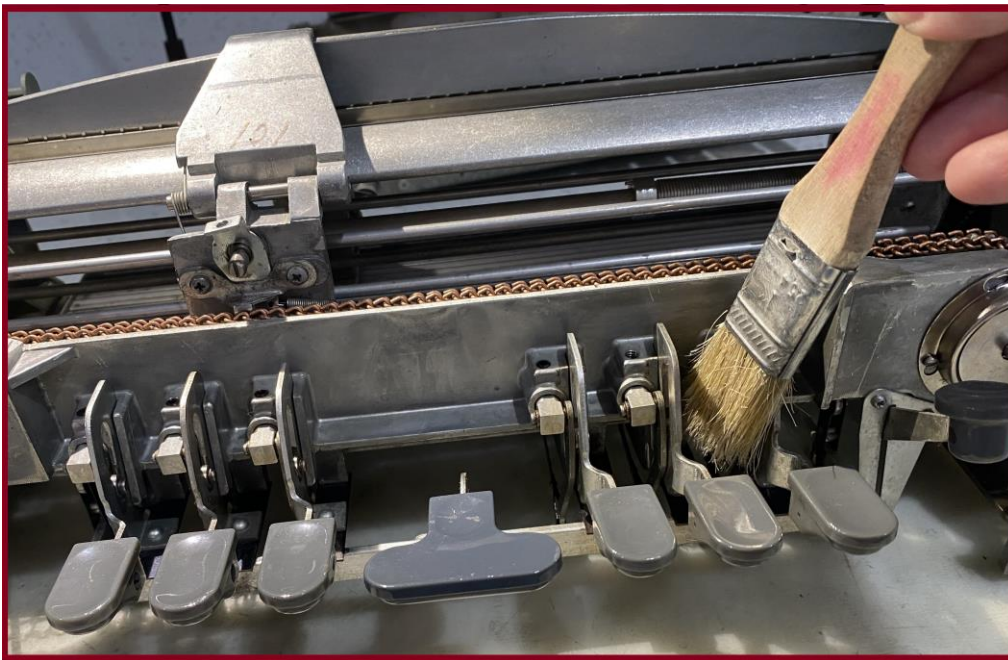




Texas School for the Blind and Visually Impaired  
1100 West 45th Street  
Austin, Texas 78756

# Braille Cleaner and Maintenance

## 2nd Edition



Amanda Storaasli

NLS Certified Braille Transcriber & Adapted Materials Specialist

Braille Repair Technician, Level II

[storaaslia@tsbvi.edu](mailto:storaaslia@tsbvi.edu)

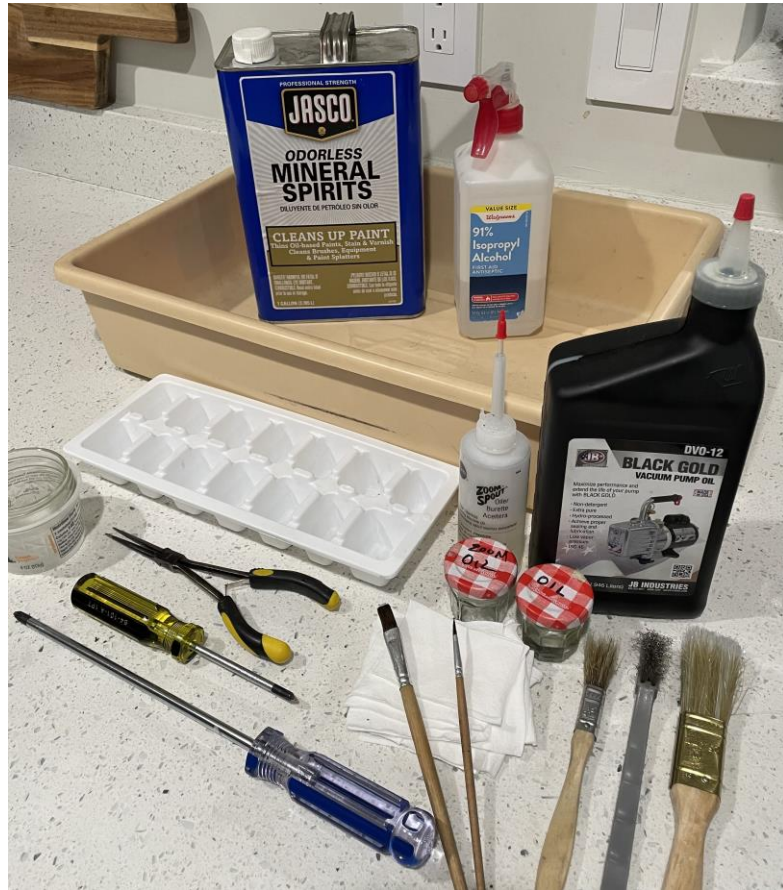
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# Braille Cleaning and Maintenance 2nd Edition

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# Braille Repair Tools and Supplies



- Mineral Spirits and/or Isopropyl alcohol, 99%
- Black Gold Vacuum Pump Oil  
(Amazon, Walmart.com)
- Sewing machine oil  
(Joann Fabrics, Wal-Mart)
- Large tub—at least 11 in x 16 in, plastic mat, or old towel
- Ice cube tray
- 2 small jars for oils
- 2 medium jars for mineral spirits and alcohol
- Lint-free cloth—old cut up t-shirts work great!
- #2 Phillips head screwdriver with 8 inch shank
- #1 Phillips head screwdriver
- Wire brush
- Large bent paperclip
- 2- small artist paintbrushes (one tiny) for applying oil
- 2- 1 inch chip brushes—One for dusting, one for washing.
- 1/2 inch chip brush or other small, stiff bristled artist paintbrush is great for getting into small crevices.

## Optional, but recommended:



- Needle-nose pliers for jewelry
- Dental tools
- Small flat head screwdriver
- 2 mm or 1/16 in Hex key or Allen wrench
- Extra screws, nuts, washers, springs, etc.!



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Support**

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# Diagnosing Issues

- Review the checklist provided.
- Note any malfunctions or issues observed during inspection.
- Use the repair log on page 29 of this manual to note your findings.

## Braille Inspection Check Sheet

Adapted from "Braille Inspection Check Sheet" by Sue Fowler & Jessica Zamarripa, 2021

1. Move the left and right stops on back cover to make sure they both slide freely.
2. Push down on the carriage knob and move the carriage unit left to right and back several times to make sure it slides freely.
3. Move the left paper guide and make sure the thumb wheel tightens down.
4. Release the pressure roller assembly and insert a sheet of paper. Feed the paper in and out checking for smooth operation.
5. Press down the line space lever making sure there are 25 lines on an 11.5" long sheet of paper. Also, observe if the line spacer lever response is weak. Slow, or sticking.
6. Place the carriage in home position (full left) and repeatedly press down all of the key levers and emboss across the sheet of paper, 40 cells.
7. Verify the end of line bell is clear and audible and make sure that it does not ring twice. Verify that the bell assembly doesn't cause the carriage to hang.
8. Check the dot quality of the cells across the entire sheet.

