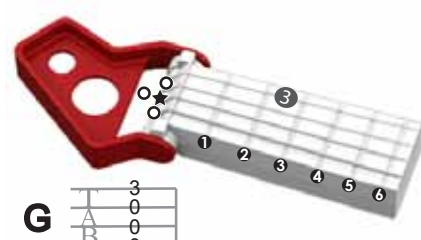
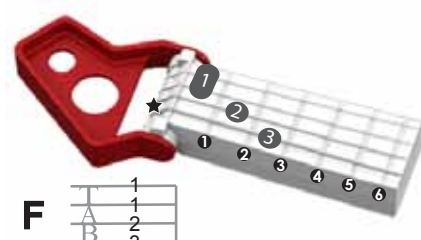
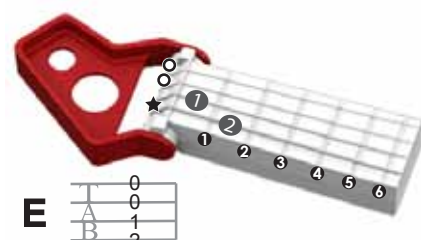
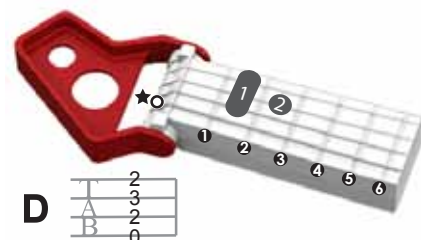
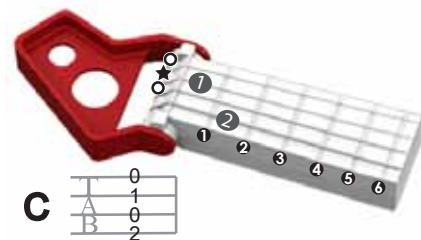


## MAJOR CHORDS

What is shown on the right are called major triads. The chords are laid out the same way as a keyboard. (C, C#, D, D#...etc.) Each chord has a rootnote such as C in C chord and D in D chord. The string marked with a ★ is the root of the chord.

## MINOR CHORDS

Minor chords have a little sadder and melancholic tonality. The same rule applies to the roots of the major chords. By the way, a chord with # and a chord with ♭ can become the same chord sometimes, for example, C# = D ♭



