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CAUTION! Please read the following instructions before using this kit.

Use caution when handling the needles contained in this kit. Improper use may cause injury.

Use caution when handling any metallic parts that are thin and sharp. Improper use may cause injury.

To avoid the risk of suffocation, do not swallow small parts. Keep away from small children.

To avoid the risk of electric shock, do not insert the lead wires into an electric socket.

Remove the batteries after using the kit and keep them away from small children.

*** Two size C dry batteries are required. Improper use of batteries may cause the generation of heat, explosions or leaks. The following precautions should be taken:**

Do not use rechargeable batteries, such as nickel cadmium batteries. (A rechargeable battery may not be able to maintain a sufficient electric supply.)

Ensure that the positive and negative terminals on the batteries are facing the right way.

If any acid from the batteries leaks and comes in contact with an eye, wash the eye in water immediately and consult a doctor. If any battery acid comes in contact with skin or clothes, wash with water immediately.

Remove the batteries after using this kit.

Read the assembly instructions and cautions in this booklet carefully before using the kit.

*For your safety, the assembly instructions and cautions in this booklet should be followed. Do not use any materials that have become damaged or deformed while in use.

The plastic materials used in this kit

- body (green): ABS resin slider and turntable (black): ABS resin
 - small bags: polyethylene battery box (black), motor unit (black): polypropylene
 - needle cover (black) : foamed polyethylene cone A and B : polystyrene
 - switch (black) : urea resin gear and the like (white) : POM
 - CD-ROM for recording: polycarbonate disk for recording (white): polystyrene
- Vinyl chloride resin is used for the covers of the lead wires.
- When disposing of the kit, please follow the recycling regulations in your area.

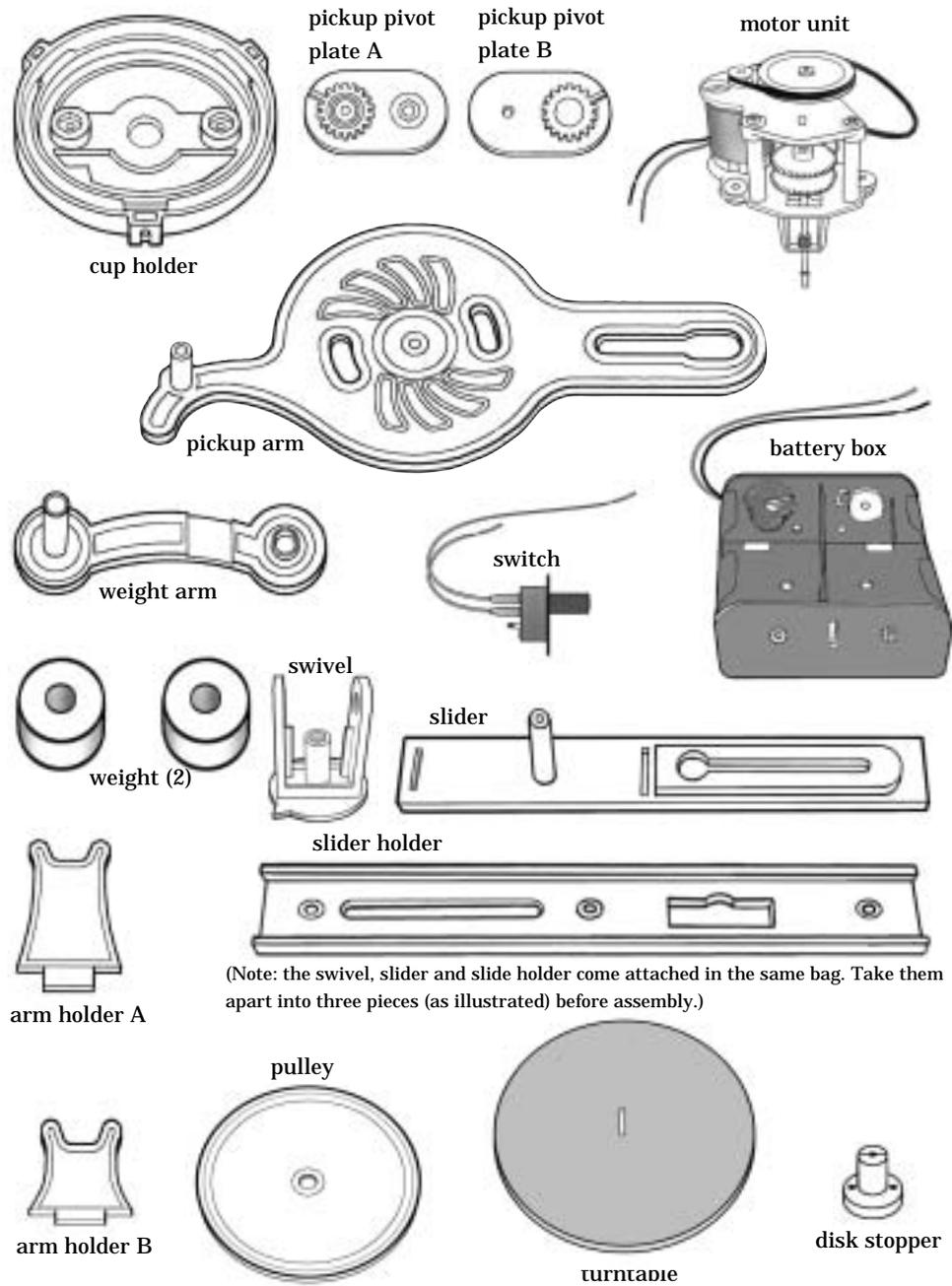
Berliner and the "Disk Record"

In the 20th century, the dominant medium for recording and playing sound was the 'disk record'. It was invented in 1887 by the great German-American scientist Emile Berliner. After distinguishing himself as an engineer at the Bell Telephone Company, Berliner was to become Thomas Edison's greatest rival in creating a commercially successful 'talking machine'. It was Berliner's gramophone that was to triumph, largely because it used a flat disk that was much cheaper to mass-produce. That 'disk record' went on to become the leading way of playing music until the arrival of the CD. This gramophone kit applies the principles of Berliner's 'disk record' to replicate sound. With it, you can enjoy experimenting with different materials to create Emile Berliner your 'disk record'. But which material will sound best...?