9. Place the carriage unit in home position and repeatedly press down the space bar to moving the carriage back across the width of the sheet.
10. Inspect the sheet to ensure there are no ghost dot impressions across the sheet.
11. Place the carriage unit in home position and Braille the alphabet across several rows of the sheet.
12. Check the dot quality.
13. With the carriage unit all the way to the right, repeatedly press down the back space lever to return it to home position. Verify that it needed 42 back space strokes to return the full width of the sheet and observe that there is no hesitation, slow or weak movement.
14. Make sure the backspace does not respond sluggishly or stick.
15. Make sure the screws are all in place. Check the knobs for cracks. Make sure the pressboard bottom cover and all eleven screws are in place. Check that all four rubber feet on the bottom are intact and relatively level.
16. Shake the Braille gently, to ensure there are no loose parts.
17. Inspect unit for overall cleanliness and wipe down if necessary.

# 1. Removing the Covers

**1.1. Bottom Cover.** Using your #1 Phillips screwdriver, remove the 11 screws from the bottom cover and place them in the first compartment of your ice cube tray.

**Figure 1.1** Bottom view of braille with covers on



**Figure 1.3** Top view with covers on



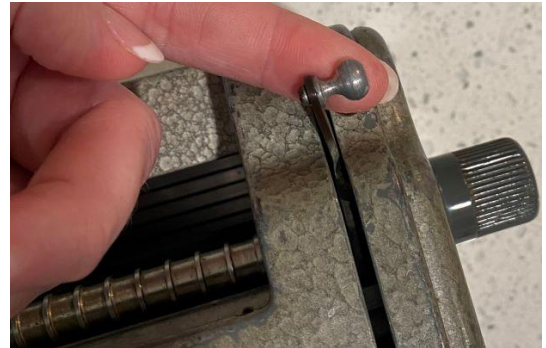
**1.3 Top Cover.** Using your #1 Phillips screwdriver, remove the Top Cover. Place the 4 larger, and 2 smaller screws in the next compartment of the ice cube tray.

**DO NOT REMOVE**

**SIDE COVERS**

**(unless you are a Level III+ Braille Repair Technician)**

**Figure 1.2** Paper release knob



**1.2 Paper Lever Knobs.** If present, unscrew the small knobs from the two paper release levers. Place them in the next compartment.

Ice cube tray with parts in it





**1.4. Paper Stop.** After removing the top cover, remove the paper stop from the groove on the braille's left side. Place it in the next compartment of the ice cube tray.

**Figure 1.4** Paper stop



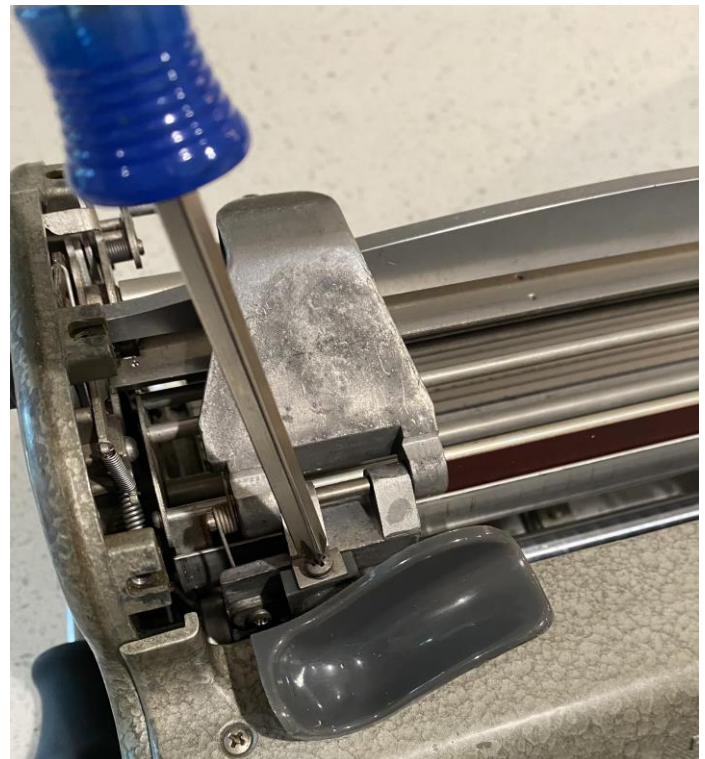
**Figure 1.5** Back view of braille with top cover off



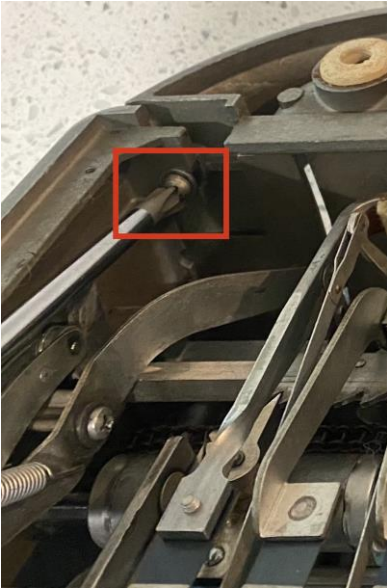
**1.5. Back Cover.** Using either Phillips head screwdriver, remove the back cover and place the 4 screws in the next compartment.

**Figure 1.6** Top view of braille with top cover off; close-up of carriage lever

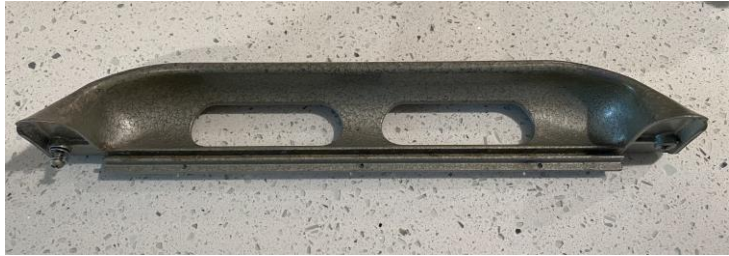
**1.6. Carriage Lever.** Using the #1 Phillips head screwdriver, remove the plastic carriage lever. Place the screw and washer in the next compartment along with the plastic lever.



**Figure 1.7.1** Interior bottom left view of apron



**Figure 1.7** Top view of Apron



**1.7.1. Apron: Part One** With the brailler turned upside down, and the front facing away from you, use the #2 Phillips screwdriver with 8 inch shank to remove the screw to the apron in the back left corner. Put the screw and washer in the next compartment of the ice cube tray.

**1.7.2 Apron: Part Two** Using the #2 screwdriver, half-way loosen the other apron screw, located in the back right corner. With your right hand, push the apron to the left and it will come free.