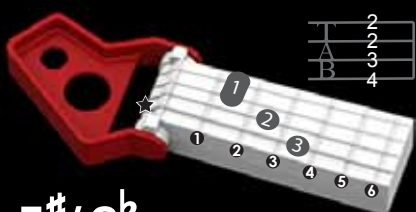
## MAJOR CHORDS



**C# / D<sup>b</sup>**



**D# / E<sup>b</sup>**



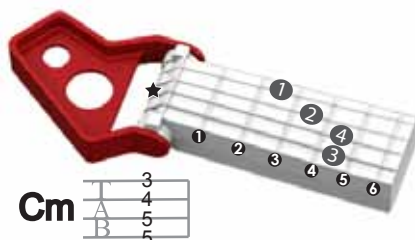
**F# / G<sup>b</sup>**



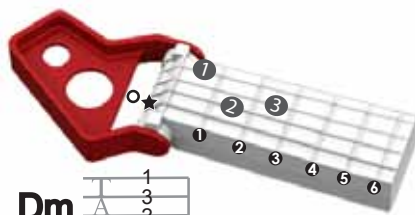
**G# / A<sup>b</sup>**



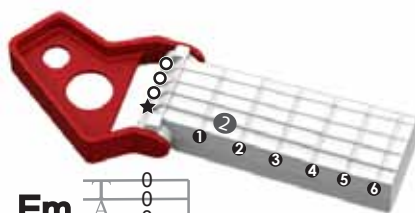
**A# / B<sup>b</sup>**



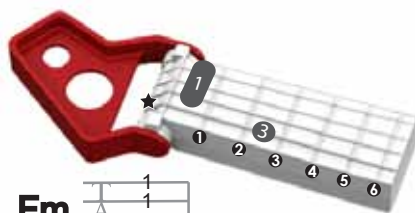
**Cm**



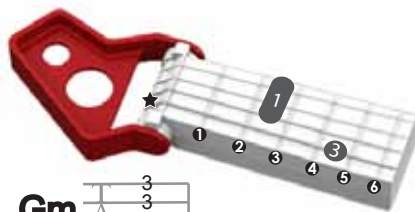
**Dm**



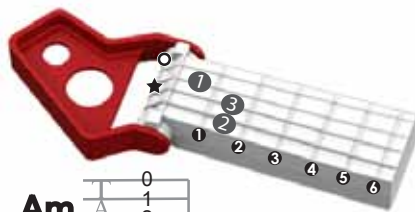
**Em**



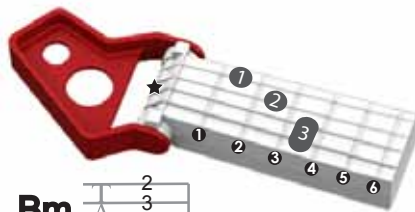
**Fm**



**Gm**



**Am**



**Bm**

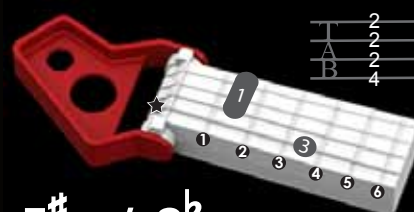
## MINOR CHORDS



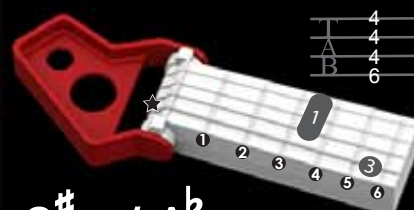
**C#m / D<sup>b</sup>m**



**D#m / E<sup>b</sup>m**



**F#m / G<sup>b</sup>m**



**G#m / A<sup>b</sup>m**



**A#m / B<sup>b</sup>m**

# ⚡ Useful Tips



## How to hold the Mini Electric Guitar

Holding the guitar securely is a key point in playing a guitar. Your left hand should gently grip the neck while the right hand holds the body.



## Pose

The Mini Electric Guitar is very delicate. The angle of the neck sensitively affects the sound. Turning the neck up in order to see the fret (left picture) or peeking into the fret by slouching your back (right picture) are not good posture. Even when you tune the guitar, keep holding your body as the same way as when you play.





## Holding a pick, and play

Hold the pick with thumb and index finger. Strum the string near the pickup. Use side of your palm to mute the string. Alternate picking is a technique that employs strictly alternating downward and upward picking strokes in a continuous run, and is the most common method of plectrum playing. It is easier to play if your thumb is relaxed and points toward the tip of the pick.



## Adding expression to the sound

Let's learn some techniques that will make you sound like an advanced player.

### Vibrato

Hold a string in one position and shake the string. The rapid shake of the string bends the sound and makes vibrato. Shown in the pictures below, the most common method is to hold a string in one position and rapidly twist the wrist and shake the finger back and forth. You can use another method for the Mini Electric Guitar to create a vibrato. Hold a string in one position and change the pressure (hard and soft) rapidly.

### Tapping

One of the more advanced and impressive techniques is tapping. Tapping is performed either one-handedly or two-handedly incorporating hammer-ons and pull-offs. Hammer-on is done by sharply bringing a finger down on the fingerboard to make a sound. Pull-off is to make sound by pulling off a fretting finger slightly across the face of the string. It is a very effective technique and makes a performance very dramatic. It is easier to tap if you hold the guitar neck up right. It is not force that makes tapping loud, but more the way you tap. Practice finger movement patiently till you get a hang of it!



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# MINI ELECTRIC ⚡ GUITAR

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