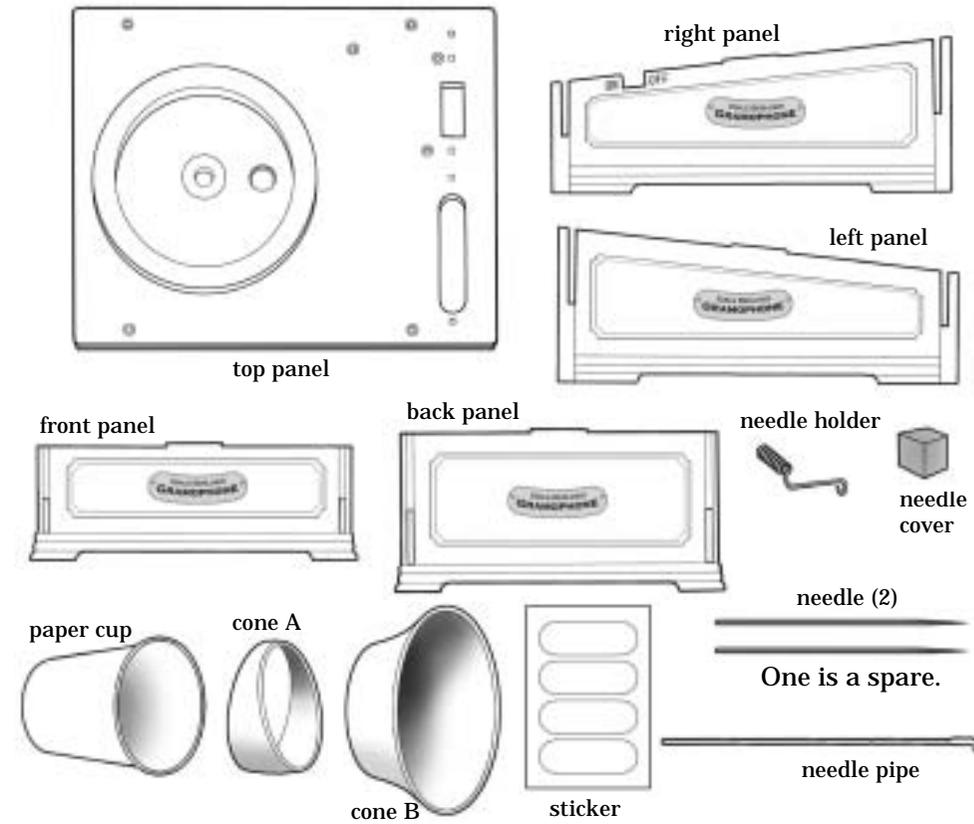
Emile Berliner
(1851 ~ 1929)

Parts in this Kit



(Note: the swivel, slider and slide holder come attached in the same bag. Take them apart into three pieces (as illustrated) before assembly.)

4 *Please note that the illustrations are not to scale. The actual kit parts may appear slightly different.



Screws and Nuts to be used			
<p>disk for recording (5)</p> <p>Both sides can be used.</p>	<p>A: Three 2.6-by-8 mm round screws</p>	<p>B: Two 2.6-by-8 mm screws with collars</p>	<p>Twelve nuts</p>
<p>CD-ROM for recording</p> <p>Both sides can be used.</p>	<p>C: One 2.6-by-10 mm screws with a collar</p>	<p>D: Six 2.6-by-12 mm flat screws</p>	<p>Three washers</p>
	<p>E: Six 2.6-by-6 mm self-tapping screws with collars</p>	<p>F: Six 2.6-by-8 mm self-tapping screws</p>	

*The screw D and the nut in the same small bag with the pushpin are spares.

Tools supplied in this kit		
<p>pushpin</p>	<p>nut holder</p>	<p>needle gauge</p>

Things you will need		
<p>size C alkaline battery (2)</p>	<p>Scotch tape</p>	
<p>screwdriver (cross-headed tip)</p>	<p>scissors</p>	

Let's Assemble the pickup!

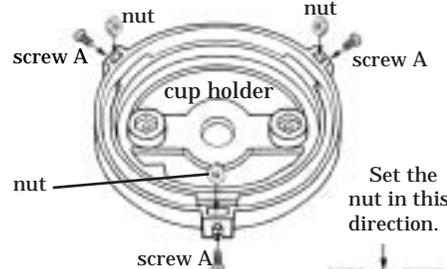
Parts to be used

Tools to be used
 scissors, pushpin
 * Scotch tape and screwdriver (cross-headed tip) are also needed.

Screws and Nuts to be used

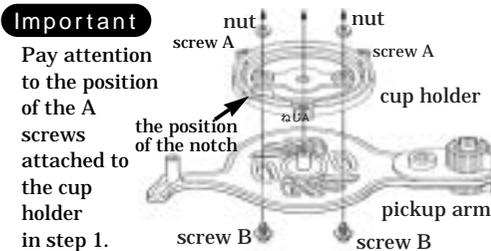
- A: Three 2.6-by-8 mm round screws
- B: Two 2.6-by-8 mm screws with collars (short)
- C: One 2.6-by-10 mm screw with a collar
- E: Three 2.6-by-6 mm self-tapping screws with collars

1 Set a nut into each of three holes in the cup holder. Then put a screw A (a round screw) in each hole.



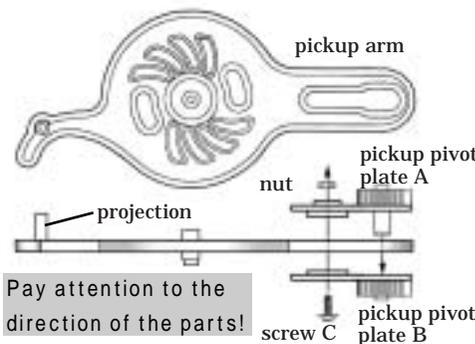
Turn the screw A several times so that the nut will not come off.