**Figure 1.7.2** interior bottom view showing apron screw locations





**1.8. Front Cover.** Using the #1 Phillips head screwdriver, remove the two screws from either side of the front cover. Place the two screws into the next compartment in the ice cube tray. Lift the front plate above the keys to remove.

### 1.9. Optional Square Nut Removal:

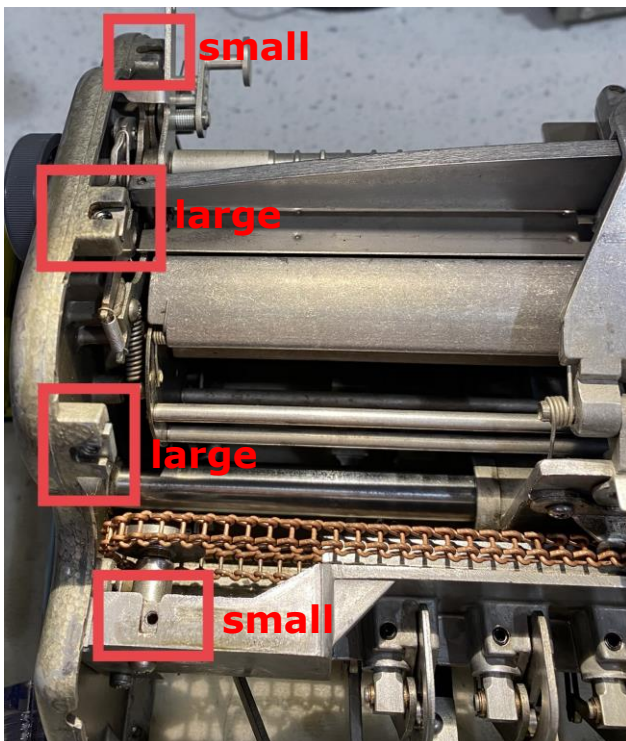
If the square nuts are loose, consider removing them before dusting & cleaning. If your braille is being cleaned in a plastic tub, this might not be necessary. If the nuts are secure with petroleum jelly or similar, you can leave them be. No need to clean them if they are still doing their job!

Using the needle nose pliers or a large bent paperclip, remove the 10 square nuts. There are 6 large, and 4 small. Place them in two different compartments so as not to confuse them later.

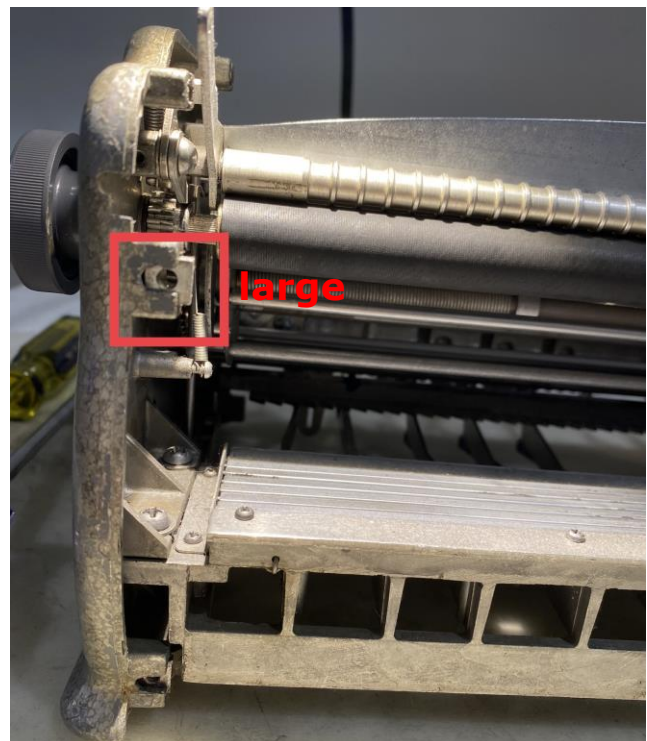
**Figure 1.8** Top view, removing front cover



**Figure 1.9.1** Interior front view highlighting nut locations



**Figure 1.9.2** Interior left back view highlighting nut location



## 2. Dusting

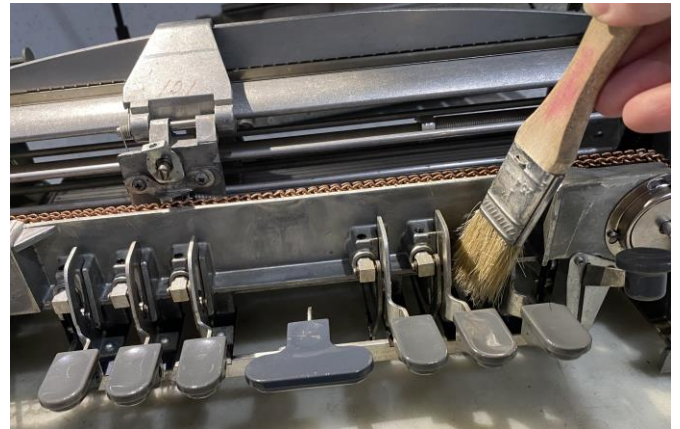
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**2.1.** With the front of the braille facing you, dust the braille from top to bottom with the 1 inch chip brush. Be thorough; get into all the nooks and crannies!

**Figure 2.1.1** Interior top view



**Figure 2.1.2** Interior front view



**2.2.** Next, turn the braille on its back with the bottom facing you. Dust the bottom of the braille, trying to reach everything that you could not reach from the top.

**Figure 2.2** Interior bottom view



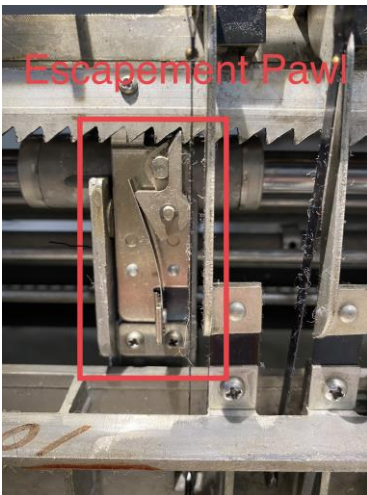


## 3. Cleaning

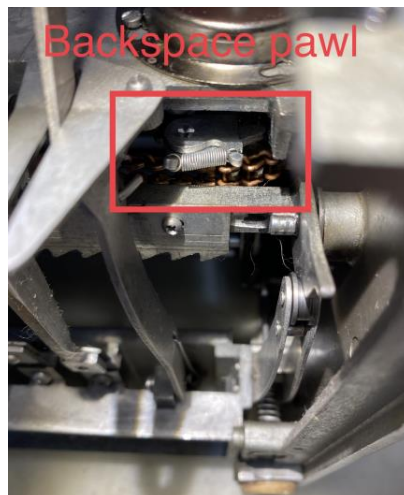
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**3.1.** Clean the 1-inch chip brush by swirling it in the jar of mineral spirits. When it is cleaned off, use the brush and either the mineral spirits or the alcohol to clean the brailler, starting at the top and working your way down. Pay special attention to areas that are particularly dirty or are not functioning properly.

