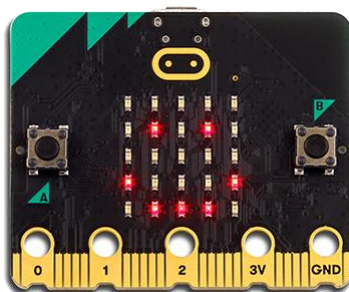




Part Image

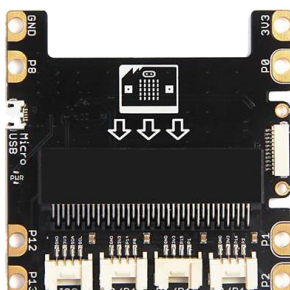
Description

Reference Link



BBC micro:bit

Reference [here](#). These are available from many different retail stores.



Grove micro:bit
expansion shield

Reference [here](#). These are available from many different retail stores.



Grove Sweep Servo. **Do not purchase a continuous 360° Servo for this project.**

Reference [here](#). These are available from many different retail stores.



USB mini OTG to micro cable. This cable is the same as the one supplied with the TI Bluetooth Adapter.

You can request a TI cable [here](#) by filling out the request form. These cables are also available from many different retail stores. However, there are different types of this cable. It must be **mini OTG** to work with micro:bit.



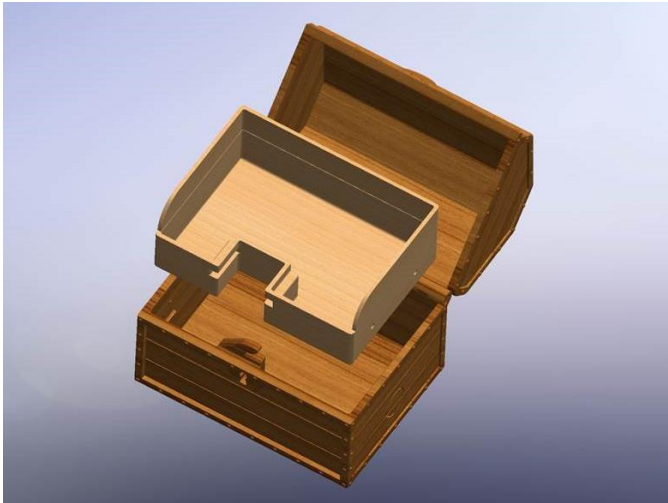
Rechargeable external USB battery with USB A to micro power cable. This cable typically comes with a battery.

Reference [here](#). These are available from many different retail stores.

Treasure Chest 3D Printing Instructions

1. **Chest.stl** is the bottom and top of the chest that print as one part. With a successful print, the top and bottom of the chest should have a freely moving hinge right off the printer.
2. **Tray.stl** is the drop-in tray that holds the sweep servo
3. Print settings
 - a) 0.2mm layer lines
 - b) 3 to 4 shells
 - c) 10 to 20% infill
 - d) Material PLA
 - e) TIP: Ensure your printer is well-calibrated and has minimal hairs and zits. These issues could cause the "print in place" hinge on the chest to fuse.

Assembly Instructions:



*

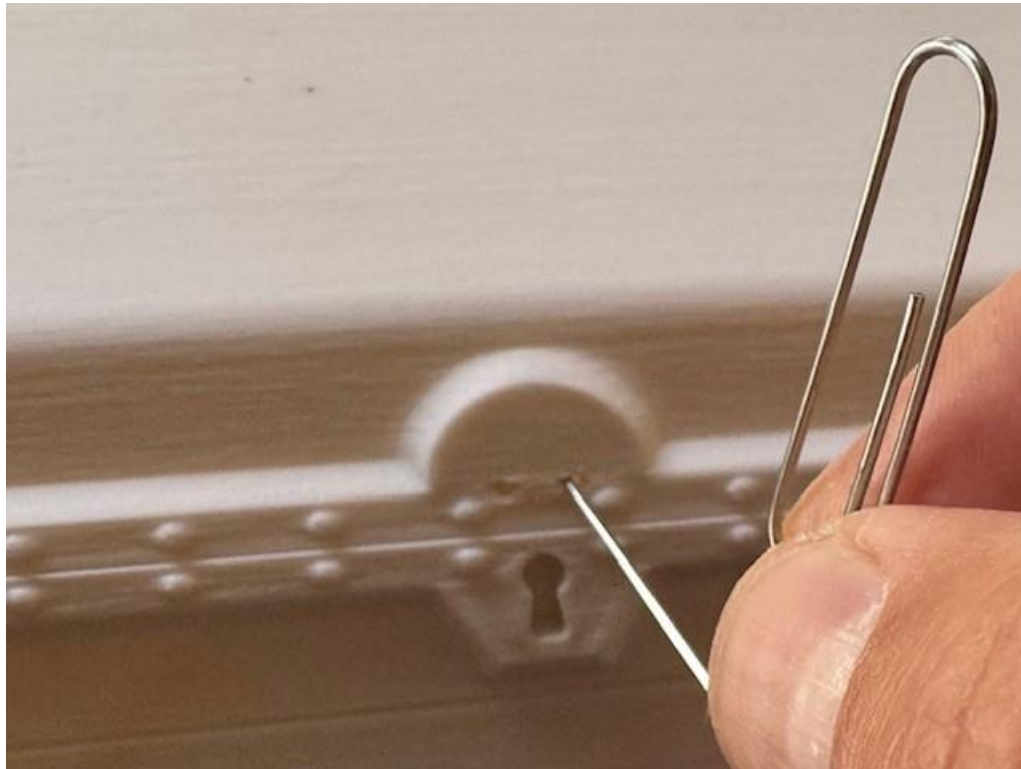
*Note: Refer to the image above and right as a visual aid to these assembly instructions.

1. Insert micro:bit card face-up in the Grove expansion shield.
2. Insert Grove servo cable in the P1/P15 receptacle on the Grove expansion shield.
3. Place the assembly in the bottom of the treasure chest. Mind the routing of the cable.
4. Slide the servo, without the horn attached, into the tray with the shaft offset to the right.
5. Turn on your TI-84 Plus CE Python. Insert the micro:bit calculator cable through the hole on the right side of the chest. You will need to pop out the plastic disk on the first assembly. Insert the micro end into the top of the micro:bit. Attach the opposite mini end to the USB port on the side of the calculator, and the Texas logo should display on the 5x5 LED display.
6. Insert the USB power cable through the hole on the back side of the chest. You will need to pop out the plastic disk on the first assembly. Insert the USB micro end of the power cable into the micro USB connector on the left side of the Grove expansion shield. Attach the other end, USB A, into the external battery and turn it on.
7. Place the tray and servo into the chest. You may need to wiggle it from side to side until the front edges are flush.
8. Open "servo_7.py" in the editor. Notice that the code has two functions: lock() and unlock().
9. Run the program, then press the [var] key to access the lock() and unlock() functions. Run each program alternately to see the shaft turn back and forth. If it does not, be sure the external battery is turned on. Before proceeding to the next step, run unlock() to position the shaft correctly for mounting the horn in the next step.
10. Select the small horn that came with the servo and gently press it onto the shaft, as shown in the image above. Use the very smallest supplied screw to secure the horn to the shaft.
11. If the horn engages the latch too much, you may hear the motor hum; if so, edit the parameter in the servo() function to a slightly larger value, e.g., servo(25). Adjust these numbers until the servo operates as required to lock and unlock the chest.

12. Optionally, place a small binder clip on the back of the tray, as shown in the image on the “Pick the Lock” activity. This serves as a spring to pop open the lid when unlocked.
13. You are now ready to pick the lock!



Note: If your chest becomes locked and you need to open it by picking the lock the old-fashioned way, remove the external battery and disconnect the calculator. Insert a paperclip into one of the two small holes in the lid above the keyhole, and push the servo horn into the unlocked position to release the lid.



Files

- Transfer the activity files listed below to your calculator using the TI Connect CE Software. The link to download is [here](#).

Name	Description
Servo_7.py	Tune the servo to rotate the latch to the open and locked positions.