3 Set the cup holder on the pickup arm and fasten with two screw B's (short screws with collars) and nuts.

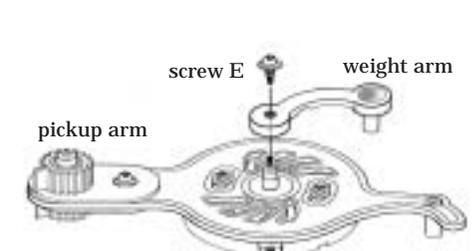


6 Drive the screw B's in loosely so that the weight arm can move easily.

2 Attach the pickup pivot plates A and B to both sides of the pickup arm and fasten with a screw C (a long screw with a collar) and a nut.

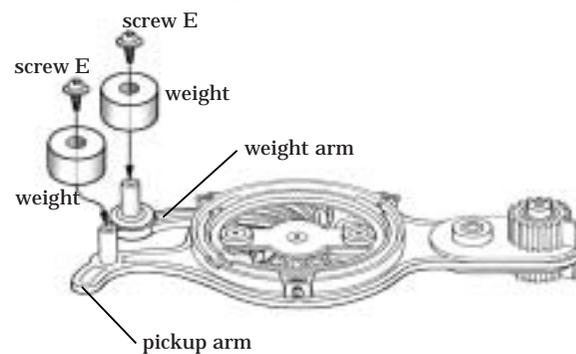


4 Attach the weight arm to the pickup arm with a screw E (a self-tapping screw with a collar).

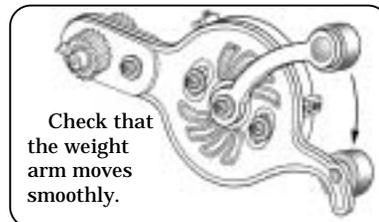
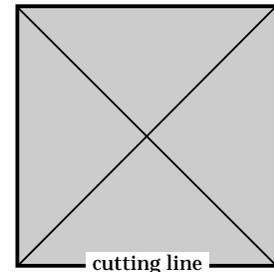


Drive the screw E in loosely so that the weight arm can move easily.

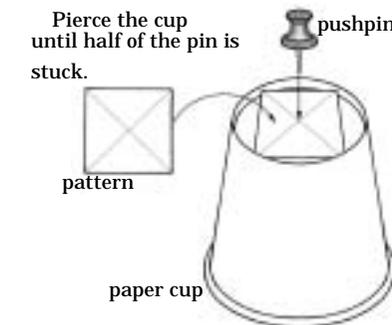
5 Attach weights to the weight arm and the pickup arm with two screw E's (self-tapping screws with collars). (Drive the screw in tightly.)



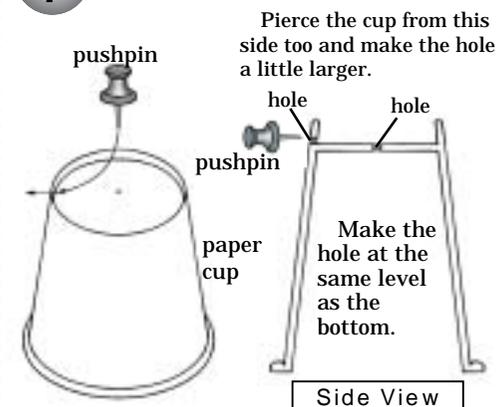
pattern



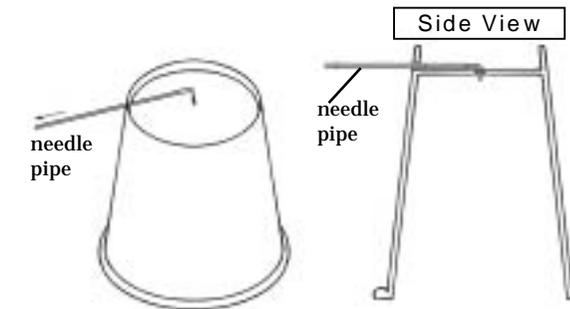
6 Cut out the pattern in the upper right corner of this page and put it on the bottom of the paper cup. Then pierce the center of the pattern with the pushpin.



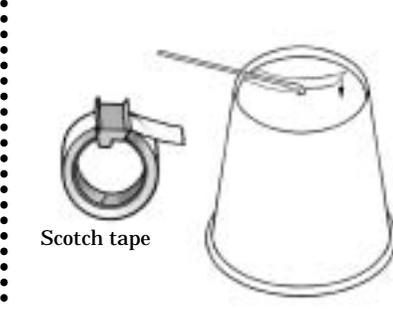
7 Pierce a hole in the bottom edge of the paper cup.