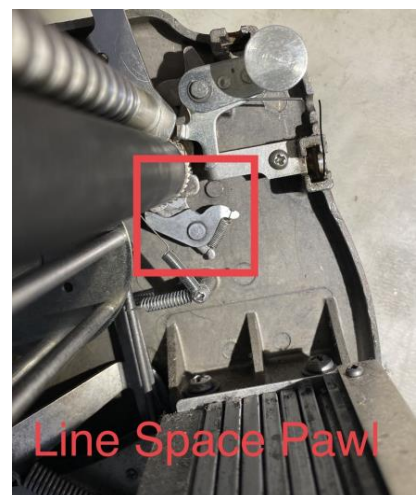
**Figure 3.1.1** Interior bottom view: escapement pawl



**Figure 3.1.2** Interior bottom view, right side: backspace pawl

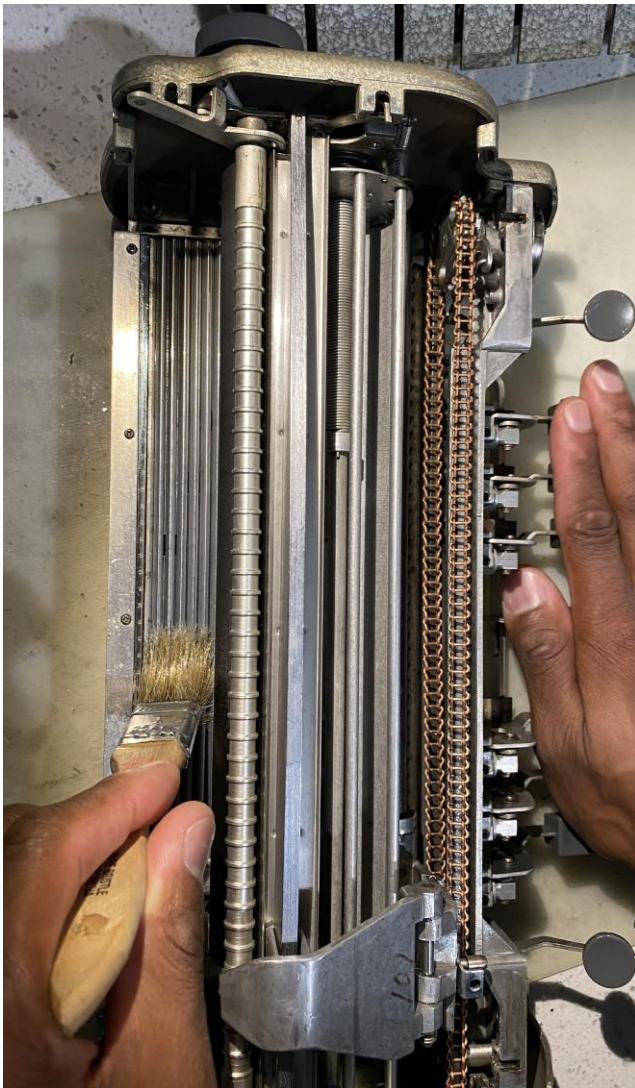


**Figure 3.1.3** Interior back view right inner side: line space pawl



- 3.2** Clean the cam rods in the back. First, in their flat position, scrub them with the chip brush. Use a wire brush if they are very dirty. Then, with your non-dominant hand, press all six keys down to engage all of the cam rods, and repeat the cleaning process while engaging the cam rods.

**Figure 3.2** Interior top view. Cam rods run vertically on the right side of the photo.



- 3.3** Clean the bell located on the back plate that you removed in step 1.5. This is especially important if the bell does not make a sound when the carriage head reaches the end of the line.

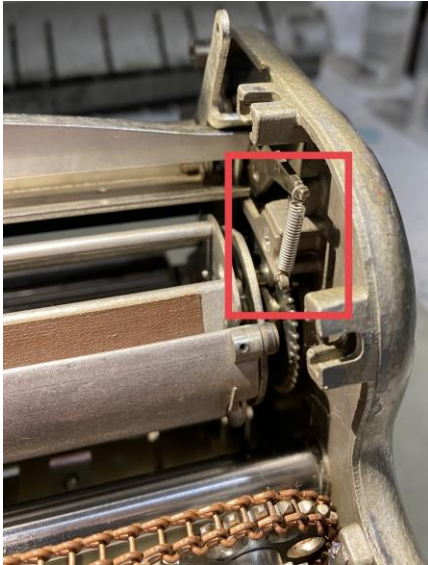
**Figure 3.3** Inside view of back plate: bell assembly



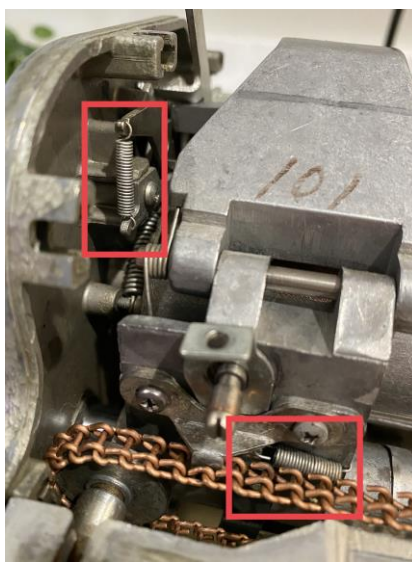


**3.4** Let the braille dry for about 10 minutes. During this time, you can check that there are no loose or missing springs. Reattach loose springs and if needed, ask for replacements for missing or broken springs.

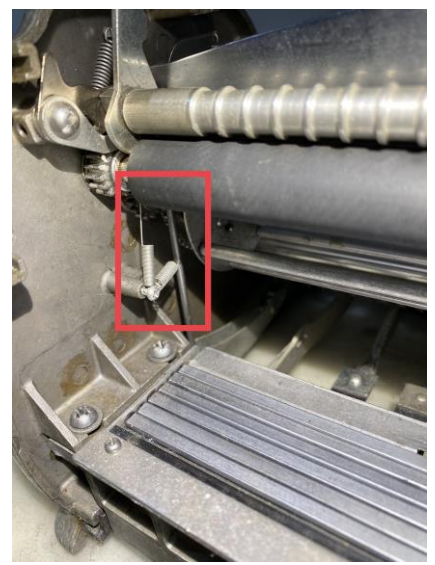
**Figure 3.4.1** Interior right front view