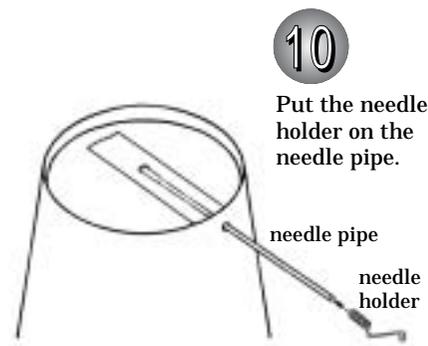


8 Thread the needle pipe through the hole at the bottom edge of the cup and push the L shaped part in the center hole.

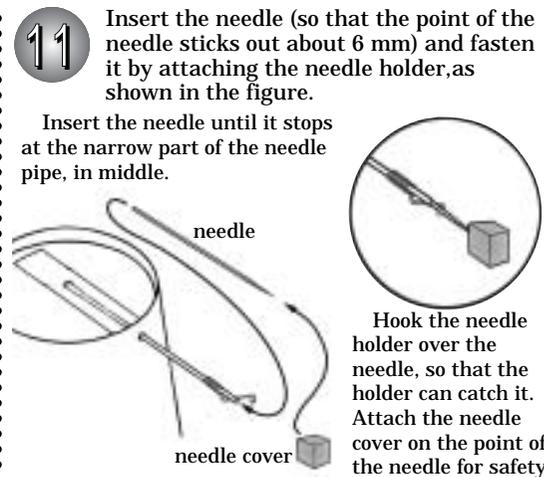


9 Fasten the needle pipe firmly with a piece of Scotch tape.





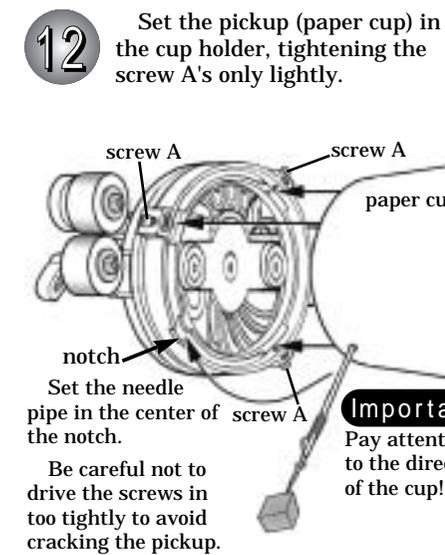
10 Put the needle holder on the needle pipe.



11 Insert the needle (so that the point of the needle sticks out about 6 mm) and fasten it by attaching the needle holder, as shown in the figure.

Insert the needle until it stops at the narrow part of the needle pipe, in middle.

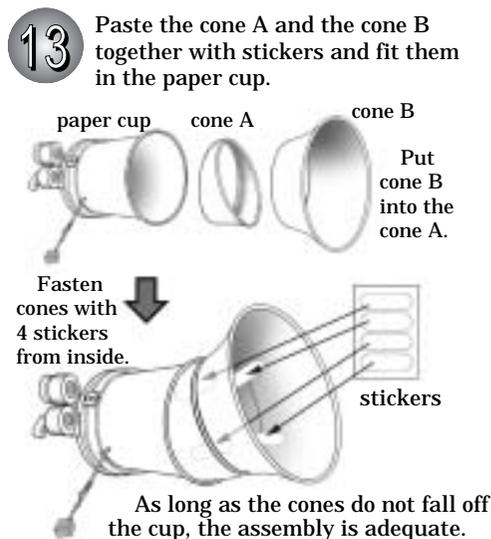
Hook the needle holder over the needle, so that the holder can catch it. Attach the needle cover on the point of the needle for safety.



12 Set the pickup (paper cup) in the cup holder, tightening the screw A's only lightly.

Be careful not to drive the screws in too tightly to avoid cracking the pickup.

Important
Pay attention to the direction of the cup!



13 Paste the cone A and the cone B together with stickers and fit them in the paper cup.

Put cone B into the cone A.

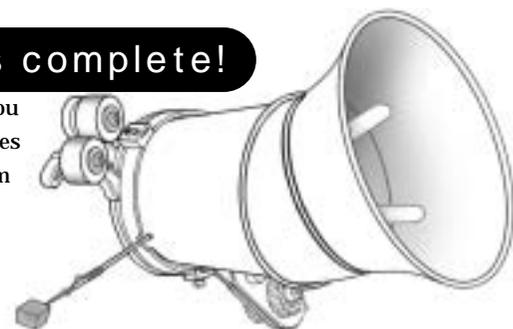
Fasten cones with 4 stickers from inside.

As long as the cones do not fall off the cup, the assembly is adequate.

Now the pickup is complete!

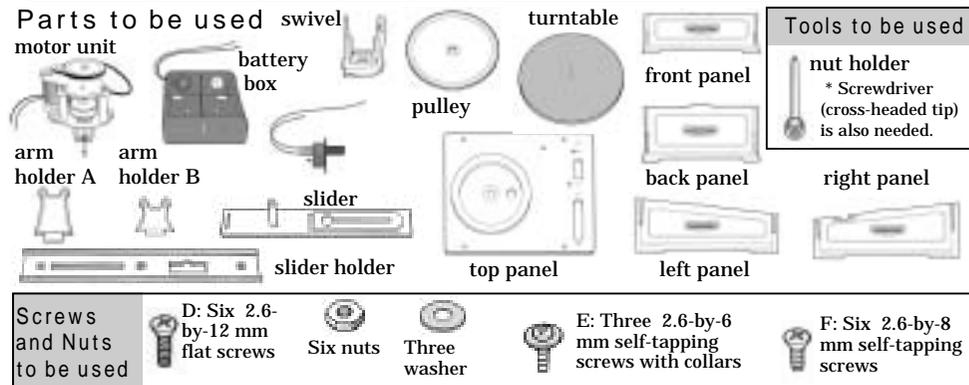
You've finished the pickup. (When you attach it to the body, remove the cones from the paper cup, and replace them when recording.)

Get the following needle size when a replacement is needed:
Diameter: 0.84mm
Length: 45.5mm

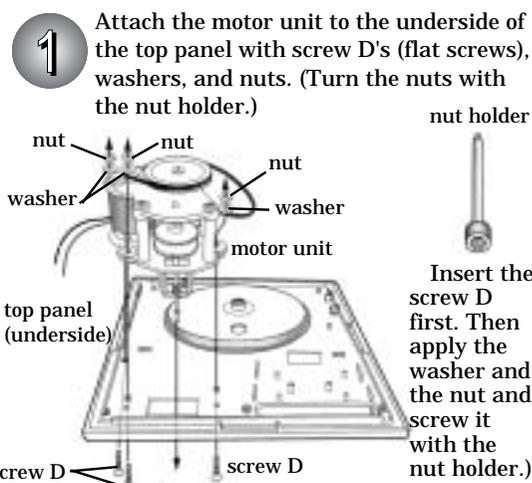


The needle can be used more than ten times to record and replay but it will need to

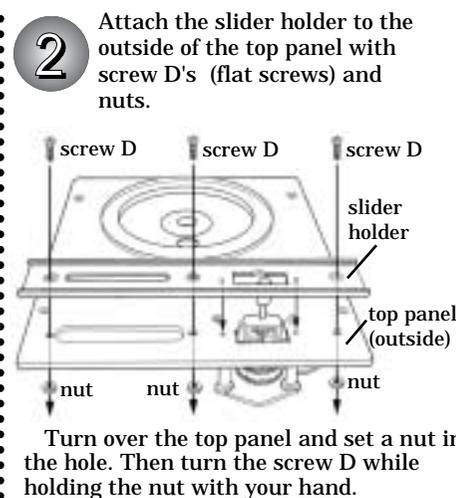
Let's Assemble the Body!