**Figure 3.4.2** Interior left front view



**Figure 3.4.3** Interior left back view



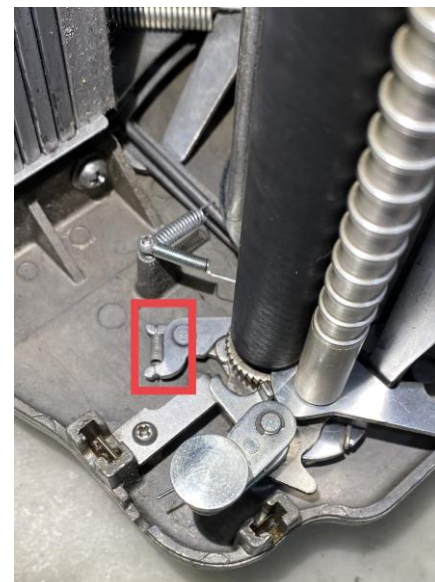
**Figure 3.4.4** Interior right back view



**Figure 3.4.5** Interior right bottom/front view



**Figure 3.4.6** Interior right back view with line space key partially depressed



*After 10 minutes use a clean cloth to dry any areas of the braille that are still damp.*

*When the braille is clean and dry, use this Braille Inspection Check Sheet to ensure all areas of the braille are functioning properly before reassembling. If something is still not working correctly, ask for help or mess around with it until it does.*

## **Braille Inspection Check Sheet**

**for use when covers are off**

Adapted from "Braille Inspection Check Sheet" by Sue Fowler & Jessica Zamarripa, 2021

- Replace grey plastic carriage lever. Push down on the carriage lever and move the carriage unit left to right and back several times to make sure it slides freely.
- Release the pressure roller assembly and insert a sheet of paper. Feed the paper in and out checking for smooth operation.
- Press down the line space lever making sure there are 25 lines on an 11.5" long sheet. Also, observe if the line spacer lever response is weak. Slow, or sticking.
- Place the carriage in home position (full left) and repeatedly press down all of the key levers and braille "full cells" across the width of the sheet
- Check the dot quality of the cells across the entire sheet.
- Place the carriage unit in home position and repeatedly press down the space bar to moving the carriage back across the width of the sheet.
- Inspect the sheet to ensure there are no ghost dot impressions across the sheet.
- Place the carriage unit in home position and braille the alphabet across several rows of the sheet.
- Check the dot quality.
- With the carriage unit all the way to the right, repeatedly press down the back space lever to return it to home position. Verify that it needed 42 back space strokes to return the full width of the sheet and observe that there is no hesitation, slow or weak movement.
- Make sure the backspace does not respond sluggishly, stick, or skip.



## 4. Lubricating

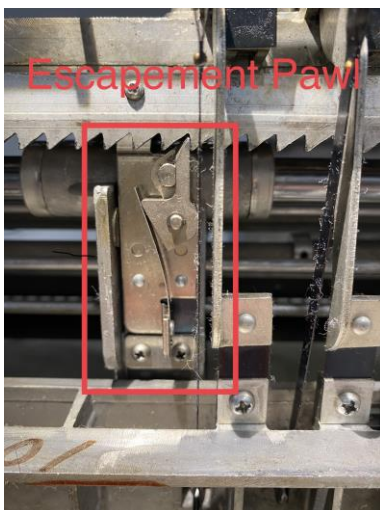
4.1 There are just **four areas** on the braille that need to be lubricated:

- 4.1.1 **Carriage tube**: 3 drops sewing machine oil
- 4.1.2 **Cam rods**: sewing machine oil on flat artist's paintbrush
- 4.1.3 **All six key levers**: vacuum pump oil on a small round artist's paintbrush
- 4.1.4 **Left and right grooved rollers**: vacuum pump oil on a small round artist's paintbrush

Use the two smaller paintbrushes as appropriate for lubricating the braille. Sewing machine oil is a suitable replacement for the watch oil needed for the carriage tube. It will also work for the cam rods which require clock oil. I use Black Gold Vacuum Pump Oil in place of Aeroplate grease, but different lubricants and solvents can react differently depending on the climate. For reference, I am in Central Texas.

**Be careful not to get oil on any of the three pawls!**

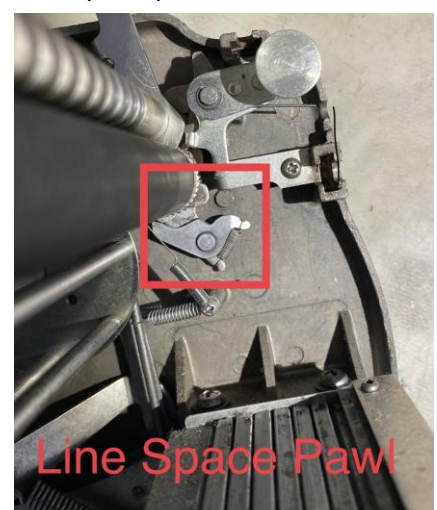
Interior bottom view- escapement pawl



Interior bottom view, right side-backspace pawl



Interior back view right inner side-line space pawl



**4.1.1 Carriage tube:** Put the plastic carriage lever back on the machine, and apply three drops of sewing machine oil or watch oil along the length of the carriage tube. This is the smooth, shiny steel tube that the carriage assembly slides across left and right. Then, move the carriage back and forth, all the way to the left and all the way to the right, several times to ensure even distribution of the lubricant.

**Figure 4.1.1** Demonstration of sewing machine oil application to carriage tube.

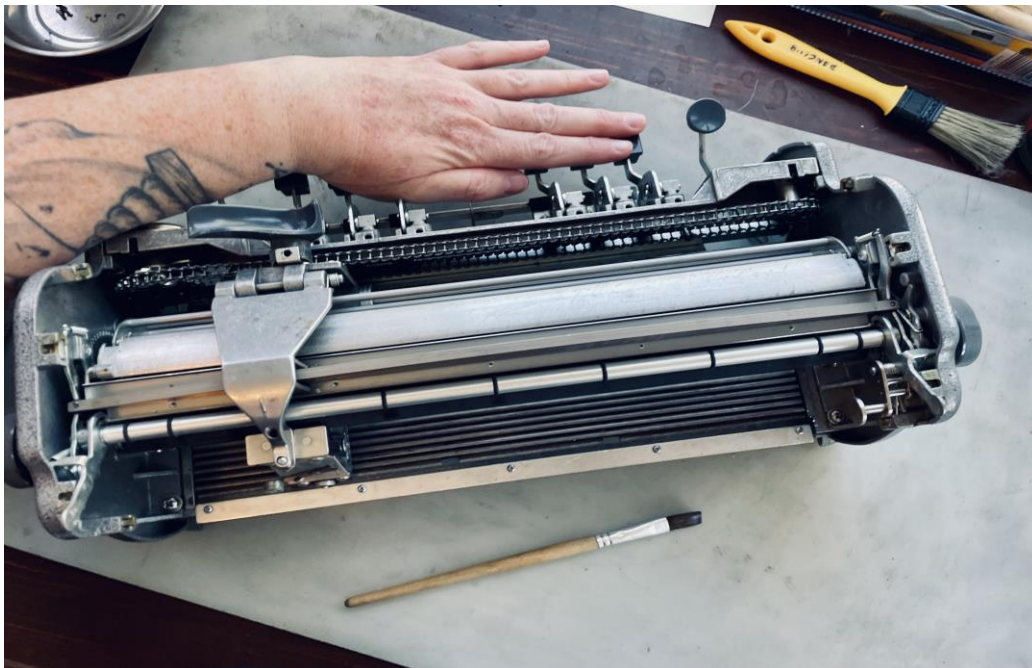




**Figure 4.1.2** Top interior view. Oil is applied to the length of the cam rods.



**4.1.2 Cam rods:** Dip a flat artist's brush into sewing machine oil or clock oil (squirt a small amount of oil into a small jar or plastic cup). Brush a small amount of oil onto the length of the six cam rods, moving the carriage assembly out of the way as needed. Then repeat this with all six dot keys depressed (engaging the cam rods) as shown in the bottom picture.



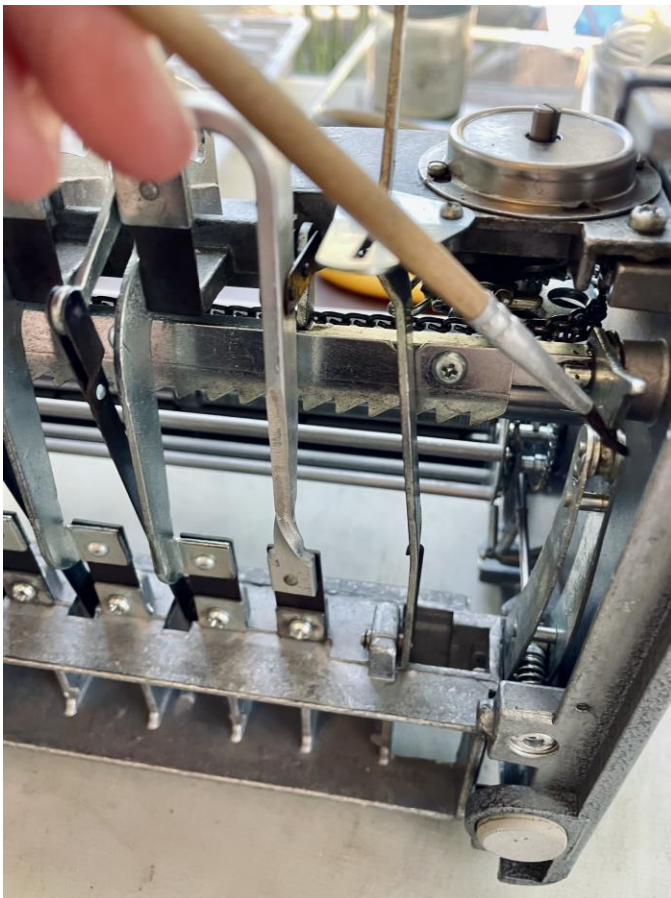
**Figure 4.1.2a** Front interior view. Oil is applied to the cam rollers with a small brush.

**4.1.3 All six key levers** Using the small round artist brush, Apply a bit of vacuum pump oil or Aeroplate grease to the top of each cam roller.

**Figure 4.1.3** Front-right interior view .  
Oil is applied to the top of each cam roller.



**Figure 4.1.4** Bottom interior view. Oil is applied to the grooved roller with a small brush.



**4.1.4 Left and right grooved rollers** Using the small round artist brush, Apply a bit of vacuum pump oil or Aeroplate grease to both grooved rollers.



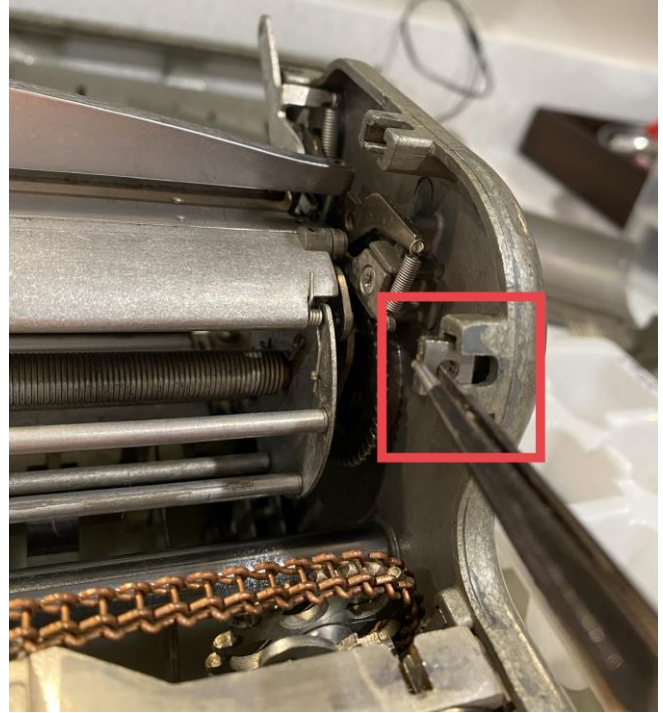
## 5. Reassembly

**5.1 Replace any square nuts** that have been removed or fallen out. Skip this page if they are all still intact.

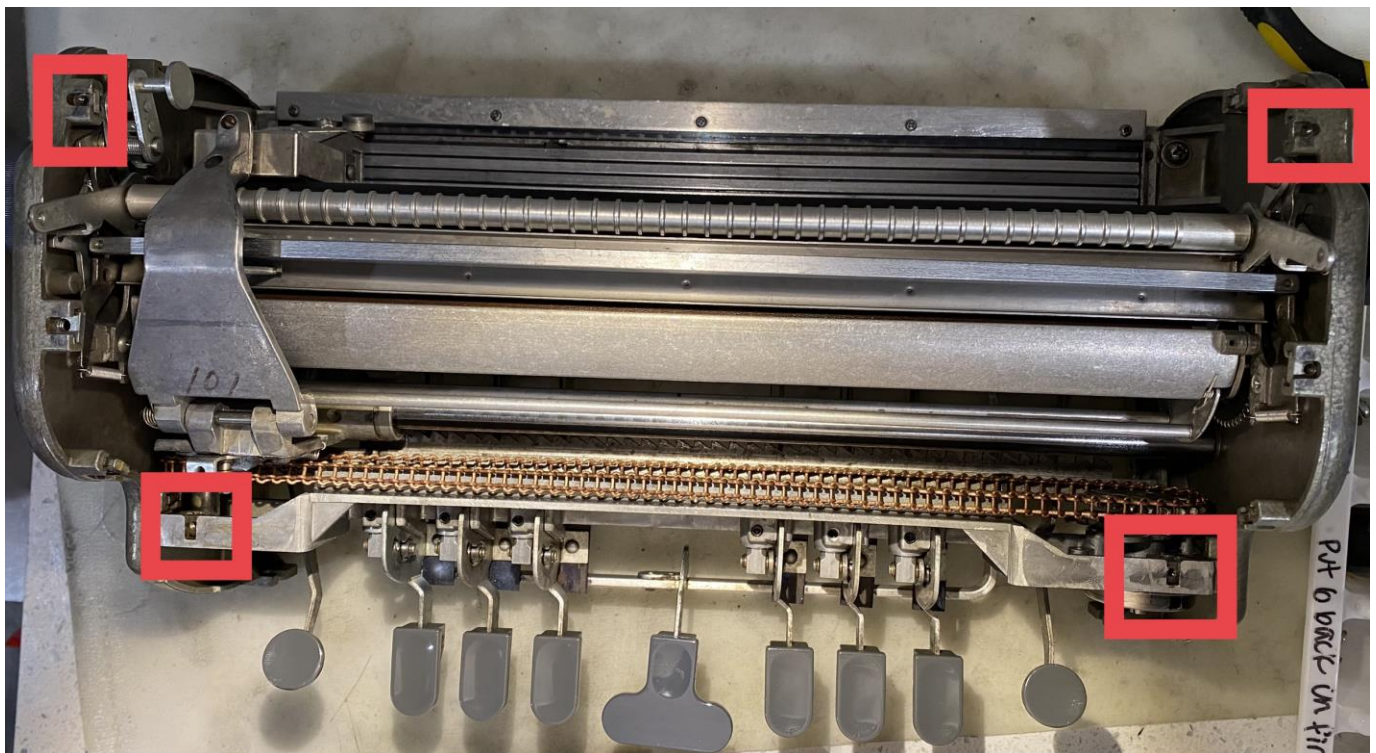
**5.1.1** Using needle-nose pliers or a bent paperclip, place the square nuts (4 small, 6 large) back into their spaces.