Be careful to select correct screws since all the screws look similar. Also separate the swivel, the slider and the slider holder before use.

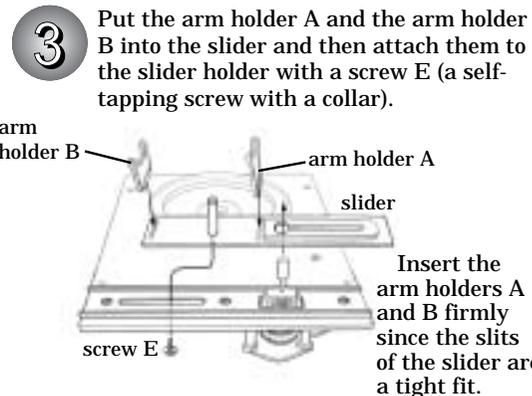


1 Attach the motor unit to the underside of the top panel with screw D's (flat screws), washers, and nuts. (Turn the nuts with the nut holder.)



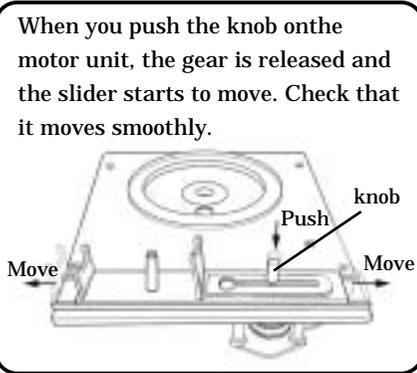
2 Attach the slider holder to the outside of the top panel with screw D's (flat screws) and nuts.

Turn over the top panel and set a nut in the hole. Then turn the screw D while holding the nut with your hand.



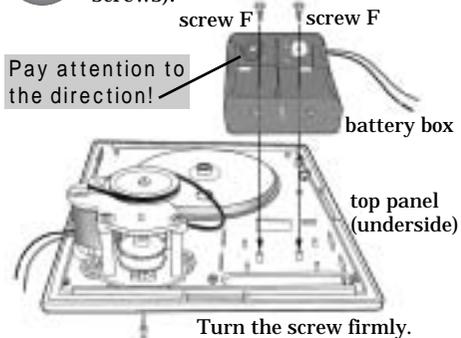
3 Put the arm holder A and the arm holder B into the slider and then attach them to the slider holder with a screw E (a self-tapping screw with a collar).

Insert the arm holders A and B firmly since the slits of the slider are a tight fit.

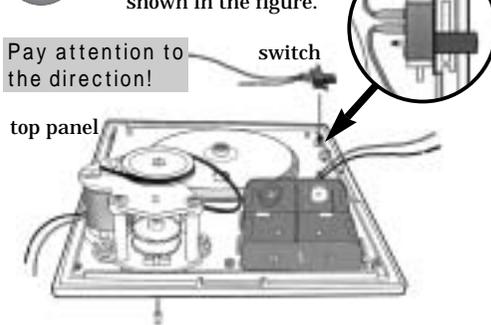


When you push the knob on the motor unit, the gear is released and the slider starts to move. Check that it moves smoothly.

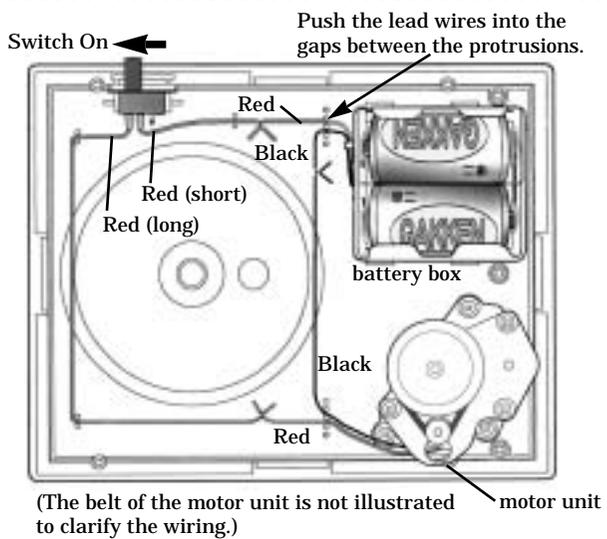
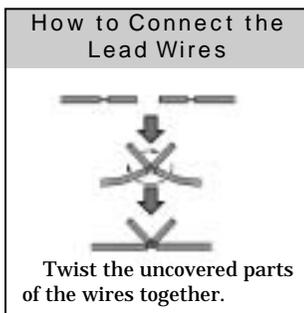
4 Attach the battery box to the top panel with screw F's (self-tapping screws).



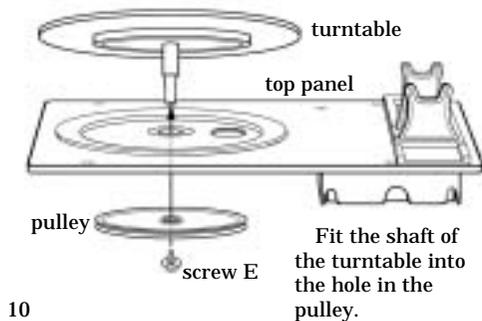
5 Set the switch on the top panel. Set it in the direction shown in the figure.