**5.1.2** Use the picture below as a guide for placing the small nuts back in the correct spaces. The large ones go in the six remaining spaces.

**Figure 5.1.1** Front right interior view of needle-nose pliers replacing a large square nut.



**Figure 5.1.2** Top interior view with red squares indicating where the four small square nuts should be placed.





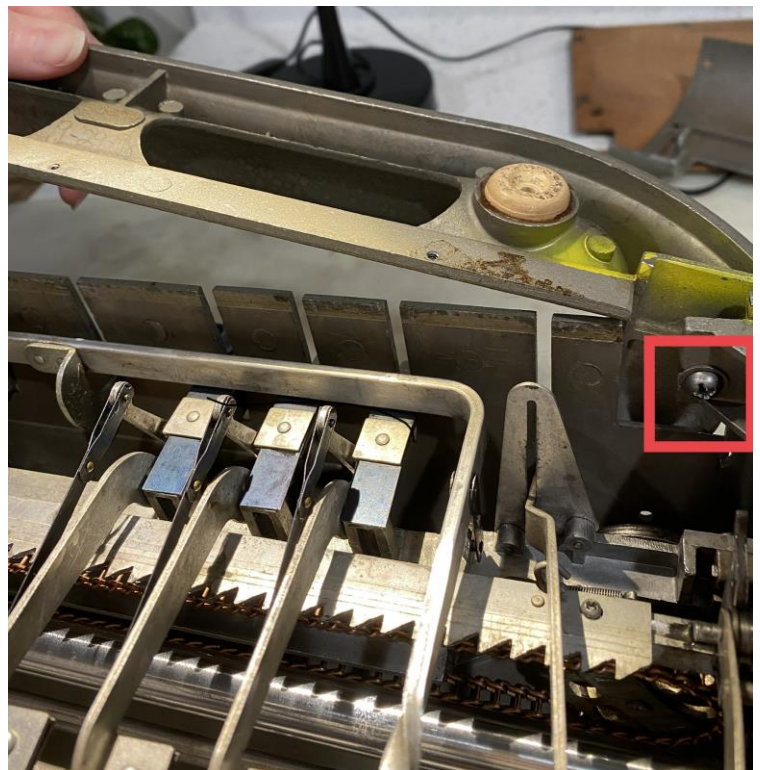
**5.2. Replace the front plate.** Slide the front plate over the keys, and use the last two screws that you put into the ice cube tray to secure the front plate.

**Figure 4.2** Front view



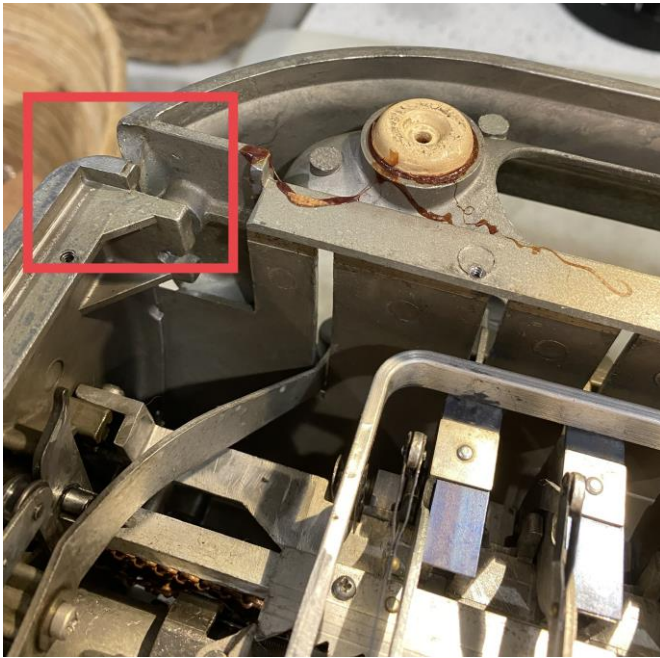
**Figure 5.3** Interior bottom view of right apron screw

**5.3 Replace the apron.** Turn the brailler upside down with the front of the brailler facing away from you. Grab the apron and slide the screw into the slot as shown in the picture.



**5.3.1 Replace the Apron.** Note in the first picture below, that the apron is not aligned with the front corner of the brailler. Use your fist, (seriously) as shown to smash the apron into place. Note in the second photo that the two pieces are now joined properly.

**Figure 5.3.1.1** Bottom interior view of front before smashing apron into place



**Figure 5.3.1.2** Bottom interior view of front after smashing apron into place



**5.3.2** Using the #2 screwdriver with the 8-inch shank, loosely fasten the screw on the other side. Then alternate tightening each side until both are securely fastened. Be sure the washer is next to the screw head, not back behind the slot on the front of the brailler.

Be sure not to tighten these screws too much as this can warp the front plate causing the brailler to malfunction.



**5.4 Replace the plastic carriage knob.** Fit the knob onto the pin. Be sure it fits snug. Do this by lightly pushing the plastic knob toward the back of the brailler and gently pushing the metal plate above it to the right **until it clicks into place**. Ask for assistance if needed.

Failing to do this step can often cause the knob to rub against the top cover and can also cause the backspace mechanism to malfunction.