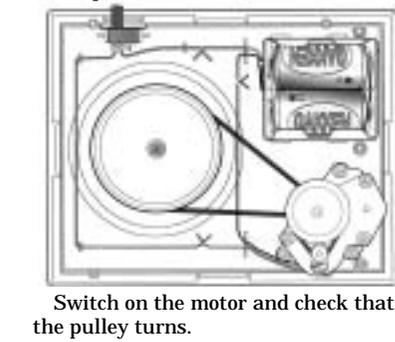
6 Connect the lead wires as shown in the figure. Put the batteries in the battery box as indicated by the markers. Then switch on the motor and check that it spins.



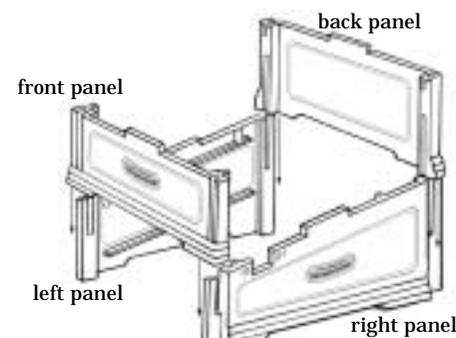
7 Push the turntable onto the top panel. Apply the pulley from the underside and fasten it firmly with a screw E (a self-tapping screw with a collar).



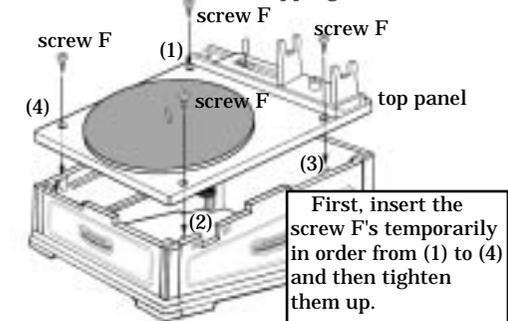
8 Hang the belt of the motor unit around the pulley. (Hang it around the pulley at the lower part of the motor unit as well.)



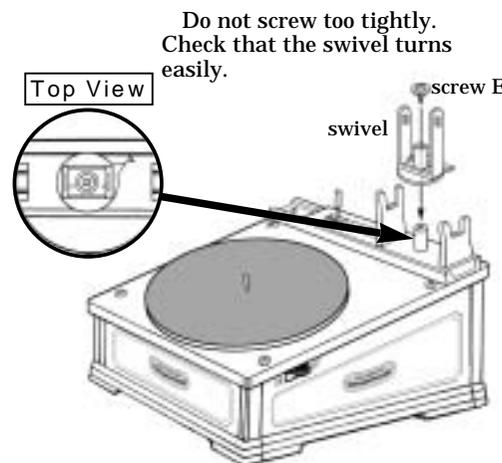
9 Assemble the four panels as shown in the figure. (Check that the panels fit completely.)



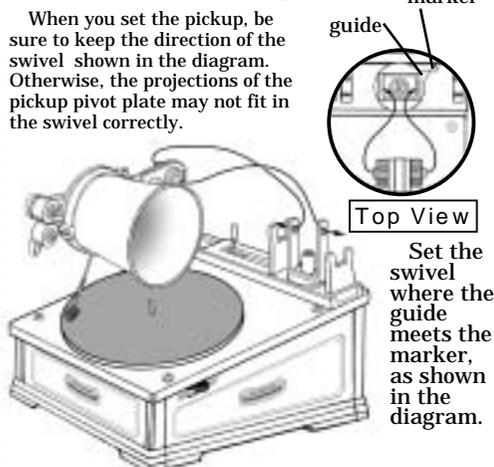
10 Put the top panel on from the back and fit the grooves on the four panels so that the panel is secure. Then fasten them firmly with screw F's (self-tapping screws.)



11 Put the swivel on the slider and fasten them with a screw E.

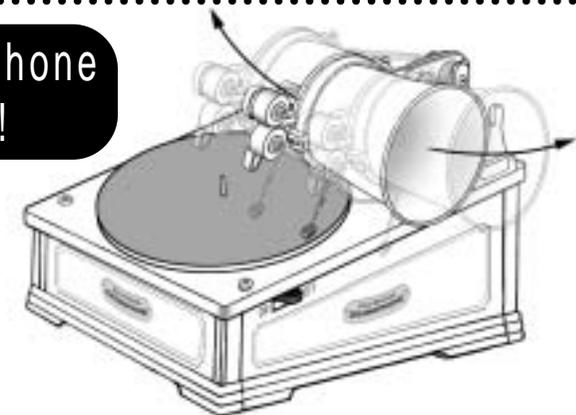


12 Widen the swivel and snap in the pickup in the right direction, as shown in the diagram.



Now the gramophone is complete!

You've finished the assembly. Check that the pickup goes up and down, and right and left smoothly.

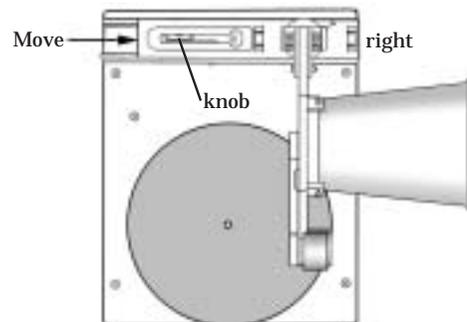


Recording and Playback

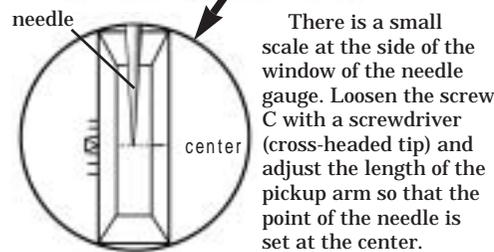
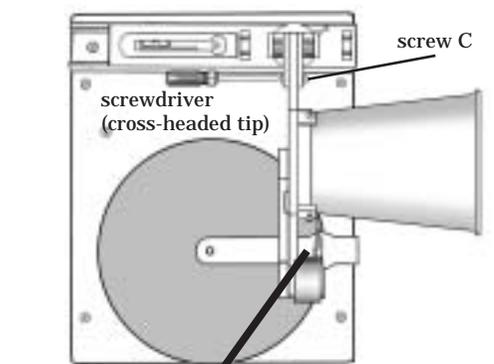
Note: It is not necessary to make adjustments before each use.