**Figure 5.4.1 Incorrect placement of plastic knob.**



**Figure 5.4.2 Correct placement of plastic knob.**





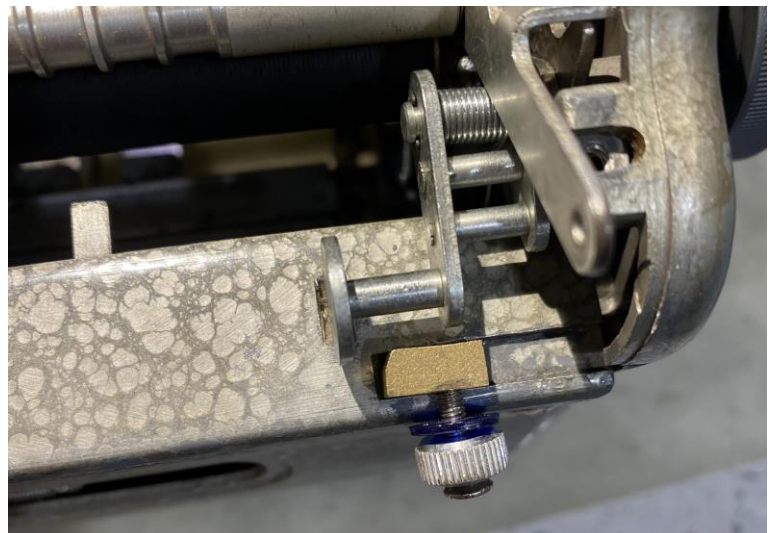
**Figure 5.5** Back cover



**5.5 Replace the back cover.** Place the back cover in its place ensuring that **the tail from the paper check spring on the right, is tucked underneath the back cover.**

**The paper will roll into the machine if you forget this step.**

**Figure 5.6** Top view of Back cover with paper stop resting in its groove



**5.6. Replace the paper stop.** Set the paper stop in its groove, with the curved side facing inward, as shown in the picture.

**Figure 5.7** Top view of Top cover



### 5.7 Replace the top cover.

Using the #1 screwdriver, fasten the four large screws and two small screws until they are tight.

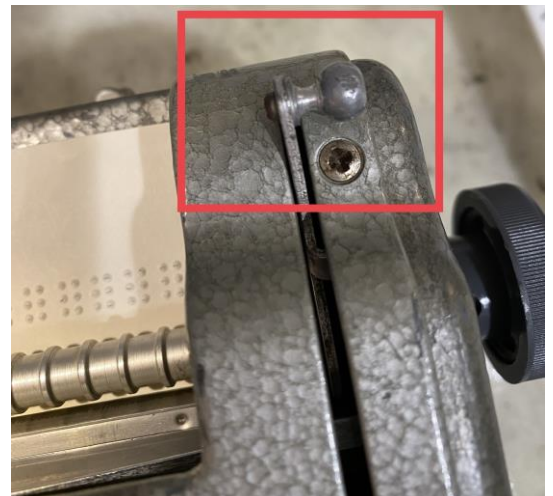
**Figure 5.8** View of Bottom cover being reattached to Perkins brailleur



### 5.8 Replace the bottom cover.

Using the #1 screwdriver, fasten the remaining screws to the bottom cover. You can fasten them loosely at first to ensure they all align properly, and adjust the back plate or apron if needed.

**Figure 5.9** Top view of metal knob on right lever



### 5.9 Replace metal knobs.

If present, replace the metal knobs as shown. Tighten slightly with the #1 screwdriver.

# Final Braille Inspection Check Sheet

Adapted from "Braille Inspection Check Sheet" by Sue Fowler & Jessica Zamarripa, 2021

1. Move the left and right stops on back cover to make sure they both slide freely.
2. Push down on the carriage knob and move the carriage unit left to right and back several times to make sure it slides freely.
3. Move the left paper guide and make sure the thumb wheel tightens down.
4. Release the pressure roller assembly and insert a sheet of paper. Feed the paper in and out checking for smooth operation.
5. Press down the line space lever making sure there are 25 lines on an 11.5" long sheet of paper. Also, observe if the line spacer lever response is weak. Slow, or sticking.
6. Place the carriage in home position (full left) and repeatedly press down all of the key levers and emboss across the sheet of paper, 40 cells.
7. Verify the end of line bell is clear and audible and make sure that it does not ring twice. Verify that the bell assembly doesn't cause the carriage to hang.
8. Check the dot quality of the cells across the entire sheet.
9. Place the carriage unit in home position and repeatedly press down the space bar to moving the carriage back across the width of the sheet.
10. Inspect the sheet to ensure there are no ghost dot impressions across the sheet.
11. Place the carriage unit in home position and Braille the alphabet across several rows of the sheet.



12. Check the dot quality.
13. With the carriage unit all the way to the right, repeatedly press down the back space lever to return it to home position. Verify that it needed 42 back space strokes to return the full width of the sheet and observe that there is no hesitation, slow or weak movement.
14. Make sure the backspace does not respond sluggishly or stick.
15. Make sure the screws are all in place. Check the knobs for cracks. Make sure the pressboard bottom cover and all eleven screws are in place. Check that all four rubber feet on the bottom are intact and relatively level.
16. Shake the Braille gently, to ensure there are no loose parts.
17. Inspect unit for overall cleanliness and wipe down if necessary.

### **A Note About Electric Brailers:**

You can work on an electrical braille in a similar manner as you would a regular Perkins braille, just be cautious to **avoid getting any liquids on the electrical components**. In my experience, it is not usually the electric components that are in need of repair, but the braille's mechanical components. I use a very small amount of rubbing alcohol on an old shirt to clean targeted sticky or stiff mechanical components that I have determined to be causing issues. I don't do a whole general cleaning like I normally would, unless the electric braille really needs it. **Always be sure the electric braille is unplugged and powered off during cleaning, repairs, and lubrication. Be sure the braille is completely dry before plugging back in to test it.**

# Brailler Repair Log

Date/Location	Serial Number or Identifying Features	Issues	Repair Notes	Repaired?
Belongs to which classroom, school district, student, teacher, etc.	Unimanual? Large Cell? Electric?  (Always use serial number on front or bottom of apron, if present.)		Cleaned? Oiled? Tightened something? Replaced something? Tweaked something?	

# Brailler Repair Log

Date/Location	Serial Number or Identifying Features	Issues	Repair Notes	Repaired?



# Braille Repair Log

Date, Location/Owner	Serial Number or Identifying Features	Issues	Repair Notes	Repaired?

For questions or comments, please contact:

Amanda Storaasli

NLS Certified Braille Transcriber & Adapted Materials Specialist  
Braille Repair Technician, Level II

Texas School for the Blind and Visually Impaired  
1100 West 45th Street  
Austin, Texas 78756

Email: [storaaslia@tsbvi.edu](mailto:storaaslia@tsbvi.edu)

Work Phone: 512-206-9261

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