Let's adjust the gramophone before use.

- 1 Push the knob and move the slider to the right end. (Turn the slider back a little and check that the knob snaps up.)

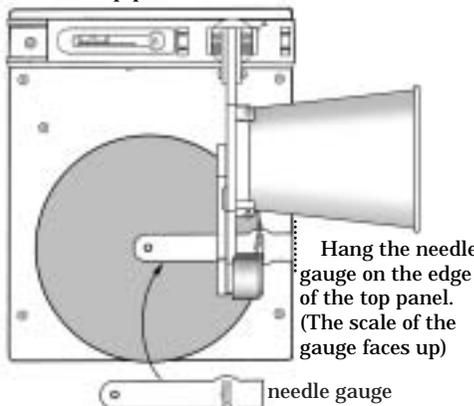


- 3 Loosen the screw C so that the pickup can move. Remove the needle cover and set the point of the needle at the center of the needle gauge. Then tighten the screw C again.

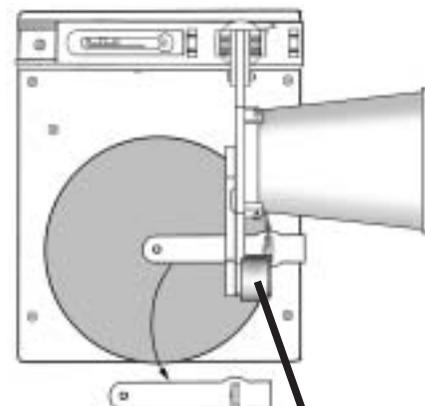


There is a small scale at the side of the window of the needle gauge. Loosen the screw C with a screwdriver (cross-headed tip) and adjust the length of the pickup arm so that the point of the needle is set at the center.

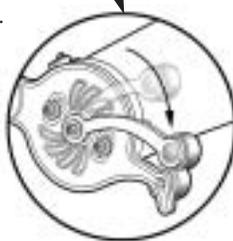
- 2 Put the hole of the needle gauge on the shaft of the turntable and align the other end with the edge of the top panel.



- 4 Remove the needle gauge and move the weight arm to the position shown in the diagram.

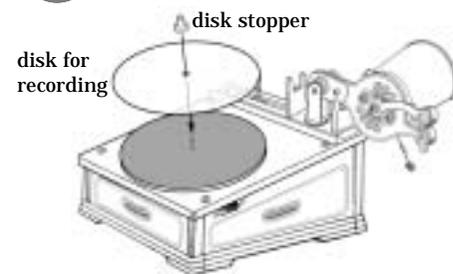


Move the arm so that the two weights touch each other. As a result, the pressure exerted on the needle during recording is increased.



Let's Start Recording!

- 1 Put the recording disk on the turntable, and put the disk stopper on.

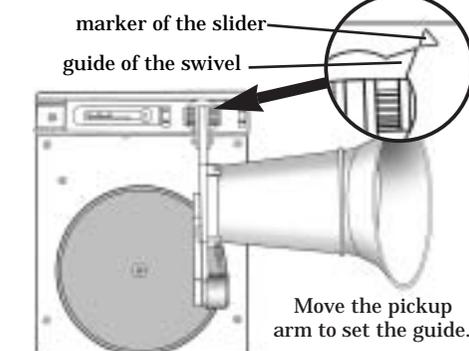


Note: When you use a CD-ROM, put the disk stopper on first.

- 3 Check the position of the weights (that both are to the side of the needle) and the slider (that it is at the right end) and gently put the needle onto the recording disk.



- 2 Set the cones in the paper cup. Then set the point on the guide of the swivel at the marker shown on the slider.



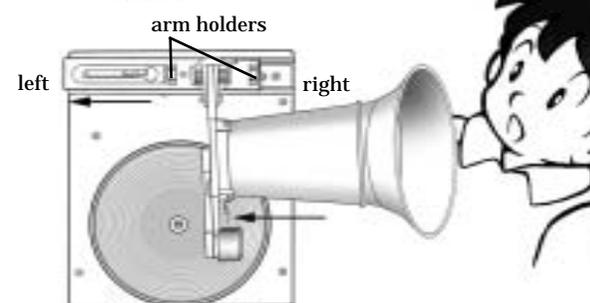
- 4 Bring your mouth close to the cones. Then turn on the switch and start recording (for about a minute to a minute and a half).



If the needle slips to the outside or remains tracing the same groove, push the pickup a little bit with your fingers.

<How to speak when recording>
Speak loud and clear (but there's no need to shout). Avoid laughing because the needle tends to slip with the vibration. Do not touch the speaker with your mouth.

- 5 When the slider comes to the left end, the recording is finished. Switch off the machine and hang the pickup on one of the arm holders.



Check the Following Points before Recording.

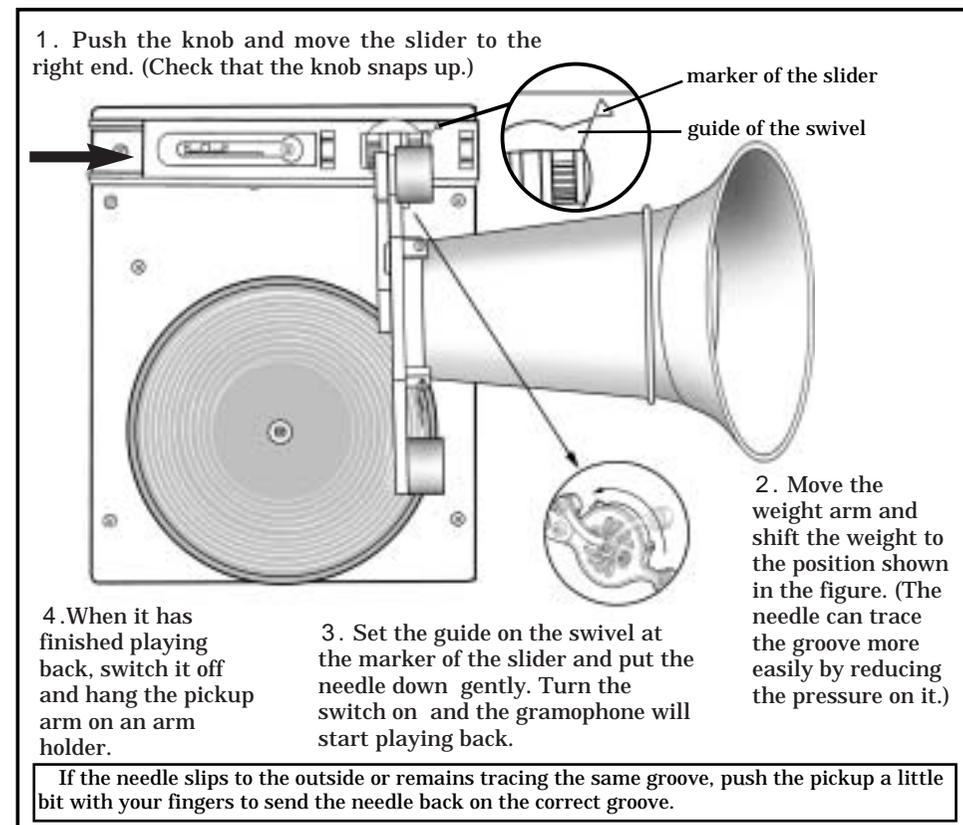
- Is the slider at the right end? (After recording it moves to the left end.)
- Is weight arm at the front? Are the weights touching each other?
- Is guide on the swivel set at the marker on the slider?

*Nursery rhymes, like "Mary had a little lamb", are good for recording because they are relatively clear when recorded and also easy to check when played back.

Let's Play it Back!

The sound is recorded as a groove carved onto the disk. You can play it back straight after recording.

- ① Push the knob and move the slider to the right end (the position shown in the figure).
- ② Move the weight arm and take the weight apart from one another.
- ③ Set the guide on the swivel at the marker on the slider, gently put the needle on the disk and turn on the switch.



Check the Following Points before the Playback

Is the slider at the right end?
(After the playback it moves to the left end.)

Is weight arm at the back,
away from the other weight?

Is the guide on the swivel set
at the marker on the slider?

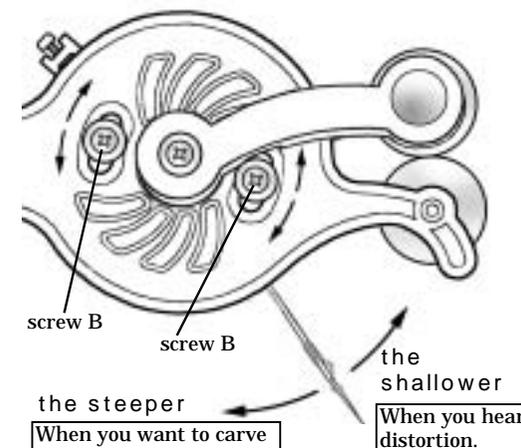
Notes for recording and playback

1. Regarding the recording time: This depends on the material used for recording, the position where the needle is put, and the remaining battery life. Usually it is between a minute and a minute and a half. (According to the editor's investigations, the disk rotates at approximately 80 revolutions a minute.)
2. Regarding the needle: The needle is a consumable. When it no longer functions, get a new one at a handicraft shop or equivalent, using the specifications on page 8. (According to the editor's investigations each needle will make and playback at least ten records even on hard surfaces like CD-ROMs.)
3. Regarding adjustments before recording: It is not necessary to make adjustments every time. However, it is necessary when the angle of the needle is changed, as explained on the next page.

How to Adjust the Angle of the Needle and How to Use Different Kinds of Disks

When it is impossible to record and replay, or when there is too much distortion, change the angle of the needle. (The normal position of the screw B's are at the center. Adjust the angle only when you have difficulty when recording or replaying.) Loosen the screw B's on the pickup arm and turn the cup holder a little. The angle of the needle can be changed a few degrees.

The steeper the angle between the needle and the disk, the more deeply the groove is carved, and the gentler, the shallower. Search for the right angle for each material, in order to record and replay with as little distortion as possible.



After adjusting the angle of the needle, check the position of the needle with the needle gauge before recording.

Let's Record on Various Materials!

Other than the disks in the kit, it's possible to record on almost any kind of flat plate, especially plastics. Try all sorts of things!

The lids on cup noodle soups



The lid of a wide bowl is suitable. Wash it well before use and pierce a hole in the center (for the shaft of the turntable) and then it's ready for use. Both sides are usable.

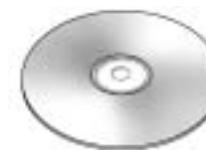
Plastic files

Draw a circle on a plastic file by drawing around a CD-ROM with a pen, then cutting it out. Pierce a hole in the center. Both sides are usable.

Magazine covers, glossy photographs, (glossy paper, and the like)

Coated paper such as the covers of magazines, glossy photographs and glossy paper can be used. However, there may be a lot of distortion since the needle tends to catch on the paper fibres. This can be reduced by setting a gentler angle for the needle.

CD-ROMs or music CDs



Caution: The scratched CD-ROMs may not be used for original purpose. Use disused one.

The reflective side (without the print) of unwanted CD-ROMs for computers or music CDs can be used.

Caution: Once scratched, CD-ROMs cannot be used for their original purpose. Use unwanted ones.

The others

Cut out a circle from a packet of potato crisps and pasting it onto a CD-ROM is just one the many ways of making a disk. What other things can you think of? Have fun!